

Don Rerick

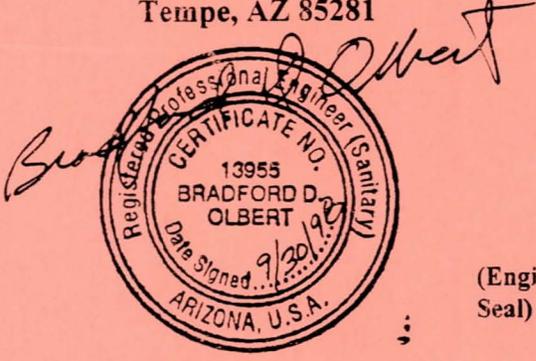
CONSTRUCTION SPECIFICATIONS

FOR

CONTRACT FCD 98-15

**BULLARD WASH CHANNEL IMPROVEMENTS PROJECT AND
ESTRELLA PARKWAY (BID CANAL TO YUMA ROAD)
IMPROVEMENTS PROJECT
PCN 4700731**

**Sverdrup Civil, Inc.
637 South 48th Street, Suite 101
Tempe, AZ 85281**



(Engineer's Seal)

Prepared For

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Recommended by: *Edward A. Raleigh* Date: 10/1/98
Edward A. Raleigh, P.E.
Manager Engineering Division

Issued for Public Bidding by: *Michael S. Ellegood* Date: 10.1.98
for Michael S. Ellegood, P.E. *Deputy*
Chief Engineer and General Manager

SUPPLEMENTARY TO MARICOPA ASSOCIATION OF GOVERNMENTS UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION EDITION OF 1998 AND REVISIONS AND SUPPLEMENTS THERETO.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY**Bullard Wash Channel Improvements and
Estrella Parkway – BID Canal to Yuma Road Project****FCD 98-15****ADDENDUM NO. 2****November 9, 1998****Contract FCD 98-15****To Contract Documents****Title:** Bullard Wash Channel Improvements and
Estrella Parkway – BID Canal to Yuma Road Project**Owner:** Flood Control District of Maricopa County

This Addendum No. 2 modifies or clarifies Contract FCD 98-15. All other provisions of the contract remain unchanged unless specifically modified herein. The Addendum No. 2 forms a part of the Contract Documents and modifies them as follows:

I. Revisions to Bidding Schedule**1. Page 12A of 33**

Bid Item 505.02000 – Steel Reinforcement (Bridge); Change the quantity from 202,782 LB to 187,536 LB.

Bid Item 505.03000 – Portland Cement Concrete (Bridge), Class AA; Change the quantity from 960 CY to 1,045 CY.

Bid Item 505.04000 – Portland Cement Concrete (Bridge) Class A; Change the quantity from 165 CY to 152 CY.

II. Revisions to Supplementary General Conditions

Not applicable to Addendum No. 2.

III. Revisions to Special Provisions

Not applicable to Addendum No. 2.

IV. Revisions to Construction Plans

1. Estrella Parkway Improvements, Sheet 107 of 150

Replace the Approximate Quantities table with the table shown below.

APPROXIMATE QUANTITIES				
	Class 'A' Concrete f'c = 3000 C.Y.	Class 'AA' Concrete f'c = 4000 C.Y.	Reinf. Steel lbs.	36" Diam. Drilled Shafts Lin. Ft.
Abutment # 1		109	7,565	90
Pier # 1	10	20	14,267	120
Pier # 2	10	20	14,267	120
Abutment # 2		109	7,565	90
Superstructure		787	124,695	
Bridge Barrier	20		1,805	
Approach Slabs	112		17,372	
Total	152	1,045	187,536	420
As-Built Total				

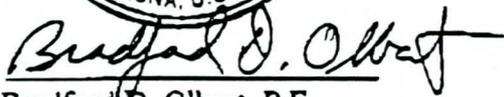
Note that the due date of all bids under this Invitation For Bids has been changed from November 6, 1998 at 2:00 pm to November 12, 1998 at 2:00 pm. Bidders are reminded that each addenda must be acknowledged on page 5 of 33 of the bid and a copy of addenda attached to the bid package.

FLOOD CONTROL DISTRICT
 OF MARICOPA COUNTY

Sverdrup Civil, Inc.



By: 
 Michael S. Ellegood, P.E.
 For Chief Engineer and General Manager

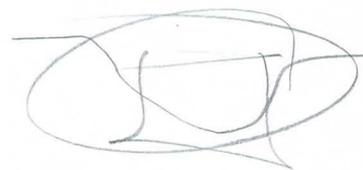
By: 
 Bradford D. Olbert, P.E.
 Project Manager

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Bullard Wash Channel Improvements and
Estrella Parkway – BID Canal to Yuma Road Project
FCD 98-15

ADDENDUM NO. 1

November 5, 1998



Contract FCD 98-15

To Contract Documents

Title: Bullard Wash Channel Improvements and
Estrella Parkway – BID Canal to Yuma Road Project

Owner: Flood Control District of Maricopa County

This Addendum No. 1 modifies or clarifies Contract FCD 98-15. All other provisions of the contract remain unchanged unless specifically modified herein. The Addendum No. 1 forms a part of the Contract Documents and modifies them as follows:

I. Revisions to Bidding Schedule

1. Page 7 of 33

Bid Item 505-4 – Concrete Channel Lining; Change the quantity from 21,115 SY to 20,728 SY. The existing Bid Schedule page 7 will be replaced with revised Bid Schedule page 7A attached to and made a part of this Addendum No. 1.

2. Page 10 of 33

For Bid Item 401.01100 – Uniformed Off-Duty Law Enforcement Officer; Insert the amount of \$8,000.00 in the unit price column and the extended amount column of the bid schedule.

3. Page 9, 10, 11, 12, 13, and 14 of 33

The City of Goodyear, Arizona has requested that additional improvements be made to the roadway portion of the project near the intersection of Estrella Parkway and Yuma Road. These additional improvements include intersection improvements for a future six-lane “loop road” located at the quarter mile points north, east, south, and west of the Estrella Parkway and Yuma Road intersection. The improvements will include a new bid item for bus bays, and will cause an increase in quantities for other already existing bid items. It is anticipated that revised plans and specifications incorporating these changes will be provided to the Contractor at the Pre-Construction and Partnering meeting. The following quantity revisions are provided for bidding purposes in support of these changes.

The existing Bid Schedule pages 9, 10, 11, 12, 13, and 14 will be replaced with revised Bid Schedule pages 9A, 10A, 11A, 12A, 13A, and 14A attached to and made a part of this Addendum No. 1.

Bid Item 205.08000 – Roadway Excavation; Change the quantity from 35,702 CY to 41,731 CY.

Bid Item 215.08100 – Earthwork for Dirt Irrigation Ditches; Change the quantity from 5,161 CY to 5,291 CY.

Bid Item 301.07000 – Subgrade Preparation; Change the quantity from 214,220 SY to 223,985 SY.

Bid Item 309.08000 – Lime Slurry with Fly Ash Stabilization; Change the quantity from 44,729 CY to 45,904 CY.

Bid Item 310.03161 – Aggregate Base Course; Change the quantity from 74,842 TON to 77,919 TON.

Bid Item 315.03000 – Bituminous Prime Coat (Contingent Item); Change the quantity from 286.2 TON to 293.8 TON.

Bid Item 321.03940 – Asphalt Concrete (19mm); Change the quantity from 47,249 TON to 49,434 TON.

Bid Item 329.03000 – Bituminous Tack Coat; Change the quantity from 35.7 TON to 36.6 TON.

Bid Item 333.03100 – Fog Seal Coat (Contingent Item); Change the quantity from 286.4 TON to 294.0 TON.

Bid Item 340.04205 – Curb and Gutter (MAG Std. Det. 220, Type A); Change the quantity from 31,539 LF to 41,678 LF.

Bid Item 340.05400 – Alley Entrance (MAG Std. Det. 260); Change the quantity from 360 SF to 735 SF.

Bid Item 350.04210 – Removal of Existing Concrete Lined Ditches; Change the quantity from 11,383 LF to 9,297 LF.

Bid Item 350.07500 – Removal of Existing Pavement; Change the quantity from 102,931 SY to 102,929 SY.

Bid Item 402.04100 – 2 ½" PVC Conduit; Change the quantity from 2,641 LF to 2,664 LF.

Bid Item 402.04140 – 4" PVC Pipe Sleeve; Change the quantity from 1,154 LF to 1,151 LF.

Addendum No. 1
Contract FCD 98-15
Page Three

Bid Item 405.00121 – Install Survey Monument (MAG Std. Det. 120-1, Type A); Change the quantity from 2 EA to 6 EA.

Bid Item 415.10001 – Guardrail GET-1 (ADOT Std. Det. C-10.40); Change the quantity from 2 EA to 1 EA.

Bid Item 415.10002 – Guardrail GET-2 (ADOT Std. Det. C-10.41); Change the quantity from 2 EA to 3 EA.

Bid Item 415.44200 – Guardrail (MCDOT Std. Det. 2039); Change quantity from 887.5 LF to 975 LF.

Bid item 451.61100 – Thermoplastic, Long Line, White, 60 mil; Change the quantity from 64,885 LF to 65,961 LF.

Bid Item 451.61110 – Thermoplastic, Long Line, Yellow, 60 mil; Change the quantity from 58,714 LF to 63,764LF.

Bid Item 451.61001 – Thermoplastic, Short Line, White, 90 mil; Change the quantity from 20,088 LF to 23,850 LF.

Bid Item 451.60201 – Thermoplastic, Arrows, White, 90 mil; Change the quantity from 25 EA to 43 EA.

Bid Item 453.60000 – Type 'D' RPM; Change the quantity from 1,428 EA to 1,678 EA.

Bid Item 453.60100 – Type 'G' RPM; Change the quantity from 2,192 EA to 2,264 EA.

Bid Item 453.60200 – Type 'H' RPM; Change the quantity from 84 EA to 95 EA.

Bid Item 471.61312 - 3", Schedule 40 PVC w/ #8 Bare Copper Wire; Change the quantity from 2,249 LF to 3,923 LF.

Bid Item 471.60044 – No. 5 Pull Box; Change the quantity from 17 EA to 24 EA.

Bid Item 471.60046 – No. 7 Pull Box; Change the quantity from 24 EA to 36 EA.

Bid Item 505.00112 – Catch Basin (MAG Std. Det. 531, Type B); Change the quantity from 3 EA to 4 EA.

Bid Item 505.00119 – Catch Basin (MAG Std Det. 538, Type H); Change the quantity from 2 EA to 1 EA.

Bid Item 505.00122 – Catch Basin (MAG Std. Det. 532, Type C); Change the quantity from 1 EA to 5 EA.

Addendum No. 1
Contract FCD 98-15
Page Four

Bid Item 505.00212 – 4' Scupper (MAG Std. Det. 206); Change the quantity from 2 EA to 11 EA.

Bid Item 505.00222 – 8' Scupper (MAG Std. Det. 206); Change the quantity from 2 EA to 11 EA.

Bid Item 525.07431 – Pneumatically Placed Mortar; Change the quantity from 365 SY to 283 SY.

Bid Item 618.02330 – 18" RGRCP, Class III; Change the quantity from 1,805 LF to 2,343 LF.

Bid Item 618.02350 – 24" RGRCP, Class III; Change the quantity from 3,999 LF to 4,583 LF.

Bid Item 618.02360 – 30" RGRCP, Class III; Change the quantity from 719 LF to 807 LF.

Bid Item 618.02370 – 36" RGRCP, Class III; Change the quantity from 395 LF to 403 LF.

Bid Item 623.06430 – "Straight" Headwall for 18" Pipe (MAG Std. Det. 501-1,2); Change the quantity from 15 EA to 19 EA.

Bid Item 623.06450 – "Straight" Headwall for 24" Pipe (MAG Std. Det. 501-1,2); Change the quantity from 30 EA to 40 EA.

Bid Item 623.06460 – "Straight" Headwall for 30" Pipe (MAG Std. Det. 501-1,2); Change the quantity from 7 EA to 6 EA.

Bid Item 623.06470 – "Straight" Headwall for 36" Pipe (MAG Std. Det. 501-1,2); Change the quantity from 2 EA to 3 EA.

Bid Item 623.06570 – "U" Headwall w/ Trash Rack for 36" Pipe (MAG Std. Det. 502-1); Change the quantity from 2 EA to 1 EA.

Bid Item 623.40000 – Special Headwalls; Change the quantity from 5 EA to 4 EA.

Bid Item 625.00130 – Storm Drain Manhole Shaft and Base (MAG Std Det 520 & 522); Change the quantity from 2 EA to 5 EA.

Bid Item 635.04100 – Concrete Slipform Irrigation Ditch (1' Bottom); Change the quantity from 8,937 LF to 8,820 LF.

Add Bid Item 340.20500 – Bus Bay (City of Phoenix Std. Det. P 1256-1, Type 1) using a quantity of 4 EA.

Add Bid Item 505.40212 – Concrete Scupper per Special Detail E-4 using a quantity of 1 EA.

Add Bid Item 623.06358 – “L” Headwall for 2 - 24” Pipes (MAG Std. Det. 501-1,2) using a quantity of 1 EA.

II. Revisions to Supplementary General Conditions

1. SGC Page 11 of 26

In the El Paso Natural Gas Company (ELPNG) section, include the following – “The Contractor shall coordinate with ELPNG by providing 30 calendar days notice prior to any construction activity near the inlet structure for the East Tributary Channel as shown on plan sheets 43 and 61 of 81. Prior to the Contractor beginning work in this area, ELPNG will install a concrete (or other) type of protective cap over the gas line at its crossing of the existing RID irrigation ditch immediately north of the inlet structure.”

2. SGC Page 16 of 26

In Subsection 105.6.4 – Coordination With Farmers; The mobile phone number for Ron Rayner should be changed from 376-5971 to 882-3059.

3. SGC Page 17 of 26

In Subsection 106.1 – Source of Materials and Quality; Add the following: “The Contractor shall perform all work in strict accordance with the contract documents and shall be responsible for ensuring all work is in full compliance with the quality and design requirements contained in the contract documents. The Contractor shall be fully responsible for providing any necessary testing or inspection at his own expense to verify the contract requirements are met. The Engineer, or his designated representative(s), shall have the right to perform inspections, surveillances and audits of the activities of the Contractor, lower-tier subcontractors and vendors involved in the performance of the contract to assure that the required levels of quality are achieved.”

4. SGC Page 22 of 26

In Subsection 107.6.3 – Public Information and Notification; Preparation and distribution of newsletters shall be changed from “at least bi-weekly” to “at the direction of the Engineer”.

III. Revisions to Special Provisions

1. SP Page 12 of 38

In Subsection 221.2 – Materials; In the fourth paragraph make the following revisions to the wire diameters: In the third sentence change 0.120 to 0.106 inches. In the eleventh sentence change 0.150 inches to 0.134 inches. In the twelfth sentence change 0.091 inches (US gauge 13) to 0.087 inches (US gauge 13.5).

Modify Subsection 221.2 – Materials and Subsection 221.3 – Assembling and Placing to allow the use of welded wire fabric as an alternative material for the fabrication of gabion baskets and mattresses, in accordance with the USDA-NRCS specifications attached to and made a part of this Addendum No. 1. The zinc - 5% aluminum and PVC coating requirements remain unchanged and will also be applicable to the welded wire fabric baskets and mattresses. The fabrication, assembly, placing and filling of the welded wire fabric baskets and mattresses will be in accordance with the USDA-NRCS specifications, with the exception of the following: wire diameters shall conform to the requirements of Table 3 of ASTM A 974, and weld shear strength shall conform to the requirements of paragraph 7.2 of ASTM A 974. All other criteria for the gabion baskets and mattresses, including placement configuration, use of filter fabric, rock size, and basket unit sizes will be in accordance with the plans and Special Provisions. The Contractor shall inform the Engineer in the Pre-Construction meeting of the type of gabion wire fabric that was used as a basis for the bid.

2. SP Page 13 of 81

In Section 340 – Concrete Curb, Gutter, Sidewalk, Driveways, and Alley Entrances; Add the following: “bus bays” after the word “driveways” in the first line of the first paragraph of the Section.

3. SP Page 14 of 81

In Section 340 – Concrete Curb, Gutter, Sidewalk, Driveways, and Alley Entrances; Add the following: “Payment for concrete bus bays shall be made at the contract unit price bid per each for ITEM 340.20500 – Bus Bay (City of Phoenix Std Det P 1256-1, Type 1), which price shall include all the items shown in the detail except sidewalks and bus shelter pad.”

4. SP Page 75 of 81

In Subsection 505.10 – Payment; Add the following to the 4th paragraph of the subsection: “ITEM 505.40212 – Concrete Scupper per Special Detail E-4”.

5. SP Page 78 of 81

In Section 623 – Headwall; Add the following to the 7th paragraph: “ITEM 623.06358 – “L” Headwall for 2-24” Pipes (MAG Std Det 501-1,2)”

IV. Revisions to Construction Plans

1. Bullard Wash Channel Improvements, Sheet 8 of 81

In Section B3; The south bank channel lining height will vary as follows – “Station 0+49[±] to 0+55 - the south bank height varies 7.3’ to 7.0’, Station 0+55 to 21+62.73 – the south bank height is 7.0’, Station 21+62.73 to 21+90.22 – the south bank height varies 7.0’ to 0.9’.” Refer to the revised Section B3 attached to and made a part of this Addendum No. 1.

In Section B3; The south bank fill condition section is modified with two sections to provide vehicle access along the top of the south bank between Stations 19+52.61 to 21+63 and 21+63 to 21+90. Refer to the revised south bank edge conditions shown with Section B3 that is attached to and made a part of this Addendum No. 1.

2. Bullard Wash Channel Improvements, Sheet 26 and 27 of 81

The south bank channel lining height will vary as follows – “Station 0+49[±] to 0+55 - the south bank height varies 7.3' to 7.0', Station 0+55 to 19+00 – the south bank height is 7.0'.” Refer to the revised Section B3 attached to and made a part of this Addendum No.1.

3. Bullard Wash Channel Improvements, Sheet 28 of 81

Clarification is provided regarding the placement of the fill area along the inlet end of the East Tributary Channel. The revised fill limits, elevations, compaction and grading requirements are shown on the revised sheet 28 of 81, attached to and made a part of this Addendum No. 1.

Note that the due date of all bids under this Invitation For Bids has been changed from November 6, 1998 at 2:00 pm to November 12, 1998 at 2:00 pm. Bidders are reminded that each addenda must be acknowledged on page 5 of 33 of the bid and a copy of addenda attached to the bid package.

**FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY**

By: Michael S. Ellegood 11/4/98
Michael S. Ellegood, P.E.
Chief Engineer and General Manager

Sverdrup Civil Inc.



By: Bradford D. Olbert
Bradford D. Olbert, P.E.
Project Manager

UNITED STATES DEPARTMENT OF AGRICULTURE
NATIONAL RESOURCES CONSERVATION SERVICE
USDA-NRCS

CONSTRUCTION SPECIFICATION

64. WIRE MESH GABIONS AND MATTRESSES
TWISTED (WOVEN) OR WELDED MESH

1. SCOPE

~~The work shall consist of furnishing, assembling and installing rock filled wire mesh gabion baskets and mattresses.~~

2. TYPES

Gabions shall consist of rectangular wire mesh formed containers filled with rock. Gabions will conform to one of the following types:

Woven Mesh - Non-raveling double twisted hexagonal wire mesh, consisting of two wires twisted together in two 180 degree turns.

Welded Mesh - Welded wire mesh with a uniform square or rectangular pattern and a resistance weld at each intersection. The welded wire connections shall conform with the requirements of ASTM A 185, including wire smaller than W1.2 (0.124 in.); except that the welded connections shall have a minimum average shear strength of 70% and a minimum shear strength of 60% of the minimum ultimate tensile strength of the wire.

Gabions shall be furnished as baskets or mattresses, as specified in Section 8. Baskets and mattresses shall be fabricated within a dimension tolerance of plus or minus 5 percent.

Baskets - Baskets have a height of 12 inches or greater.

Mattresses - Mattresses have a thickness of 12 inches and less.

3. MATERIALS

Gabions shall be fabricated, assembled and installed in accordance with the nominal wire sizes and dimensions found in Tables 1 and 2, using the following materials, unless otherwise specified in Section 8.

Wire for fabrication and assembly shall be hot dipped galvanized. The wire shall have a minimum tensile strength of 60,000 psi. Galvanized steel wire shall conform to ASTM A 641, class 3, soft temper.

TABLE 1 (Minimum Requirements)*

GABION BASKETS - Height 12, 18 or 36 Inches; Length as Specified

Type Of Wire	Mesh Size Inches	Wire Diameter Inches	PVC Coating Inches	Total Diameter Inches	Galvanized Coating oz/SF
Woven Mesh	3 1/4 x 4 1/2	0.118	None	0.118	0.80
	3 1/4 x 4 1/2	0.105	0.02	0.145	0.80
Selvage		0.153	None	0.153	0.80
		0.132	0.02	0.172	0.80
Lacing & Internal Connecting Wire		0.086	0.02	0.126	0.70
Welded Mesh	3 x 3	0.118	None	0.118	0.80
	3 x 3	0.105	0.02	0.145	0.80
Spiral Binder		0.105	0.02	0.145	0.80

TABLE 2 (Minimum Requirements)*

GABION MATTRESSES - Height 6, 9, or 12 Inches; Length as Specified

Type Of Wire	Mesh Size Inches	Wire Diameter Inches	PVC Coating Inches	Total Diameter Inches	Galvanized Coating oz/SF
Woven Mesh	2 1/2 x 3 1/4	0.086	0.02	0.126	0.70
Selvage		0.105	0.02	0.145	0.80
Lacing & Internal Connecting Wire		0.086	0.02	0.126	0.70
Welded Mesh	1 1/2 x 3	0.080	0.02	0.120	0.70
Spiral Binder		0.105	0.02	0.145	0.80

*NOTE: The wire sizes and PVC coating thickness shown are nominal sizes.
The wire sizes include the galvanizing coating thickness.

When Epoxy or Polyvinyl Chloride (PVC) coated wire is specified in Section 8, the galvanized wire shall be coated by fusion bonded epoxy; or fusion bonded, extruded, or extruded and bonded PVC material. The wire coating shall be colored black, gray, green or silvery; and the initial properties of the PVC coating shall meet the following requirements:

- (a) Specific Gravity: In the range of 1.30 to 1.40, ASTM D 792.
- (b) Abrasion Resistance: The percentage of weight loss shall be less than 12%, when tested according to ASTM D 1242, Method B at 200 cycles, CSI-A Abrader Tape, 80⁺ Grit.
- (c) Brittleness Temperature: Not higher than 15 F, ASTM D 746.
- (d) Tensile Strength: Extruded Coating - Not less than 2,980 psi., ASTM D 412. Fusion Bonded Coating - Not less than 2,275 psi., ASTM D 638.
- (e) Modulus of Elasticity: Extruded Coating - Not less than 2,700 psi. at 100 percent strain, ASTM D 412. Fusion Bonded Coating - Not less than 1980 psi. at 100 percent strain, ASTM D 638.
- (f) Ultraviolet Light Exposure: A test period of not less than 3000 hours, using apparatus type E at 63 C, ASTM G 23.
- (g) Salt Spray Test: A test period of not less than 3000 hours, ASTM B 117.

After the exposure to ultraviolet light and the salt spray test as specified above, the PVC coating shall not show cracks, blisters, splits, nor noticeable change of coloring (surface chalk). In addition, the specific gravity, resistance to abrasion, tensile strength, and modulus of elasticity shall not change more than 6 percent; 10 percent, 25 percent and 25 percent respectively, from their initial values.

The wire sizes shown in Table 1 and 2 are the size of the wire after galvanizing and before coating with PVC.

Spiral binders are the standard fastener for welded mesh gabion baskets and mattresses, and shall be formed from wire meeting the same quality and coating thickness requirements as specified for the gabion baskets and mattresses.

Alternate fasteners for use with wire mesh gabions, such as ring fasteners, shall be formed from wire meeting the same quality and coating thickness requirements as specified for the gabions.

Standard fasteners and alternate fasteners must provide a minimum strength of 1,400 lb. per lineal foot for gabion baskets and 900 lb. per lineal foot for gabion mattresses. When used to interconnect gabion baskets or mattresses with PVC coating, ring fasteners shall be made of stainless steel and spiral fasteners will be PVC coated. All fasteners shall meet all of the closing requirements of the gabion manufacturer in addition to any requirements specified in Section 8.

Rock shall conform to the quality requirements in Material Specification 523, unless otherwise specified in Section 8. At least 85 percent of the rock particles, by weight, shall be within the predominant rock size range.

Gabion Basket or Mattress Height	Predominant Rock Size Inches	Minimum Rock Dimension Inches	Max. Rock Dimension Inches
12, 18 & 36 Inch Basket	4 to 8	4	8
6, 9 & 12 Inch Mattress	3 to 6	3	6

At least 30 days prior to delivery to the site, the Contractor shall inform the COTR in writing of the source from which the rock will be obtained, and include the test data and other information by which the material was determined by the Contractor to meet the specification. The Contractor shall provide the COTR free access to the source for the purpose of obtaining samples for testing and source approval.

~~Bedding or filter material, when specified, shall meet the gradation shown on the plans or as specified in Section 8, and the requirements of Material Specification 521. Geotextile, when specified, shall conform to the requirements specified in Section 8, and those of Material Specification 592.~~

4. ~~FOUNDATION PREPARATION~~

~~The foundation on which the gabions are to be placed shall be cut or filled and graded to the lines and grades shown on the drawings. Surface irregularities, loose material, vegetation, and all foreign matter shall be removed from foundations. When fill is required, it shall consist of materials conforming to the specified~~

~~requirements. Gabions and bedding or specified geotextiles shall not be placed until the foundation preparation is completed, and the subgrade surfaces have been inspected and approved by the COFR.~~

~~Compaction of bedding or filter material will be required as specified in Section 8. The surface of the finished material shall be to grade and free of mounds, dips or windrows. Geotextile shall be installed in accordance with the requirements of Construction Specification 95.~~

5. ASSEMBLY AND PLACEMENT

Unless otherwise specified in Section 8, the assembly and placement of gabions shall be in accordance with the following procedures:

Assembly - Rotate the gabion panels into position and join the vertical edges with fasteners for gabion assembly. Where lacing wire is used, wrap the wire with alternating single and double half-hitches at intervals between 4 to 5 inches. Where spiral fasteners are used for welded wire mesh, crimp the ends to secure the spirals in place. Where ring type alternate fasteners are used for basket assembly, install the fasteners at a maximum spacing of 6 inches. Use the same fastening procedures to install interior diaphragms where they are required.

Interior diaphragms will be required where any inside dimension exceeds three feet. Diaphragms will be installed to assure that no open intervals are present that exceed three feet.

Placement - Place the empty gabions on the foundation and interconnect the adjacent gabions along the top, bottom, and vertical edges using lacing wire. Wrap the wire with alternating single and double half-hitches at intervals between 4 to 6 inches. Unless otherwise specified in Section 8, lacing wire will be the only fastener allowed for interconnecting woven mesh gabions. Spiral fasteners are commonly used for the assembly and interconnection of welded mesh gabions. Spirals are screwed down at the connecting edges then each end of the spiral is crimped to secure it in place. Lacing may be used as needed to supplement the interconnection of welded mesh gabions, and the closing of lids.

Interconnect each layer of gabions to the underlying layer of gabions along the front, back, and sides. Stagger the vertical joints between the gabions of adjacent rows and layers by at least one half of a cell length.

fasteners, or lacing wire wrapped with alternating single and double half-hitches in the mesh openings.

Any damage to the wire or coatings during assembly, placement and filling shall be repaired promptly in accordance with the manufacturer's recommendations or replaced with undamaged gabion baskets.

7. MEASUREMENT AND PAYMENT

Method 1 For items of work for which specific unit prices are established in the contract; the volume of rock will be measured within the neat lines of the gabion structure and computed to the nearest cubic yard. Payment for gabions will be made at the contract unit price, and includes the wire mesh and rock. Such payment will be considered full compensation for all labor, materials, equipment and all other items necessary and incidental to completion of the work.

Method 2 For items of work for which specific unit prices are established in the contract, the volume of the gabions will be measured within the neat lines of the gabion structure and computed to the nearest cubic yard. Payment for the gabions will be made at the contract unit price, and includes the wire mesh, rock and specified bedding material or geotextile. Such payment will be considered full compensation for all labor, materials, equipment and all other items necessary and incidental to the completion of the work.

Method 3 For items of work for which specific unit prices are established in the contract, the surface area will be measured within the neat lines of the gabion mattress structure and computed to the nearest square yard. Payment for the gabion mattress will be made at the contract unit price, and includes the wire mesh and rock. Such payment will be considered full compensation for all labor, materials, equipment and all other items necessary and incidental to the completion of the work.

Method 4 For items of work for which specific unit prices are established in the contract, the surface area will be measured within the neat lines of the gabion mattress structure and computed to the nearest square yard. Payment for the gabion mattress will be made at the contract unit price, and include the wire mesh, rock and specified bedding material or geotextile. Such payment will be considered full compensation for all labor, materials, equipment and all other items necessary and incidental to the completion of the work.

~~All Methods~~ The following provisions apply to all methods of measurement and payment. Unless otherwise specified in Section 8, no deduction in volume will be made for any void or embedded item. Compensation for any item of work described in the contract, but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Each item and the items to which they are made subsidiary are identified in Section 8 of this specification.

6. FILLING OPERATION

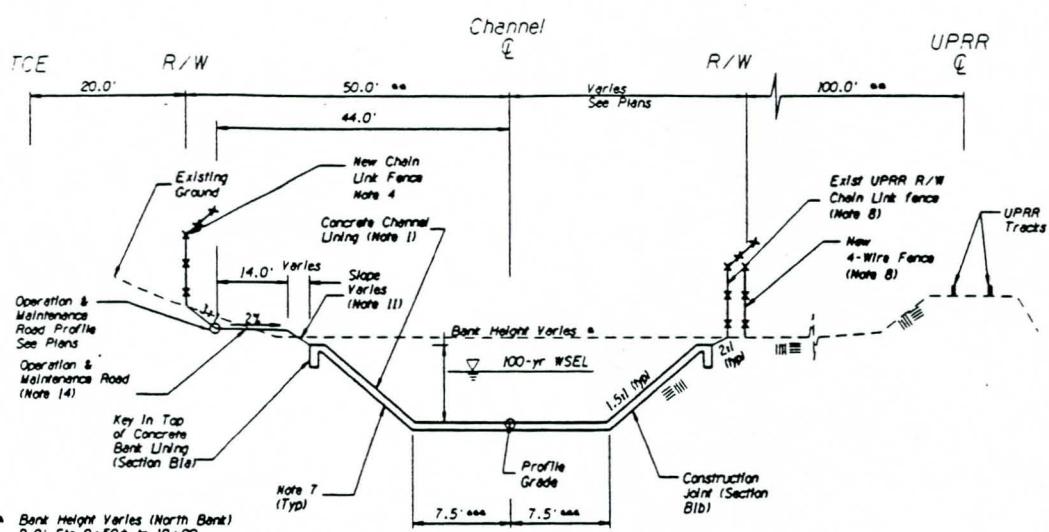
After adjacent empty woven wire gabion units are set to line and grade and common sides properly connected, they shall be placed in straight line tension and stretched to remove any kinks from the mesh and to gain a uniform alignment. Welded mesh gabions do not require stretching. Staking of the gabions may be done to maintain the established proper alignment prior to the placement of rock. No stakes shall be placed through geotextile material. Connecting lacing wire and other fasteners (as allowed), shall be attached during the filling operation to preserve the strength and shape of the structure.

Internal connecting cross-tie wires shall be placed in each unrestrained gabion cell greater than 18 inches in height, including gabion cells left temporarily unrestrained. Two internal connecting wires shall be placed concurrently with rock placement, at each 12 inch interval of depth. In woven mesh gabions these cross-ties will be placed evenly spaced along the front face and connecting to the back face. All cross-tie wires shall be looped around two mesh openings and each wire end shall be secured by a minimum of five 180 degree twists around its self after looping.

In welded mesh gabions these cross-ties or stiffeners will be placed across the corners of the gabions (at 12 inches from the corners) providing a diagonal bracing. Lacing wire or preformed hooked wire stiffeners may be used.

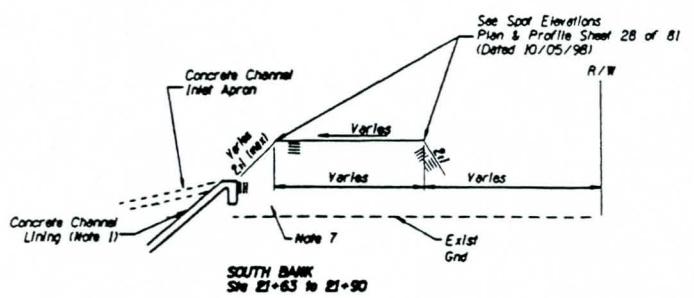
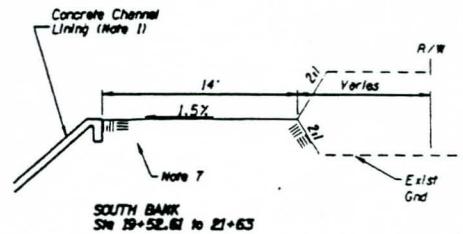
The gabions shall be carefully filled with rock, either by machine or hand methods, ensuring alignment, avoiding bulges, and providing a compact mass that minimizes voids. Machine placement will require supplementing with hand work to ensure the desired results. The cells in any row shall be filled in stages so that the depth of rock placed in any one cell does not exceed the depth of rock in any adjoining cell by more than 12 inches. Along the exposed faces, the outer layer of stone shall be carefully placed and arranged by hand to ensure a neat, compact placement with a uniform appearance.

The last layer of rock shall be uniformly leveled to the top edges of the gabions. Lids shall be stretched tight over the rock filling using only approved lid closing tools as necessary. The use of crowbars or other single point leverage bars for lid closing is prohibited as they may damage the baskets. The lid shall be stretched until it meets the perimeter edges of the front and end panels. The gabion lid shall then be secured to the sides, ends, and diaphragms with spiral binders, approved alternate



TRAPEZOIDAL CHANNEL SECTION
 CONCRETE CHANNEL LINING
 East Tributary Channel
 Sta 0+43 ± to 21+90.22
SECTION B3
 N. T. S.

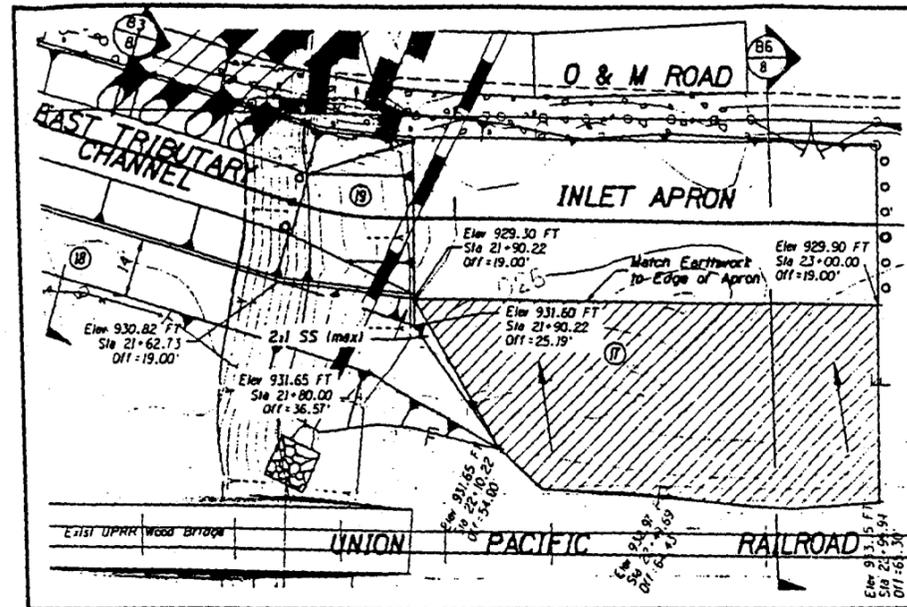
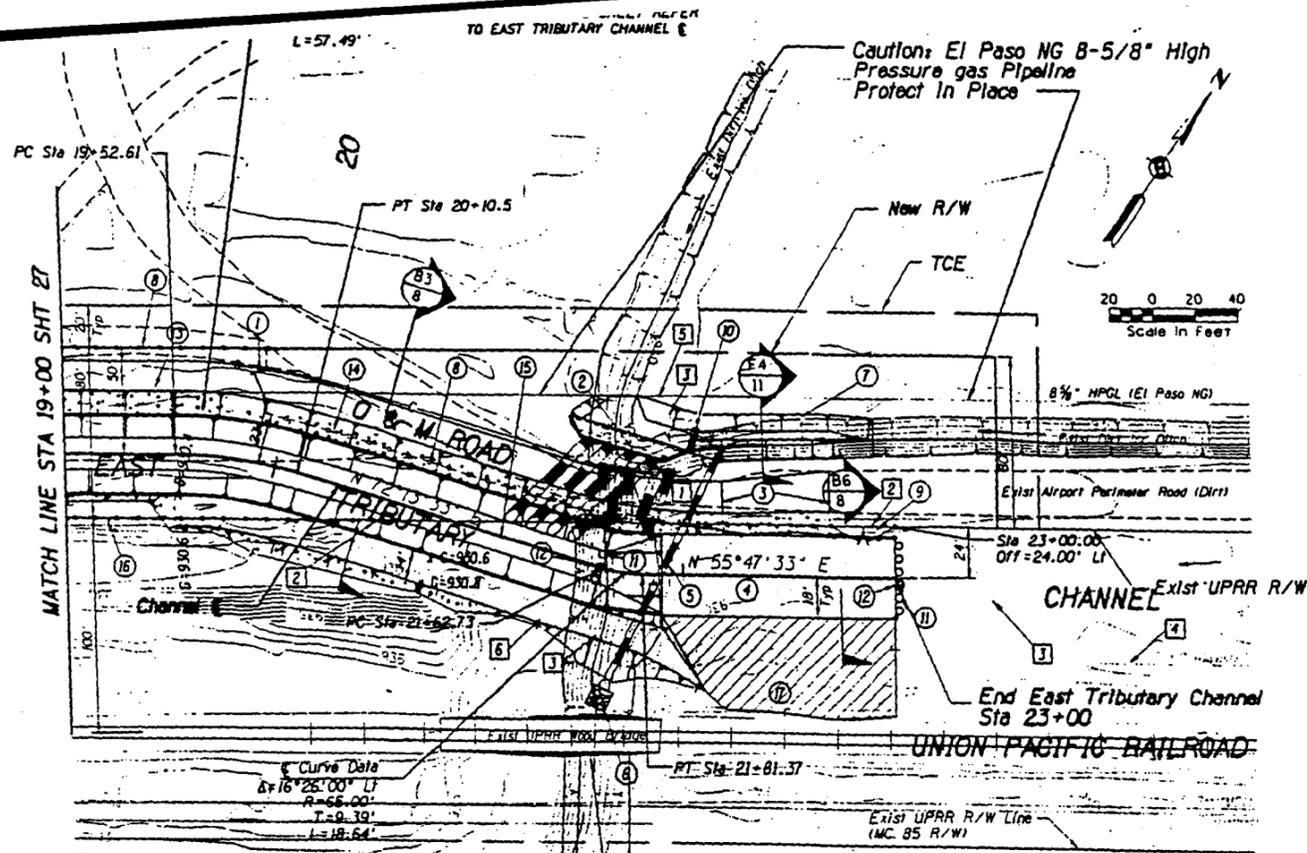
- Bank Height Varies (North Bank)
 9.0', Sta 0+50 ± to 10+00
 Varies, Sta 10+00 to 10+20
 7.0', Sta 10+20 to 21+62.73
 varies, Sta 21+63.73 to 21+90.22
 Bank Height varies (South Bank)
 Varies 7.3' to 7.0', Sta 0+49 ± to 0+55
 7.0', Sta 0+55 to 21+62.73
 Varies, Sta 21+62.73 to 21+90.22
- ** Distances Vary
 Sta 19+52.61 to 21+90.22
 See Plans
- *** Distances and
 Cross-Slope Varies
 Sta 21+62.73 to 21+90.22
 See Plans



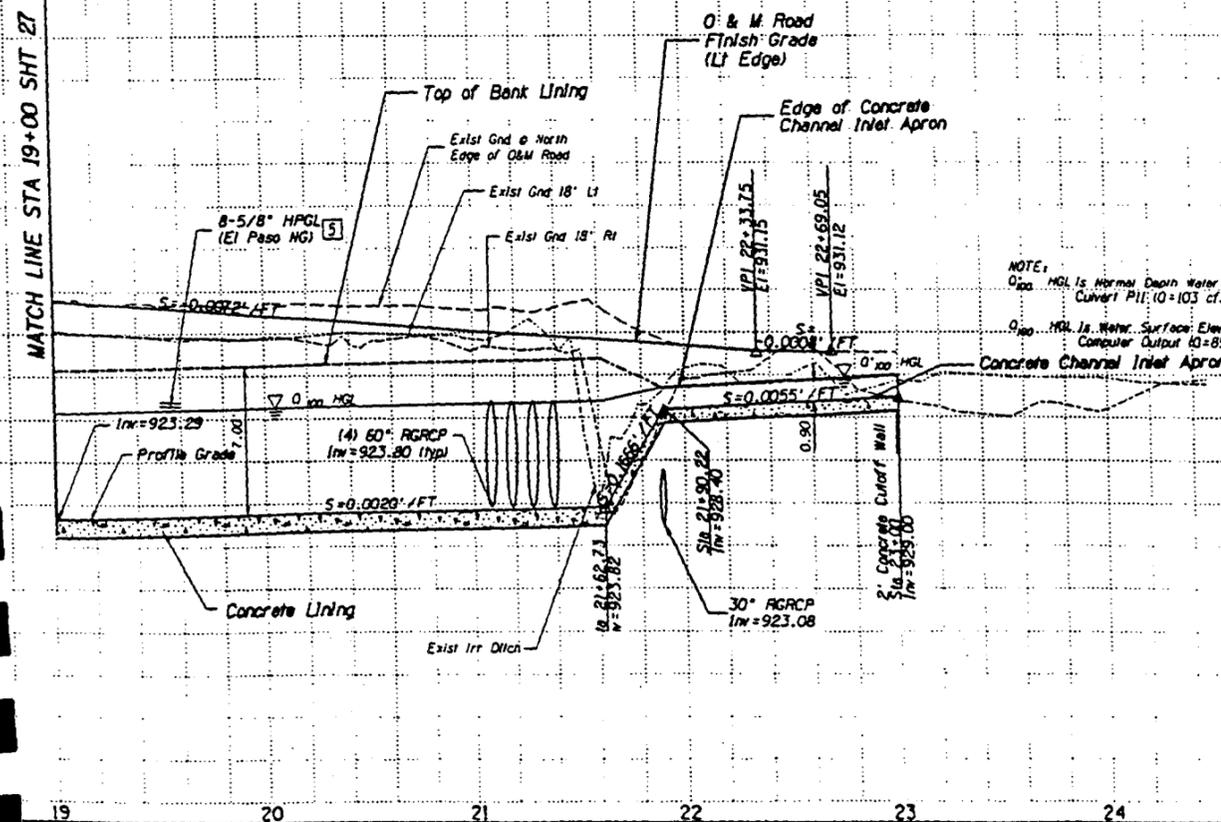
NOTES

- 1) Channel bottom shell be roughened with rebed finish, and sideslopes with heavy broom finish.
- 4) Chain link fence (WAG Std 160) is to be installed along airport R/W. See Plans for Location.
- 7) Compact subgrade under concrete lining, bank fill, and O & M road to 95%. Compact AB to 95%.
- 8) Remove chain link fence and replace with 4-wire fence @ R/W Line Sta 0+40 to 19+53. See special provisions. Remove chain link fence Sta 19+53 to 23+50.
- 11) Cover Sideslope with gravel mulch on sideslope 2:1 or steeper.
- 14) Install 4" thick AB to all operation & maintenance roads. Compact AB to 95%.

NO.	REVISION	BY	DATE
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION			
BULLARD WASH CHANNEL IMPROVEMENTS PROJECT PROJECT NO. 4700731			
DESIGNED	D. STOUGH	BY	DATE
DRAWN	D. STOUGH		10/22/98
CHECKED	B. OLBERT		10/22/98
			Sverdrup CORPORATION
SECTION B3			SHEET OF 1 1



DETAIL INSET -
INLET APRON GRADING



NOTE:
 0₁₀₀ MSL is Normal High Water Surface For Flow By From
 Culvert P11: (Q=103 cfs)
 0₁₀₀ MSL is Water Surface Elevation Determined by HEC-RAS
 Computer Output (Q=850 cfs)

REMOVAL/RELOCATE

- 1 Remove Exist 60" Steel Pipe 27 LF x 5 ea (Lump Sum)
- 2 Remove Exist Chain Link Fence Sta 19+00 e Rt to Sta 23+50 e Lt. 400 LF
- 3 Clear and Grub, 0.6 Ac
- 4 Exist Tel-FO Cable (Protect In Place)
- 5 Exist 8-5/8" High Pressure Gas Line Protect In Place (El Paso NG)
- 6 Rubble & Debris Removal, 10 Tons

CONSTRUCTION

- 1 New 12' Wide (Single) Access Gate, Chain Link Fence (MAG Std Det 160) Sta 19+90, 30.7' Lt
- 2 New (4) 60" RGRCP x 58 LF (232 LF) e Lt and Inlet & Outlet Headwalls Detail 13 & 22
- 3 50' Roadway Transition, Match Exist Airport Perimeter Road, Sta 22+19.06, Off=44.66' Lt to Sta 22+69.05, Off=49.64'
- 4 New Concrete Channel Inlet Apron. See (B6) (B8)
- 5 New 30" RGRCP 122 LF with Outlet End Section w/ Drop Inlet Headwall (MAG Std Det 501-5)
- 6 New Dumped Riprap Outlet Protection, 4 CY
- 7 New 4' BW Dirt Irr Ditch, 83 LF, see Sta 22+07.25, Off 66.00' Lt to Sta 22+90.00, Off 66.00' Lt; See (FA) (P10) (P11) (P12) (P13) (P14) (P15) (P16) (P17) (P18) (P19) (P20) (P21) (P22) (P23) (P24) (P25) (P26) (P27) (P28) (P29) (P30) (P31) (P32) (P33) (P34) (P35) (P36) (P37) (P38) (P39) (P40) (P41) (P42) (P43) (P44) (P45) (P46) (P47) (P48) (P49) (P50) (P51) (P52) (P53) (P54) (P55) (P56) (P57) (P58) (P59) (P60) (P61) (P62) (P63) (P64) (P65) (P66) (P67) (P68) (P69) (P70) (P71) (P72) (P73) (P74) (P75) (P76) (P77) (P78) (P79) (P80) (P81) (P82) (P83) (P84) (P85) (P86) (P87) (P88) (P89) (P90) (P91) (P92) (P93) (P94) (P95) (P96) (P97) (P98) (P99) (P100)
- 8 New Chain Link Fence 422 LF e Lt. (MAG Std Det 160). See Table 7c For Locations (7C) (55)
- 9 New 24' Wide (Double 12') Access Gate, Chain Link Fence (MAG Std Det 160) East Pole at Sta 23+00, Off=24.00' Lt
- 10 New Gabion Basket Wire, 12 LF Sta 22+03.44, Off=56.97' Rt to Sta 22+06.84, Off=68.48' Rt (13c) (61)
- 11 New Safety Posts (Fixed) (7 ea) at Sta 23+00 Off 3' Lt, 9' Lt, 15' Lt, 9' Rt, and 15' Rt and Sta 21+60, Off 0' Lt and 6' Lt.
- 12 New Removable Safety Post, 2 ea at Sta 23+00, Off 3' Rt and Sta 21+60, Off 6' Rt; see (17) (63)
- 13 15' O & M Road w/ 4" AB; 370 LF e Lt
- 14 New Gravel Mulch, 233 SY
- 15 New Concrete Channel Lining 15' Bottom Width (East of Tributary Channel) (B3) (B8)
- 16 New 4-Wire Fence, 50 LF e Rt Sta 19+00 to Sta 19+50, see Table 7a for Locations (7a) (16) (55) (63)
- 17 Fill In and Compact to 95% See Inset Detail For Spot Elevations
- 18 Compact Embankment to 95%. See (B3) (B8)
- 19 Channel Transition, Sec B3 to B6, Sta 21+62.73 to Sta 21+90.22

NO.	REVISION	BY	DATE
1	Added inset and notes 17-19		

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION

BULLARD WASH CHANNEL IMPROVEMENTS PROJECT PROJECT NO. 4700731

DESIGNED	BY	DATE
D. STOUGH	D. STOUGH	10/05/98
B. EDGAR	B. EDGAR	10/05/98
R. MILES/B. OLBERT	R. MILES/B. OLBERT	10/05/98

Sverdrup CORPORATION

PLAN AND PROFILE (EAST TRIBUTARY) STA 20+00.00 TO STA 23+00.00 SHEET OF

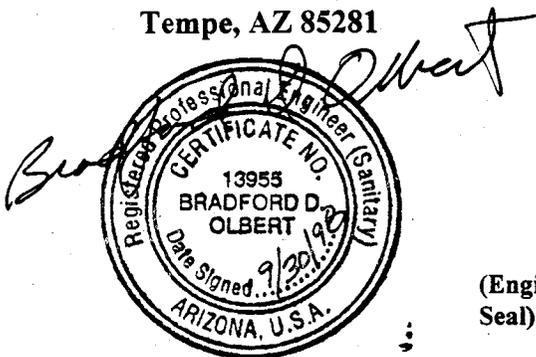
CONSTRUCTION SPECIFICATIONS

FOR

CONTRACT FCD 98-15

**BULLARD WASH CHANNEL IMPROVEMENTS PROJECT AND
ESTRELLA PARKWAY (BID CANAL TO YUMA ROAD)
IMPROVEMENTS PROJECT
PCN 4700731**

**Sverdrup Civil, Inc.
637 South 48th Street, Suite 101
Tempe, AZ 85281**



(Engineer's Seal)

Prepared For

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Recommended by: Edward A. Raleigh Date: 10/1/98
Edward A. Raleigh, P.E.
Manager Engineering Division

Issued for Public Bidding by: Michael S. Ellegood Date: 10.1.98
Michael S. Ellegood, P.E. Deputy
Chief Engineer and General Manager

SUPPLEMENTARY TO MARICOPA ASSOCIATION OF GOVERNMENTS UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION EDITION OF 1998 AND REVISIONS AND SUPPLEMENTS THERETO.

ATTENTION

ALL PROSPECTIVE BIDDERS

A.R.S. Section 34-201 requires that construction bid proposals be accompanied by a certified check, cashiers check or surety bond for ten percent (10%) of the total amount of the bid.

All bonds must be executed solely by a surety company or companies holding a Certificate of Authority to transact surety business in Arizona, issued by the Director of the (State) Department of Insurance.

Bonds (bid, payment and performance) executed by an individual surety or sureties are not in compliance with the Arizona Revised Statutes. Bids received containing bid bonds not in compliance with the Arizona Revised Statutes will be considered as being non-responsive. The use of District-supplied bond forms is required.

Please submit your bids accordingly.

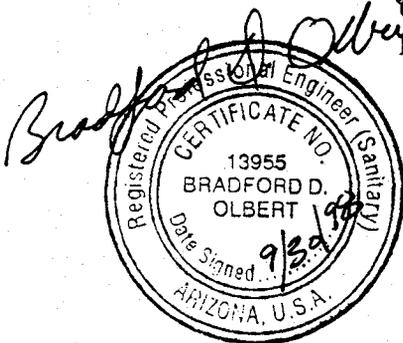
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

CONTRACT FCD 98-15

PCN 4700731

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18. Special Provisions (SP): Channel	38 pages
Roadway	81 pages
19. Appendix "A".....	9 pages
20. Appendix "B".....	2 pages
21. Appendix "C"	8 pages
22. Drawings - (Separate) - Channel Plans	81 sheets
Roadway Plans.....	150 sheets
Channel Cross Sections	35 sheets
Roadway Cross Sections.....	38 sheets



(Area to left reserved for Engineer's Seal)

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

INVITATION FOR BID

BID OPENING DATE: **NOVEMBER 6, 1998**

LOCATION: This Project is located in the City of Goodyear and extends from Yuma Road south to the Gila River, along and one quarter mile east of Estrella Parkway. Some construction activities will occur within the Phoenix Goodyear Airport, and within Union Pacific Railroad right-of-way.

PROPOSED WORK: **This is a joint project between the FCDMC and MCDOT.** The proposed work includes the construction of five miles of four lane divided roadway, one bridge, and associated roadway features; and two miles of concrete and gabion lined trapezoidal channel, spillways, culverts and associated drainage features.

BIDS:

SEALED BIDS for the proposed work will be received by the Flood Control District of Maricopa County, 2801 West Durango Street, Phoenix, Arizona 85009 until **2:00 p.m. (Phoenix time)** on **Friday, November 6**, and then publicly opened and read at 2801 West Durango Street, Phoenix, Arizona 85009. All bids are to be marked in accordance with Section 102.9 of the MAG Uniform Standard Specifications and addressed to the Chief Engineer and General Manager, Flood Control District of Maricopa County, 2801 West Durango Street, Phoenix, Arizona 85009. No bids will be received after the time specified for bid opening. All bids must be submitted on proposal forms furnished by the Flood Control District and included in the Proposal Pamphlet. The Board of Directors reserves the right to reject any and all bids and to waive any informality in any bid received.

ELIGIBILITY OF CONTRACTOR:

The bidder shall be required to certify that it has the appropriate "A" Contractor's license in the State of Arizona to perform the before-mentioned type of work. Certification shall be on the form provided herein.

The bidder may be required to furnish an affidavit as evidence of previous satisfactory performance in the above-mentioned type of work.

PRE-BID CONFERENCE:

A **MANDATORY Pre-Bid conference** will be held on **Tuesday, October 27, 1998 at 2:00 p.m.** in the Flood Control District New River Conference Room, 2801 West Durango Street, Phoenix, Arizona. All potential contractors and subcontractors are encouraged to attend this pre-bid conference and be prepared at that time to submit in writing and discuss any comments concerning this solicitation.

SITE VISIT:

A site visit of the airport area of the project will be offered on October 28 at 9:00 a.m. All interested parties should meet at the airport terminal before 9:00 a.m. **Anyone arriving late will not be allowed to join the site visit group once the group has left the terminal. This will be the only time access to the airport area of the project will be allowed during the bidding process.**

QUESTIONS:

Questions or items for clarification may be addressed to the Contracts Manager, in writing, at least five (5) days prior to bid opening date. Questions received after this deadline may not be accepted. Responses to all questions submitted will be sent to all planholders by addenda. Verbal interpretations, unless specifically addressed by addendum, shall not be binding nor have any legal effect.

CONTRACT TIME:

All work on this Contract is to be completed within three hundred sixty-five (365) calendar days after date of Notice to Proceed.

MBE/WBE PARTICIPATION:

It is the policy of the Flood Control District of Maricopa County to endeavor to ensure in every way possible that minority and women-owned business enterprises have every opportunity to participate in providing professional services, purchased goods, and contractual services without being discriminated against on the grounds of race, religion, sex, age, disability, or national origin.

The Maricopa County Minority and Women-Owned Business Enterprise Program, effective January 1, 1992, is incorporated herein by reference.

Two Affidavits are included herein. The first form, the "M/WBE Assurances Affidavit", must be completed and submitted with the bid - **Failure to do so may be cause for rejection of the bid.** The first and second low bidders must complete and return the second form, "Actual M/WBE Participation Affidavit", to the Minority Business Office, with a copy to the Flood Control District, by 4:00 p.m. on the seventh calendar day after bid opening,

For this contract, a goal of ten percent (10%) is established for Minority/Women-Owned Business Enterprises (MBE/WBE). Complete instructions and additional forms are available from the Maricopa County Minority Business Office, located at 2901 West Durango Street, Phoenix, Arizona, telephone number 506-8656. Failure to implement "good faith" efforts in accordance with the Maricopa County Minority Business Enterprise Program to the satisfaction of Maricopa County may result in rejection of the bid.

PROJECT PLANS, SPECIAL PROVISIONS AND CONTRACT DOCUMENTS:

Construction documents consist of one set of plans for the channel features and one set of plans for the roadway and bridge features. The specifications are divided into the Supplementary General Conditions applicable to both the channel and the roadway, a separate set of Special Provisions for the channel features and a separate set of Special Provisions for the roadway and bridge features. In addition, a set of channel cross sections and a set of roadway cross sections has been provided.

Plans and Construction Specifications may be obtained from the Flood Control District of Maricopa County, 2801 West Durango Street, Phoenix, Arizona 85009 upon payment of **\$138.00** by check, payable to the **Flood Control District of Maricopa County**. This payment will not be refunded. Mail orders for project documents must include an additional \$10.00 for first class U.S. postage and handling. The total \$148.00 will not be refunded. Regardless of circumstances, we cannot guarantee mail delivery.

Each bid must be accompanied by a Bid Bond executed on the District-supplied bond form, cashier's or certified check or postal money order equal to 10 percent (10%) of the bid, made payable to the

Flood Control District of Maricopa County as a guarantee that if the work is awarded to the bidder, the bidder will within ten (10) days of receipt of the Proposal Acceptance, enter into proper contract and bond condition for the faithful performance of the work, otherwise, said amount may be forfeited to the Flood Control District of Maricopa County Board of Directors.

PRINCIPLE ITEMS AND APPROXIMATE QUANTITIES

QUANTITY	UNIT	DESCRIPTION
CHANNEL FEATURES		
335,000	CY	Channel Excavation
19,000	CY	Gabion Baskets and Mattresses
21,000	SY	Concrete Channel Lining
2,800	LF	Dip and RGRCP Pipe
ROADWAY FEATURES		
47,000	TONS	Asphalt Concrete
1,125	CY	Class "A" and "AA" Concrete
38,000	LF	Concrete Curb and Gutter
7,000	LF	RGRCP Pipe

BID

TO THE BOARD OF DIRECTORS
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
PHOENIX, ARIZONA

Gentlemen:

The following Bid is made for Bullard Wash Channel Improvements Project and Estrella Parkway (Bid Canal to Yuma Road) Improvements Project, Contract FCD 98-15, in the County of Maricopa, State of Arizona.

The following Bid is made on behalf of

FNF Construction, Inc.

and no others. Evidence of authority to submit the bid is herewith furnished. The bid is in all respects fair and is made without collusion on the part of any person, firm, or corporation mentioned above, and no member or employee of the Board of Directors is personally or financially interested, directly or indirectly, in the bid, or in any purchase or sale of any materials or supplies for the work in which it relates, or in any portion of the profits thereof.

The Undersigned certifies that the approved Plans, Supplementary General Conditions, Special Provisions, Forms of Contract, Bonds, and Sureties authorized by the Board of Directors and constituting essential parts of the bid, have been carefully examined and also that the work site has been personally inspected.

The Undersigned declares that the amount and nature of the work to be done is understood and that at no time will misunderstanding of the Plans, Construction Specifications, Special Provisions, Supplementary General Conditions, or conditions to be overcome, be pled. On the basis of the Plans, Construction Specifications, Special Provisions, Supplementary General Conditions, the Forms of Contract, Bonds, and Sureties proposed for use, the Undersigned proposes to furnish all the necessary machinery, equipment, tools, apparatus, and other means of construction, to do all the work and to furnish all the materials in the manner specified and to finish the entire project within the time hereinafter proposed and to accept, as full compensation therefore, the sum of various products obtained by multiplying each unit price, herein bid for the work or materials, by the quantity thereof actually incorporated in the complete project, as determined by the Engineer or Architect.

The Undersigned understands that the quantities mentioned herein are approximate only and are subject to increase or decrease and hereby proposes to perform all quantities of work, as either increased or decreased, in accordance with the provisions of the Specifications, at the unit price bid in the Bidding Schedule.

The Undersigned further proposes to perform all extra work that may be required on the basis provided in the Specifications and to give such work personal attention and to secure economical performance.

The Undersigned further proposes to execute the Contract Agreement and furnish satisfactory Bonds and Sureties within ten (10) days of receipt of Notice of Bid acceptance, **TIME BEING OF THE ESSENCE**. The Undersigned further proposes to begin work as specified in the Contract attached hereto, and to complete the work within three hundred sixty-five (365) calendar days from the effective date specified in the Notice to Proceed, and maintain at all times a Payment and Performance Bond, approved by

the Board of Directors, each in an amount equal to one hundred percent of the contract amount. This Bond shall serve not only to guarantee the completion of the work on the part of the Undersigned, but also to guarantee the excellence of both workmanship and material and the payment of all obligations incurred, said Bonds and Sureties to be in full force and effect until the work is finally accepted and the provisions of the Plans, Specifications, and Special Provisions fulfilled.

A bid bond in the amount and character named in the Invitation to Bid, and amounting to not less than ten (10) percent of the total bid, is enclosed. The bid bond is submitted as a guaranty of good faith that the Bidder will enter into a written contract to do the work, as provided, if successful in securing the award thereof. It is therefore agreed that if the Undersigned withdraws its bid at any time except as herein provided, or if the bid is accepted and the Undersigned fails to execute the Contract and furnish satisfactory Bonds and Sureties as herein provided, the Flood Control District of Maricopa County shall be entitled and is hereby given the right to retain the said Bid Bond as liquidated damages.

The Undersigned acknowledges receipt of the following addenda, attached these to the bid package, and has included their provisions in the bid:

Addendum No. <u>1</u>	Dated <u>11-5-98</u>
Addendum No. <u>2</u>	Dated <u>11-9-98</u>
Addendum No. _____	Dated _____
Addendum No. _____	Dated _____
Addendum No. _____	Dated _____

The Undersigned has enclosed the required bid security to this Bid.

BID SCHEDULE

**Contract FCD 98-15 Bullard Wash Channel Improvements Project and
Estrella Parkway (Bid Canal to Yuma Road) Improvements Project**

ITEM	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	EXTENDED AMOUNT
105-1	Partnering	L.S.	1	10,000.00	10,000.00
105-2	UPRR Flagman Allowance	L.S.	1	20,000.00	20,000.00
105-3	Roadway Construction Survey and Staking	L.S.	1	75,000.00	75,000.00
107-1	NPDES/SWPPP Permits	L.S.	1	10,000.00	10,000.00
107-2	Public Information and Notification Allowance	L.S.	1	25,000.00	25,000.00
107-3	Project Signs Allowance	L.S.	1	6,000.00	6,000.00
111-1	Mobilization	L.S.	1	325,000.00	325,000.00
	SUBTOTAL				471,000.00
201-1	Clear and Grub	Acre	8	650.00	5,200.00
211-1	Irrigation Ditch Fill Construction	Cu. Yd.	22352	1.20	26,822.40
211-2	Channel Embankment Fill Construction	Cu. Yd.	34994	0.70	24,495.80
211-3	Landscaping Berm Fill Construction	Cu. Yd.	2798	2.00	5,596.00
211-4	Lower Buckeye Road Berm Construction	Cu. Yd.	6559	1.20	7,870.80
215-1	Earthwork for Drainage Channel	Cu. Yd.	334616	2.85	953,655.60
216-1	Temporary Bypass Ditch	L.S.	1	8,000.00	8,000.00
216-2	Graded V-Ditch	L.F.	4804	1.00	4,804.00
216-3	Dirt Irrigation Ditch (4' Bottom)	L.F.	320	7.00	2,240.00
220-1	Grouted Riprap	Cu. Yd.	2847	75.00	213,525.00
220-2	Dumped Riprap	Cu. Yd.	49	90.00	4,410.00
220-3	Tree Wells	Ea.	10	1200.00	12,000.00
221-1	Gabion Baskets	Cu. Yd.	3944	68.00	268,192.00
221-2	Gabion Mattress	Cu. Yd.	15347	73.50	1,128,004.50

953,455.6

BID SCHEDULE

Contract FCD 98-15 Bullard Wash Channel Improvements Project and Estrella Parkway (Bid Canal to Yuma Road) Improvements Project

ITEM	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	EXTENDED AMOUNT
301-1	Farm and BID Canal Roads	L.F.	14,076.0	1.00	14076.00
310-1	Aggregate Base Course	Ton	10,997.0	9.00	98973.00
310-2	Filter Blanket (Type I)	Ton	695.0	18.00	12510.00
310-3	Filter Blanket (Type II)	Ton	1,053.0	14.00	14742.00
350-1	Remove Concrete Lined Ditch	L.S.	1.0	15000.00	15000.00
350-2	Remove Irrigation Culverts	L.S.	1.0	5000.00	5000.00
350-3	Remove Chain Link Fence	L.S.	1.0	7000.00	7000.00
350-4	Rubble and Debris Removal	Ton	2,900.0	10.00	29000.00
350-5	Miscellaneous Removals	L.S.	1.0	10000.00	10000.00
401-1	Traffic Control	L.S.	1.0	40000.00	40000.00
405-1	Survey Monument	Ea.	1.0	350.00	350.00
415-1	Barricades	L.F.	250.0	35.00	8750.00
420-1	Chain Link Fence and Gates	L.F.	6,355.0	9.00	57195.00
421-1	Wire Fence	L.F.	6,897.0	2.00	13794.00
432-1	Gravel Mulch	S.Y.	10,256.0	2.50	25640.00
502-1	Drilled Shafts	L.F.	350.0	80.00	28000.00
505-1	Structural Concrete (Class A)	Cu. Yd.	471.0	200.00	94200.00
505-2	Structural Concrete (Class AA)	Cu. Yd.	320.0	200.00	64000.00
505-3	Steel Reinforcement	Lb.	81,422.0	0.50	40711.00
505-4	Concrete Channel Lining	S.Y.	20,728.0	30.00	621840.00
505-5	Broadway Road Ford Crossing	S.Y.	934.0	45.00	42030.00
505-6	Concrete Inlet Channel	S.Y.	615.0	45.00	27675.00
505-7	Spillways	S.Y.	911.0	45.00	40995.00
505-8	O&M Path	L.F.	529.0	90.00	47610.00
505-9	Low Flow Channel	L.F.	3,843.0	40.00	153720.00

BID SCHEDULE

Contract FCD 98-15 Bullard Wash Channel Improvements Project and Estrella Parkway (Bid Canal to Yuma Road) Improvements Project

ITEM	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	EXTENDED AMOUNT
505-10	Inlet and Outlet Structures, MAG Det. 501-4	Ea.	5	1200. ⁰⁰	6000. ⁰⁰
505-11	Inlet and Outlet Structures, MAG Det. 502-1	Ea.	4	2000.⁰⁰ 1200. ⁰⁰	8000. ⁰⁰
505-12	Inlet and Outlet Structures, MAG Det. 501-1	Ea.	3	1600. ⁰⁰	4800. ⁰⁰
505-13	Inlet and Outlet Structures, Special Detail 25	Ea.	3	1800. ⁰⁰	5400. ⁰⁰
505-14	Outlet Structure, Special Section 10c	Ea.	1	1900. ⁰⁰	1900. ⁰⁰
505-15	Inlet and Outlet Structures, MAG Det. 501-5	Ea.	4	3000. ⁰⁰	12000. ⁰⁰
505-16	Outlet Structure, Special Detail 22	Ea.	1	25000. ⁰⁰	25000. ⁰⁰
505-17	Inlet Structure Detail 13	L.S.	1	25000. ⁰⁰	25000. ⁰⁰
505-18	Catch Basin, MAG Det. 535, Type F	Ea.	2	2300. ⁰⁰	4600. ⁰⁰
505-19	Concrete Staining	S.F.	130744	2. ⁰⁰	261488. ⁰⁰
506-1	Precast Slabs	Ea.	16	9000. ⁰⁰	144000. ⁰⁰
515-1	Access Gates	Ea.	13	1500. ⁰⁰	19500. ⁰⁰
515-2	Safety Posts	Ea.	33	150. ⁰⁰	4950. ⁰⁰
515-3	Removable Safety Posts	Ea.	4	125. ⁰⁰	500. ⁰⁰
515-4	Delineators	Ea.	56	50. ⁰⁰	2800. ⁰⁰
520-1	Handrail (42")	L.F.	11619	15. ⁰⁰	174285. ⁰⁰
520-2	Handrail (10")	L.F.	104	11. ⁰⁰	1144. ⁰⁰
525-1	Shotcrete Lining Spillway	S.Y.	65	60. ⁰⁰	3900. ⁰⁰
602-1	Jack and Bore Pipe	L.F.	75	600. ⁰⁰	45000. ⁰⁰
615-1	Sanitary Sewer Line Installation	L.F.	440	175. ⁰⁰	77000. ⁰⁰
618-1	24" DIP	L.F.	112	110. ⁰⁰	12320. ⁰⁰
618-2	30" DIP	L.F.	1001	160. ⁰⁰	160160. ⁰⁰
618-3	12" RGRCP	L.F.	268	45. ⁰⁰	12060. ⁰⁰
618-4	24" RGRCP	L.F.	595	60. ⁰⁰	35700. ⁰⁰
618-5	30" RGRCP	L.F.	331	65. ⁰⁰	21515. ⁰⁰

BID SCHEDULE

Contract FCD 98-15 Bullard Wash Channel Improvements Project and Estrella Parkway (Bid Canal to Yuma Road) Improvements Project

ITEM	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	EXTENDED AMOUNT
618-6	36" RGRCP	L.F.	290.0	80.00	23200.00
618-7	60" RGRCP	L.F.	232.0	180.00	41760.00
625-1	Adjust Sanitary Sewer Manhole	Ea.	2.0	400.00	800.00
625-2	Irrigation Siphon Manhole (Detail 12)	Ea.	8.0	4200.00	33600.00
632-1	PVC Pipe Sleeve	L.F.	695.0	7.00	4865.00
632-2	Steel Pipe Sleeve	L.F.	440.0	70.00	30800.00
635-1	Concrete Lined Ditch	L.F.	950.0	16.00	15200.00
635-2	Shallow Concrete Lined Ditch	L.F.	142.0	30.00	4260.00
	SUBTOTAL				5421134.10
205.08000	Roadway Excavation	Cu. Yd.	41,731.0	2.50	104327.50
215.08010	Earthwork for Retention Basins	Cu. Yd.	25,205.0	3.00	75615.00
215.08100	Earthwork for Dirt Irrigation Ditches	Cu. Yd.	5,291.0	4.00	21164.00
216.01120	Temporary Bypass Ditches	L.S.	1.0	20000.00	20000.00
220.08400	Plain Riprap	Cu. Yd.	6.0	200.00	1200.00
301.07000	Subgrade Preparation	S.Y.	223,985.0	1.00	223985.00
301.07110	Grade Dirt Farm Road	S.Y.	4,729.0	1.00	4729.00
309.08000	Lime Slurry with Fly Ash Stabilization	Cu. Yd.	45,904.0	14.00	642656.00
310.03161	Aggregate Base Course	Ton	77,919.0	8.00	623352.00
315.03000	Bituminous Prime Coat (Contingent Item)	Ton	293.8	260.00	76388.00
321.03940	Asphalt Concrete (19 mm)	Ton	49,434.0	22.00	1087548.00
329.03000	Bituminous Tack Coat	Ton	36.6	450.00	16470.00
333.03100	Fog Seal Coat (Contingent Item)	Ton	294.0	260.00	76544.00
340.00904	Median Nose Transition (MAG Std Det 223)	Ea.	25.0	40.00	1000.00

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BID SCHEDULE

Contract FCD 98-15 Bullard Wash Channel Improvements Project and Estrella Parkway (Bid Canal to Yuma Road) Improvements Project

ITEM	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	EXTENDED AMOUNT
340.04205	Curb and Gutter (MAG Std Det 220, Type A)	L.F.	41,678.0	6.00	250,068.00
340.04225	Single Curb (MAG Std Det 222, Type A)	L.F.	205.0	10.00	2,050.00
340.05012	Concrete Driveway (MAG Std Det 250)	S.F.	192.0	4.00	768.00
340.05400	Alley Entrance (MAG Std Det 260)	S.F.	735.0	4.00	2,940.00
340.05700	Sidewalk (MAG Std Det 230)	S.F.	5,448.0	2.00	10,896.00
340.20500	Bus Bay (City of Phoenix Std. Det. P 1256-1, Type 1)	Ea.	4.0	900.00	3,600.00
340.40305	Sidewalk Ramp (MCDOT Std Det 2031, Type A)	Ea.	12.0	550.00	6,600.00
340.44200	Curb and Gutter (MCDOT Std Det 2030)	L.F.	2,060.0	7.00	14,420.00
340.44220	Single Curb (MCDOT Std Det 2030)	L.F.	4,025.0	7.00	28,175.00
340.45013	Concrete Driveway (COG Std Det 3250)	S.F.	3,763.0	4.00	15,052.00
345.00112	Adjust Valve Box Frame & Cover (MAG Std Det 391-1, Type A)	Ea.	37.0	350.00	12,950.00
345.00113	Adjust Valve Box Frame & Cover (MAG Std Det 391-1, Type B)	Ea.	38.0	350.00	13,300.00
345.00340	Adjust Manhole Frame & Cover (MAG Std Det 422)	Ea.	15.0	350.00	5,250.00
350.00000	Removal of Contaminated Soil	L.S.	1.0	5,000.00	5,000.00
350.01100	Removal of Existing Miscellaneous Improvements	L.S.	1.0	20,000.00	20,000.00
350.04210	Removal of Existing Concrete Lined Ditches	L.F.	9,297.0	3.00	27,891.00
350.04710	Removal of Existing Pipe Culverts	L.F.	2,610.0	12.00	31,320.00
350.07500	Removal of Existing Pavement	S.Y.	102,929.0	1.00	102,929.00
401.01000	Traffic Control	L.S.	1.0	80,000.00	80,000.00
401.01100	Uniformed Off-Duty Law Enforcement Officer	Allowance	1.0	8,000.00	8,000.00
402.04100	2 1/2" PVC Conduit	L.F.	2,664.0	5.00	13,320.00
402.04140	4" PVC Pipe Sleeve	L.F.	1,151.0	6.00	6,906.00
402.04150	5" PVC Conduit	L.F.	1,334.0	16.00	21,344.00
405.00011	Install Brass Cap (MAG Std Det 120-2, Type E)	Ea.	4.0	100.00	400.00
405.00021	Install Brass Cap (MAG Std Det 120-1, Type A)	Ea.	10.0	100.00	1,000.00

BID SCHEDULE

Contract FCD 98-15 Bullard Wash Channel Improvements Project and Estrella Parkway (Bid Canal to Yuma Road) Improvements Project

ITEM	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	EXTENDED AMOUNT
405.00111	Install Survey Monument (MAG Std Det 120-2, Type E)	Ea.	3.0	200. ⁰⁰	600. ⁰⁰
405.00121	Install Survey Monument (MAG Std Det 120-1, Type A)	Ea.	6.0	200. ⁰⁰	1200. ⁰⁰
405.00122	Adjust Survey Monument to Grade (MAG Std Det 120-1, Type A)	Ea.	5.0	250. ⁰⁰	1250. ⁰⁰
415.10001	Guardrail GET-1 (ADOT Std Det C-10.40)	Ea.	1.0	3000. ⁰⁰	3000. ⁰⁰
415.10002	Guardrail GET-2 (ADOT Std Det C-10.41)	Ea.	3.0	3000. ⁰⁰	10500. ⁰⁰
415.40003	Guardrail Anchor (MCDOT Std Det 2042)	Ea.	2.0	1100. ⁰⁰	2200. ⁰⁰
415.40004	Shop Curved Guardrail (Details A & B)	Ea.	2.0	5000. ⁰⁰	10000. ⁰⁰
415.44200	Guardrail (MCDOT Std Det 2039)	L.F.	975.0	18. ⁰⁰	17550. ⁰⁰
420.44400	4' Chain Link Fence on Bridge	L.F.	202.0	19. ⁰⁰	3838. ⁰⁰
451.61100	Thermoplastic, Long Line, White, 60 mil	L.F.	65,961.0	0. ¹⁸	11872. ⁹⁸
451.61110	Thermoplastic, Long Line, Yellow, 60 mil	L.F.	63,764.0	0. ¹⁸	11477. ⁵²
451.61001	Thermoplastic, Short Line, White 90 mil	L.F.	23,850.0	0. ³⁰	7155. ⁰⁰
451.60201	Thermoplastic, Arrows, White 90 mil	Ea.	43.0	125. ⁰⁰	5375. ⁰⁰
451.60401	Thermoplastic, Symbols, White 90 mil	Ea.	3.0	275. ⁰⁰	825. ⁰⁰
451.60500	Removal of Curing Compound/Application of Primer-Sealer	L.F.	803.0	0. ³⁰	240. ⁹⁰
453.60000	Type 'D' RPM	Ea.	1,678.0	4. ⁰⁰	6712. ⁰⁰
453.60100	Type 'G' RPM	Ea.	2,264.0	4. ⁰⁰	9056. ⁰⁰
453.60200	Type 'H' RPM	Ea.	95.0	4. ⁰⁰	380. ⁰⁰
453.60800	911 - Blue Markers	Ea.	16.0	4. ⁰⁰	64. ⁰⁰
455.60610	Paint, Island, Yellow	Ea.	25.0	50. ⁰⁰	1250. ⁰⁰
470.00000	Remove and Salvage Traffic Signal	LS	1.0	3000. ⁰⁰	3000. ⁰⁰
471.61111	2", Schedule 40 PVC w/ 1/4" Nylon Pull Cord	L.F.	1,340.0	5. ⁰⁰	6700. ⁰⁰
471.61311	3", Schedule 40 PVC w/ 1/4" Nylon Pull Cord	L.F.	626.0	6. ⁰⁰	3756. ⁰⁰
471.61312	3", Schedule 40 PVC w/ #8 Bare Copper Wire	L.F.	3,923.0	6. ⁰⁰	23538. ⁰⁰
471.60043	No. 3 1/2 Pull Box	Ea.	8.0	200. ⁰⁰	1600. ⁰⁰

BID SCHEDULE

Contract FCD 98-15 Bullard Wash Channel Improvements Project and Estrella Parkway (Bid Canal to Yuma Road) Improvements Project

ITEM	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	EXTENDED AMOUNT
471.60044	No. 5 Pull Box	Ea.	24.0	300. ⁰⁰	7200. ⁰⁰
471.60046	No. 7 Pull Box	Ea.	36.0	350. ⁰⁰	12600. ⁰⁰
472.60100	Type 'A' Foundation	Ea.	4.0	550. ⁰⁰	2200. ⁰⁰
472.60130	Type 'R' Foundation (Mod)	Ea.	4.0	1600. ⁰⁰	6400. ⁰⁰
472.60260	Type 'SP' (Service Pedestal)	Ea.	1.0	300. ⁰⁰	300. ⁰⁰
472.60370	Type 'P' (Cabinet)	Ea.	1.0	500. ⁰⁰	500. ⁰⁰
473.60100	6' x 6' Detector Loop	Ea.	11.0	400. ⁰⁰	4400. ⁰⁰
473.60300	6' x 30' Quadrupole Loop	Ea.	1.0	500. ⁰⁰	500. ⁰⁰
473.60400	6' x 40' Quadrupole Loop	Ea.	5.0	600. ⁰⁰	3000. ⁰⁰
473.60500	6' x 50' Quadrupole Loop	Ea.	4.0	700. ⁰⁰	2800. ⁰⁰
502.44126	36" Drilled Shaft Bridge Foundations	L.F.	420.0	100. ⁰⁰	42000. ⁰⁰
505.00110	Catch Basin (MAG Std Det 535, Type F)	Ea.	2.0	2300. ⁰⁰	4600. ⁰⁰
505.00112	Catch Basin (MAG Std Det 531, Type B)	Ea.	4.0	2300. ⁰⁰	9200. ⁰⁰
505.00119	Catch Basin (MAG Std Det 538, Type H)	Ea.	1.0	2400. ⁰⁰	2400. ⁰⁰
505.00122	Catch Basin (MAG Std Det 532, Type C)	Ea.	5.0	2600. ⁰⁰	13000. ⁰⁰
505.00212	4' Scupper (MAG Std Det 206)	Ea.	11.0	2500. ⁰⁰	27500. ⁰⁰
505.00222	8' Scupper (MAG Std Det 206)	Ea.	11.0	3000. ⁰⁰	33000. ⁰⁰
505.00900	Concrete Pipe Collar	Ea.	2.0	700. ⁰⁰	1400. ⁰⁰
505.02000	Steel Reinforcement (Bridge)	Lb.	187536 202,782 202,782.0	0. ⁵⁰	93768. ⁰⁰
505.03000	Portland Cement Concrete (Bridge), Class AA	Cu. Yd.	1,045 92 960.0	250. ⁰⁰	261250. ⁰⁰
505.04000	Portland Cement Concrete (Bridge), Class A	Cu. Yd.	152 92 165.0	310. ⁰⁰	47120. ⁰⁰
505.12020	Reinforcing Steel (Box Culvert)	Lb.	48,859.0	0. ⁵⁰	24429. ⁵⁰
505.14020	Class A Concrete (Box Culvert)	Cu. Yd.	349.0	200. ⁰⁰	69800. ⁰⁰
505.40200	Scupper (Detail K)	Ea.	10.0	2600. ⁰⁰	26000. ⁰⁰
505.40212	Concrete Scupper per Special Detail E-4	Ea.	1.0	2600. ⁰⁰	2600. ⁰⁰

BID SCHEDULE

Contract FCD 98-15 Bullard Wash Channel Improvements Project and Estrella Parkway (Bid Canal to Yuma Road) Improvements Project

ITEM	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	EXTENDED AMOUNT
505.40500	Special RID Structure	Ea.	2.0	3500.00	7000.00
505.47050	Concrete Spillway	S.Y.	171.0	6.00	1026.00
505.48078	Concrete Barrier Transition (MCDOT Std Det 2044)	L.F.	80.0	60.00	4800.00
510.00000	Irrigation Junction Box (MAG Std Det 504)	Ea.	4.0	2800.00	11200.00
525.07431	Pneumatically Placed Mortar	S.Y.	283.0	31.00	8773.00
609.00000	Well Closure	Ea.	1.0	15000.00	15000.00
618.02310	12" RGRCP, Class III	L.F.	19.0	70.00	1330.00
618.02330	18" RGRCP, Class III	L.F.	2,343.0	55.00	128865.00
618.02350	24" RGRCP, Class III	L.F.	4,583.0	60.00	274980.00
618.02360	30" RGRCP, Class III	L.F.	807.0	70.00	56490.00
618.02370	36" RGRCP, Class III	L.F.	403.0	85.00	34255.00
618.02390	48" RGRCP, Class III	L.F.	296.0	145.00	42920.00
618.02450	24" RGRCP, Class IV	L.F.	229.0	60.00	13740.00
621.01170	36" Corrugated Metal Pipe	L.F.	96.0	55.00	5280.00
622.04010	12" DIP Culvert	L.F.	67.0	60.00	4020.00
622.04030	18" DIP Culvert	L.F.	126.0	70.00	8820.00
623.06220	U Headwall for 12" Pipe (MAG Std Det 501-1,2)	EA.	1.0	1200.00	1200.00
623.06230	U Headwall for 18" Pipe (MAG Std Det 501-1,2)	EA.	1.0	1200.00	1200.00
623.06250	U Headwall for 24" Pipe (MAG Std Det 501-1,2)	EA.	4.0	1300.00	5200.00
623.06259	U Headwall for 3-24" Pipes (MAG Std Det 501-1,2)	EA.	1.0	2200.00	2200.00
623.06270	U Headwall for 36" Pipe (MAG Std Det 501-1,2)	EA.	1.0	1600.00	1600.00
623.06330	L Headwall for 18" Pipe (MAG Std Det 501-1,2)	EA.	4.0	1000.00	4000.00
623.06350	L Headwall for 24" Pipe (MAG Std Det 501-1,2)	EA.	3.0	1300.00	3900.00
623.06358	L Headwall for 2 - 24" Pipes (MAG Std. Det. 501-1,2)	Ea.	1.0	1900.00	1900.00
623.06359	L Headwall for 3-24" Pipes (MAG Std Det 501-1,2)	EA.	1.0	2300.00	2300.00

BID SCHEDULE

**Contract FCD 98-15 Bullard Wash Channel Improvements Project and
Estrella Parkway (Bid Canal to Yuma Road) Improvements Project**

ITEM	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	EXTENDED AMOUNT
623.06370	L Headwall for 36" Pipe (MAG Std Det 501-1,2)	EA.	1.0	1600.00	1600.00
623.06430	Straight Headwall for 18" Pipe (MAG Std Det 501-1,2)	EA.	19.0	900.00	17100.00
623.06450	Straight Headwall for 24" Pipe (MAG Std Det 501-1,2)	EA.	40.0	1200.00	48000.00
623.06459	Straight Headwall for 2-24 Pipes (MAG Std Det 501-1,2)	EA.	3.0	1600.00	4800.00
623.06460	Straight Headwall for 30 Pipe (MAG Std Det 501-1,2)	EA.	6.0	1600.00	9600.00
623.06470	Straight Headwall for 36" Pipe (MAG Std Det 501-1,2)	EA.	3.0	2000.00	6000.00
623.06479	Straight Headwall for 2-36" Pipes (MAG Std Det 501-1,2)	EA.	3.0	2500.00	7500.00
623.06550	U Headwall w/ Trash Rack for 24" Pipe (MAG Std Det 502-1)	EA.	8.0	2500.00	20000.00
623.06560	U Headwall w/ Trash Rack for 30" Pipe (MAG Std Det 502-1)	EA.	3.0	3000.00	9000.00
623.06570	U Headwall w/ Trash Rack for 36" Pipe (MAG Std Det 502-1)	EA.	1.0	3000.00	3000.00
623.06579	U Headwall w/ Trash Rack for 2-36" Pipes (MAG Std Det 502-1)	EA.	1.0	3000.00	3000.00
623.40000	Special Headwalls	EA.	4.0	5000.00	20000.00
625.00130	Storm Drain Manhole Shaft and Base (MAG Det 520 & 522)	EA.	5.0	3800.00	19000.00
635.04100	Concrete Slip Form Irrigation Ditch (1' Bottom)	L.F.	8,820.0	12.00	105840.00
635.04300	Concrete Slip Form Irrigation Ditch (2' Bottom)	L.F.	1,323.0	17.00	22491.00
635.04400	Concrete Slip Form Irrigation Ditch (3' Bottom)	L.F.	1,348.0	24.00	32352.00
SUBTOTAL					5,471,547.40 5,471,443.40

PROJECT GRAND TOTAL:	11,363,681.50
TOTAL BID AMOUNT WRITTEN IN NUMBERS:	11,363,681.50
TOTAL BID AMOUNT WRITTEN IN WORDS: Eleven Million Three Hundred Sixty Three Thousand Six Hundred Eighty One and Fifty cents	

Grand Total - 11,363,577.50

IF BY AN INDIVIDUAL:

By: _____
(Printed Name - Title)

(Address)

(Signature) (Date)

(Telephone Number)

IF BY A FIRM, PARTNERSHIP OR L.L.C. (LIMITED LIABILITY COMPANY)

(Firm Name)

(Firm Address)

By: _____
(Signature - Title) (Date)

(Telephone Number)

** Name and Address of Each Member, or each Manager of L.L.C. per Operating Agreement

**The name and post office address of each member of the Firm or Partnership must be shown, or of each Manager of an L.L.C., also address of the registered office of the L.L.C.

IF BY A CORPORATION

FNF Construction, Inc
(Corporate Name)

P.O. Box 5005, Tempe AZ 85280-5005
(Corporation Address)

Gary Crisp, Sr. Vice President
(Printed Name - Title)

(602) 784-2910
(Telephone Number)

By: Gary Crisp 11.12.98
(Signature) (Date)

*Incorporated under the Laws of the State of Arizona

Names and Addresses of Officers:

Jed S. Billings
(President)

P.O. Box 5005, Tempe AZ 85280
(Address)

Barbara I. m'crite
(Secretary)

P.O. Box 5005, Tempe AZ 85280
(Address)

Barbara I. m'crite
(Treasurer)

P.O. Box 5005, Tempe AZ 85280
(Address)

*The name of the State under which the Laws of the Corporation was Chartered and name, title and business address of the President, Secretary, and Treasurer must be shown.

SUBCONTRACTOR LISTING

As required in Section 102.6 of the Supplementary General Conditions, the following is a listing of Subcontractors and material suppliers (including any M/WBE participation) that are to be used in the event the undersigned should enter into contract with the Owner. Although this list will not be considered as final commitment on the part of the successful proposer, any Subcontractor changes from those listed must have Owner's written approval prior to commencement of Subcontractor work on site.

Brown & White, Inc.	Heritage Trucking
Concrete Placement, Inc.	Ammax Rebar Placers
Intra-American Foundation	
Cactus Transport, Inc.	


(Signature)
Gary Crisp, Sr. Vice President

SURETY BOND

KNOW ALL MEN BY THESE PRESENTS:

That we, FNF Construction, Inc., as Principal, (hereinafter called the Principal), and the American Home Assurance Company, a corporation duly organized under the laws of the State of New York, as Surety, (hereinafter called the Surety), are held and firmly bound unto the Flood Control District of Maricopa County as Obligee, in the sum of ten percent (10%) of the total amount of the bid of Principal, submitted by him to the Flood Control District of Maricopa County, for the work described below, for the payment of which sum, well and truly to be made, the said Principal and the said Surety, bind ourselves, our heirs, executors, and administrators, successors and assigns, jointly and severally, firmly by these presents, and in conformance with the Arizona Revised Statutes.

WHEREAS, the said Principal is herewith submitting its proposal for Contract FCD 98-15, Bullard Wash Channel Improvements Project and Estrella Parkway (Bid Canal to Yuma Road) Improvements Project.

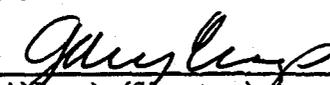
NOW, THEREFORE, if the Flood Control District of Maricopa County shall accept the proposal of the Principal and the Principal shall enter into a contract with the Flood Control District of Maricopa County in accordance with the terms of the proposal and give the Bonds and Certificates of Insurance as specified in the Standard Specifications with good and sufficient Surety for the faithful performance of the contract and for the prompt payment of labor and material furnished in the prosecution of the contract, or in the event of the failure of the Principal to enter into the contract and give such Bond and Certificate of Insurance, if the Principal pays to the Flood Control District of Maricopa County the difference not to exceed the penalty of the bond between the amount specified in the proposal and such larger amount for which the Flood Control District of Maricopa County may in good faith contract with another party to perform the work covered by the proposal then this obligation is void. Otherwise it remains in full force and effect, provided, however, that this bond is executed pursuant to the provisions of Section 34-201, Arizona Revised Statutes, and all liabilities on this bond shall be determined in accordance with the provisions of the section to the extent as if it were copied at length herein.

Signed and sealed this 2nd day of November, A.D., 1998.

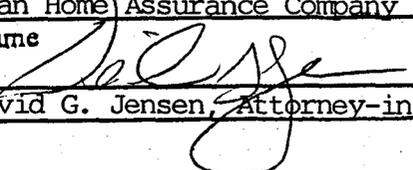
Aon Risk Services, Inc., of AZ
Agency of Record, State of Arizona

Agency Address and Phone Number:
3200 E. Camelback Road, Ste 210
Phoenix, AZ 85018-2320
(602)468-3200

FNF Construction, Inc.
Principal

By: 
(Printed Name) (Signature)
Title: Gary Crisp, Sr. Vice President

American Home Assurance Company
Surety Name

By: 
Title: David G. Jensen, Attorney-in-Fact

Bond Number: N/A

ATTACH SURETY POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS:

That American Home Assurance Company, a New York corporation, and National Union Fire Insurance Company of Pittsburgh, Pa., a Pennsylvania corporation, does each hereby appoint

---David G. Jensen, Linda Albert, Jacqueline M. Wanta: of Phoenix, Arizona---

its true and lawful Attorney(s)-in-Fact, with full authority to execute on its behalf bonds, undertakings, recognizances and other contracts of indemnity and writings obligatory in the nature thereof, issued in the course of its business, and to bind the respective company thereby.

IN WITNESS WHEREOF, American Home Assurance Company and National Union Fire Insurance Company of Pittsburgh, Pa. have each executed these presents

this 24th day of March, 1998.



Lawrence W. Carlstrom

Lawrence W. Carlstrom, Senior Vice President
National Union Fire Insurance Company of Pittsburgh, PA.
Vice President, American Home Assurance Company

STATE OF NEW YORK }
COUNTY OF NEW YORK }ss.

On this 24th day of March, 1998 before me came the above named officer of American Home Assurance Company and National Union Fire Insurance Company of Pittsburgh, Pa., to me personally known to be the individual and officer described herein, and acknowledged that he executed the foregoing instrument and affixed the seals of said corporations thereto by authority of his office.

Deborah A. Haysan

DEBORAH A. HAYSAN
Notary Public, State of New York
No. 01MASC81428
Qualified in Suffolk County
Commission Expires June 30, 1999

CERTIFICATE

Excerpts of Resolutions adopted by the Boards of Directors of American Home Assurance Company and National Union Fire Insurance Company of Pittsburgh, Pa. on May 18, 1976:

"RESOLVED, that the Chairman of the Board, the President, or any Vice President be, and hereby is, authorized to appoint Attorneys-in-Fact to represent and act for and on behalf of the Company to execute bonds, undertakings, recognizances and other contracts of indemnity and writings obligatory in the nature thereof, and to attach thereto the corporate seal of the Company, in the transaction of its surety business;

"RESOLVED, that the signatures and attestations of such officers and the seal of the Company may be affixed to any such Power of Attorney or to any certificate relating thereto by facsimile, and any such Power of Attorney or certificate bearing such facsimile signatures or facsimile seal shall be valid and binding upon the Company when so affixed with respect to any bond, undertaking, recognizance or other contract of indemnity or writing obligatory in the nature thereof,

"RESOLVED, that any such Attorney-in-Fact delivering a secretarial certification that the foregoing resolutions still be in effect may insert in such certification the date thereof, said date to be not later than the date of delivery thereof by such Attorney-in-Fact."

I, Elizabeth M. Tuck, Secretary of American Home Assurance Company and of National Union Fire Insurance Company of Pittsburgh, Pa. do hereby certify that the foregoing excerpts of Resolutions adopted by the Boards of Directors of these corporations, and the Powers of Attorney issued pursuant thereto, are true and correct, and that both the Resolutions and the Powers of Attorney are in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the facsimile seal of each corporation

this 2nd day of November, 1998



Elizabeth M. Tuck
Elizabeth M. Tuck, Secretary

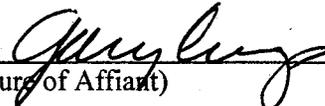
**AFFIDAVIT BY CONTRACTOR
CERTIFYING THAT THERE WAS NO COLLUSION
IN BIDDING FOR CONTRACT**

STATE OF Arizona }
County of Maricopa } SS

Gary Crisp being first duly sworn, deposes and says:

That he/she is Sr. Vice President of FNF Construction, Inc. bidding on Contract FCD 98-15, Bullard Wash Channel Improvements Project and Estrella Parkway (Bid Canal to Yuma Road) Improvements Project in the County of Maricopa, State of Arizona.

That, in connection with the above-mentioned project, neither he/she, nor anyone associated with the aforesaid business, has, directly or indirectly, participated in any collusion, entered into any contract, combination, conspiracy or other act in restraint of trade or commerce in violation of the provisions of A.R.S. Section 34-251, Article 4, as amended.



(Signature of Affiant)

Subscribed and sworn to before me this 12th day of November, 1998

Kristi Carpenter

(Notary Public)

4.29.2000
My Commission Expires



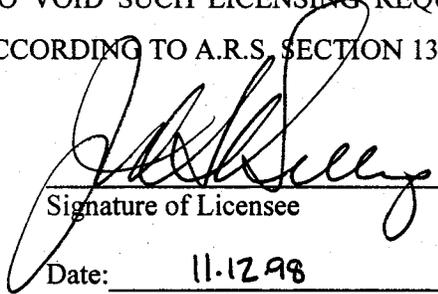
CERTIFICATION OF LICENSE

Pursuant to A.R.S. Section 32-1169, I hereby state that I hold a current contractor's license, duly issued by the office of the Registrar of Contractors for the State of Arizona, said license has not been revoked, that the license number is: ~~009574-A~~ ~~082636-B~~ that my privilege license number (as required by A.R.S. Section 42-1305) is: 07-282683-K; and that, if any exemption to the above licensing requirements is claimed;

(1) The basis for the claimed exemption is: N/A and;

(2) The name(s) and license number(s) of any general, mechanical, electrical, or plumbing contractor(s) to be employed on the work are:

IT IS UNDERSTOOD THAT THE FILING OF AN APPLICATION CONTAINING FALSE OR INCORRECT INFORMATION CONCERNING AN APPLICANT'S CONTRACTOR'S LICENSE OR PRIVILEGE LICENSE WITH THE INTENT TO VOID SUCH LICENSING REQUIREMENTS IS UNSWORN FALSIFICATION PUNISHABLE ACCORDING TO A.R.S. SECTION 13-2704.



Signature of Licensee
Date: 11.12.98

Company: FNF Construction, Inc

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
MINORITY/WOMEN-OWNED BUSINESS ENTERPRISE PROGRAM
MBE/WBE ASSURANCES AFFIDAVIT

NOTE: FAILURE TO COMPLETE AND SUBMIT THIS AFFIDAVIT WITH THE BID PROPOSAL MAY BE CAUSE FOR REJECTION OF THE BID.

The undersigned, fully cognizant of the Flood Control District of Maricopa County MBE/WBE Program requirements and of the goal established, hereby certifies that in the preparation of this bid,

FNF Construction, Inc. (the entity submitting the bid)

(CHECK ONE)

- Will meet the **established** goal for participation by Minority/Women-Owned Business Enterprises.
- Will provide the necessary documentation to Minority Business Office to establish that a good faith effort was made.

The first and second low bidders will specify their MBE/WBE participation on the Actual Participation affidavit or provide documentation of their good faith efforts not later than 4:00 p.m., the seventh calendar day following the bid opening. If participation is "None", the documentation shall provide bidder's good faith efforts to obtain the participation. This documentation will be reviewed by the MBO to determine whether in fact a comprehensive "good faith" effort has been implemented. The required affidavit shall be obtained by the apparent first and second low bidders from the Minority Business Office, 2901 West Durango Street, Phoenix, Arizona 85009, Telephone 506-8656, following the bid opening and verbal notification from the Procurement Officer of the Procurement Agency; a SAMPLE affidavit form for reference purposes follows.

FNF Construction, Inc.
Name of Firm
By: *Gary Crisp*
Signature
Gary Crisp, Sr. Vice President
Title

STATE OF Arizona)
County of Maricopa) ss

Subscribed and sworn to before me this 12th day of November, 1998

Kristi Carpenter
Notary Public

My Commission Expires: 4-29-2000



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
 MINORITY/WOMEN OWNED BUSINESS ENTERPRISE PROGRAM
ACTUAL MBE/WBE PARTICIPATION AFFIDAVIT

(NOTE: COMPLETED AFFIDAVIT MUST BE SUBMITTED WITHIN SEVEN CALENDAR DAYS FOLLOWING THE BID OPENING).

FNF Construction, Inc.
 Name of Contractor
Gary Crisp
 Contact Person
115 S. 46th Street
 Street No.
Tempe AZ 85281
 City State Zip

Project/Contract Number FCD 98-15
 Contract M/WBE Goal: 10 %

Total Amount of Contract 11363681.50

Minority/Women Owned Firm	Principal	Address	Type of Work	Contract Percentage	
Concrete Placement, Inc.	Carol Unbrd	Glendale, AZ	concrete work	4.81 %	\$ 547,370
Annex Rebar Placers, Inc.	Oscar Garcia	Scottsdale, AZ	reinforcing steel	2.64 %	300,681
Cactus Transport, Inc.	J.R. Dorniny	Phoenix, AZ	applied oils	1.26 %	143,310
Intra-American Foundation	Salvador Altamirano	Phoenix, AZ	drilled shafts	0.34 %	39,270
Brown & White, Inc.	Peter Granillo	Tucson, AZ	guardrail	0.37 %	43,022
Heritage Trucking	Joyce Tode	Mesa, AZ	trucking	1.12 %	127,506
TOTALS (Dollars/Percentage)				\$ 1,201,153	10.54 %

The undersigned has entered into a formal agreement with the MBE/WBE subconsultants/subcontractors /suppliers listed above, in the execution of this contract with Maricopa County.

Gary Crisp
 Signature
Gary Crisp
 Sr. Vice President
 Title
FNF Construction, Inc.

STATE OF Arizona)

County of Maricopa) ss

Subscribed and sworn to before me this 17th day of November 1998 by Kristi Carpenter
 Notary Public

My commission Expires: 4-29-2000



**MARICOPA COUNTY
MINORITY/WOMEN-OWNED BUSINESS ENTERPRISES PROGRAM**

**D/M/WBE PARTICIPATION REPORT
(To be attached with Each Request for Pay)**

Date: _____

General Contractor/Prime Consultant: _____
Contact Person: _____
Address: _____
Telephone Number: _____
Fax Number: _____

Project Description: _____
Contract Number: _____
For Pay Period of (indicate dates): _____

D/M/WBE Subcontractor/Subconsultant Name: _____
Contact Person: _____
Address: _____
Telephone Number: _____

Type of Firm: _____
Type of Work performed for this project: _____

Total D/M/WBE Subcontract Amount: \$ _____

**Amount Paid to this D/M/WBE
Subcontractor this invoice:** \$ _____

Total paid to this Subcontractor to date: \$ _____

Total D/M/WBE Contract Goal this project = ____ %

**Total D/M/WBE Participation
on this contract to date =** ____ %

**cc: Maricopa County Infrastructure
Contracts and D/W/MBE Office
2901 West Durango Street
Phoenix, Arizona 85009**

C69-99-013-2

CONTRACT AGREEMENT

THIS AGREEMENT, made and entered into this 4th day of December, 1998 by and between the FLOOD CONTROL DISTRICT OF MARICOPA COUNTY, hereinafter called the Owner, acting by and through its BOARD OF DIRECTORS, and FNF CONSTRUCTION, INC., hereinafter called the Contractor.

WITNESSETH: That the said Contractor, for and in the consideration of the sum of eleven million, three hundred sixty-three thousand, five hundred seventy-seven dollars and fifty cents (\$11,363,577.50) to be paid to him by the Owner, in the manner and at the times hereinafter provided, and of the other covenants and agreements herein contained, hereby agrees for himself, heirs, executors, administrators, successors, and assigns as follows:

ARTICLE I - SCOPE OF WORK: THE Contractor shall construct, and complete in a workmanlike and substantial manner and to the satisfaction of the Chief Engineer and General Manager, a project for the Flood Control District of Maricopa County, designated as Contract FCD 98-15, Bullard Wash Channel Improvements Project and Estrella Parkway (Bid Canal to Yuma Road) Improvements Project, and furnish at its own cost and expense all necessary machinery, equipment, tools, apparatus, materials, and labor to complete the work in the most substantial and workmanlike manner according to the Plans and Construction Specifications on file with the Flood Control District of Maricopa County, 2801 West Durango Street, Phoenix, Arizona, and such modifications of the same and other directions that may be made by the Flood Control District of Maricopa County as provided herein.

ARTICLE II - CONTRACT DOCUMENTS: The Construction Specifications, i.e. Invitation to Bid, Plans, Standard Specifications and Details, Supplementary General Conditions, Special Provisions, Addenda, if any, Proposal, Affidavits, Performance Bond, Payment Bond, Certificates of Insurance, and Change Orders, if any, are by this reference made a part of this Contract and shall have the same effect as though all of the same were fully inserted herein.

ARTICLE III - TIME OF COMPLETION: The Contractor further covenants and agrees at its own proper cost and expense, to do all work as aforesaid for the construction of said improvements and to completely construct the same and install the material therein, as called for by this agreement free and clear of all claims, liens, and charges whatsoever, in the manner and under the conditions specified within three hundred sixty-five (365) calendar days following notice to proceed.

ARTICLE IV - PAYMENTS: For and in consideration of the faithful performance of the work herein embraced as set forth in the Contract Documents, which are a part hereof and in accordance with the directions of the Owner, through its Engineer and to its satisfaction, the Owner agrees to pay the said Contractor the amount earned, computed from actual quantities of work performed and accepted or materials furnished at the unit bid price on the Proposal made a part hereof, and to make such payment in accordance with the requirements of A.R.S. Section 34-221, as amended. The Contractor agrees to discharge its obligations and make payments to its subcontractors and suppliers in accordance with A.R.S. Section 34-221.

ARTICLE V - TERMINATION: The Owner hereby gives notice that pursuant to A.R.S. Section 38-511(A) this contract may be canceled without penalty or further obligation within three years after execution if any person significantly involved in initiation, negotiation, securing, drafting or creating a contract on behalf of the Owner is, at any time while the contract or any extension of the contract is in effect, an employee or agent of any other party to the contract in any capacity or a consultant to any other party of the contract with respect to the subject matter of the contract. Cancellation under this section shall be effective when written notice from the Chief Engineer and General Manager of the Owner is received by all of the parties to the contract. In addition, the Owner may recoup any fee for commission paid or due to any person significantly involved in initiation, negotiation, securing, drafting or creating the contract on behalf of the Owner from any other party to the contract arising as a result of the contract.

ARTICLE VI - NEGOTIATION CLAUSE: Recovery of damages related to expenses incurred by the Contractor for a delay for which the Owner is responsible, which is unreasonable under the circumstances and which was not within the contemplation of the parties to the contract, shall be negotiated between the Contractor and the Owner. This provision shall be construed so as to give full effect to any provision in the contract which requires notice of delays, provides for arbitration or other procedure for settlement or provides for liquidated damages.

ARTICLE VII - COMPLIANCE WITH LAWS: The Contractor is required to comply with all Federal, State and local ordinances and regulation. The Contractor's signature on this contract certifies compliance with the provisions of the I-9 requirements of the Immigration Reform Control Act of 1986 for all personnel that the Contractor and any subcontractors employ to complete this project. It is understood that the Owner shall conduct itself in accordance with the provisions of the Maricopa County Procurement Code.

ARTICLE VIII - MBE/WBE PROGRAM: The Owner will endeavor to ensure in every way possible that minority and women-owned business enterprises shall have every opportunity to participate in providing professional services, purchased goods, and contractual services to the Owner without being discriminated against on the grounds of race, religion, sex, age, disability, or national origin. The Maricopa County Minority Business Program implemented January 1, 1992, is incorporated by reference.

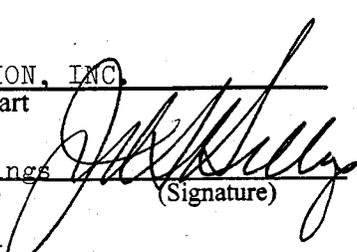
ARTICLE IX - ANTI-DISCRIMINATION PROVISION: The Contractor agrees not to discriminate against any employee or applicant for employment because of race, religion, color, sex, national origin, age, or disability and further agrees not to engage in any unlawful employment practices. The Contractor further agrees to insert the foregoing provision in all subcontracts hereunder.

IN WITNESS WHEREOF: Five (5) identical counterparts of this Contract, each of which shall for all purposes be deemed an original thereof, have been duly executed by the parties hereinabove named, on the date and year first above written.

FNF CONSTRUCTION, INC.

Party of the First Part

By Jed S. Billings
(Printed Name)


(Signature)

Title: President

Date: 11/19/98

86-0474623

Tax Identification Number

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
PARTY OF THE SECOND PART

RECOMMENDED BY:

115911 12/4/98
Chief Engineer and General Manager Date
Flood Control District of Maricopa County

By: Jan Brewer 12/4/98
Chairman, Board of Directors Date

ATTEST:

Jan Brewer 12/4/98
Clerk of the Board 071598 Date

LEGAL REVIEW

Approved as to form and within the powers and authority granted under the laws of the State of Arizona to the Flood Control District.

By: Julie M. Lemmon 12/4/98
District, General Counsel Date

**STATUTORY PAYMENT BOND PURSUANT TO TITLE 34
CHAPTER 2, ARTICLE 2, OF THE ARIZONA REVISED STATUTES
(Penalty of this bond must be 100% of the Contract amount)**

BOND NO. 20-61-58

KNOW ALL MEN BY THESE PRESENTS:

That, FNF Construction, Inc. (hereinafter called the Principal), as Principal, and American Home Assurance Company a corporation organized and existing under the laws of the State of New York, with its principal office in the City of New York (hereinafter called the Surety), as Surety, are held and firmly bound unto the Flood Control District of Maricopa County, in the County of Maricopa, State of Arizona (hereinafter called the Obligee), in the amount of eleven million, three hundred sixty-three thousand, five hundred seventy-seven dollars and fifty cents (\$11,363,577.50), for the payment whereof, the said Principal and Surety bind themselves, and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into a certain written contract with the Flood Control District of Maricopa County, dated the _____ day of _____, 1998 for Contract FCD 98-15, Bullard Wash Channel Improvements Project and Estrella Parkway (Bid Canal to Yuma Road) Improvements Project, which contract is hereby referred to and made a part hereof as fully and to the same extent as if copied at length herein.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the Principal promptly pays all monies due to all persons supplying labor or materials to the Principal or the Principal's Subcontractors in the prosecution of the work provided for in the contract, this obligation is void. Otherwise it remains in full force and effect.

PROVIDED, HOWEVER, that this bond is executed pursuant to the provisions of the Title 34, Chapter 2, Article 2, Arizona Revised Statutes, and all liabilities on this bond shall be determined in accordance with the provisions, conditions and limitations of Title 34, Chapter 2, Article 2, Arizona Revised Statutes, to the same extent as if they were copied at length in this agreement.

The prevailing party in a suit on this bond shall recover as a part of the judgment reasonable attorney fees that may be fixed by a judge of the court.

November
Witness our hands this 19th day of _____, 1998

Aon Risk Services, Inc. of AZ
Agency of Record, State of Arizona

Agency Address and Phone Number:
3200 E. Camelback Road, Ste 210
Phoenix, AZ 85018-2320
(602)468-3200

FNF Construction, Inc.
Principal

By: Jed S. Billings
Printed Name and Signature

Title: President

American Home Assurance Company
Surety Seal

By: David G. Jensen
Title: David G. Jensen, Attorney-in-Fact

ATTACH SURETY POWER OF ATTORNEY

STATUTORY PERFORMANCE BOND PURSUANT TO TITLE 34
CHAPTER 2, ARTICLE 2, OF THE ARIZONA REVISED STATUTES
(Penalty of this bond must be 100% of the Contract amount)

BOND NO. 20-61-58

KNOW ALL MEN BY THESE PRESENTS:

That, FNF Construction, Inc. hereinafter called the Principal, as Principal, and American Home Assurance Company a corporation organized and existing under the laws of the State of New York, with its principal office in the City of New York (hereinafter called the Surety), as Surety, are held and firmly bound unto the Flood Control District of Maricopa County, in the County of Maricopa, State of Arizona, in the amount of eleven million, three hundred sixty-three thousand, five hundred seventy-seven dollars and fifty cents (\$11,363,577.50), for the payment whereof, the said Principal and Surety bind themselves, and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into a certain written contract with the Flood Control District of Maricopa County, dated the ___ day of _____, 1998, for Contract FCD 98-15, Bullard Wash Channel Improvements and Estrella Parkway (Bid Canal to Yuma Road) Improvements Project, which contract is hereby referred to and made a part hereof as fully and to the same extent as if copied at length herein.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the Principal faithfully performs and fulfills all of the undertakings, covenants, terms, conditions and agreements of the contract during the original term of the contract and any extension of the contract, with or without notice to the Surety, and during the life of any guaranty required under the contract, and also performs and fulfills all of the undertakings, covenants, terms, conditions and agreements of all duly authorized modifications of the contract that may hereafter be made, notice of which modifications to the Surety being hereby waived; the above obligation is void. Otherwise it remains in full force and effect.

PROVIDED, HOWEVER, that this bond is executed pursuant to the provisions of Title 34, Chapter 2, Article 2, Arizona Revised Statutes, and all liabilities on this bond shall be determined in accordance with the provisions, conditions and limitations of Title 34, Chapter 2, and Article 2, Arizona Revised Statutes, to the same extent as if they were copied at length in this agreement.

The prevailing party in a suit on this bond shall recover as part of the judgment reasonable attorney fees that may be fixed by a judge of the court.

Witness our hands this 19th day of November, 1998.

Aon Risk Services, Inc. of AZ
Agency of Record, State of Arizona

Agency Address and Phone Number:
3200 E. Camelback Road, Ste 210
Phoenix, AZ 85018-2320
(602)468-3200

BOND NUMBER: 20-61-58

ATTACH SURETY POWER OF ATTORNEY

FNF Construction, Inc.

Principal

By: Jed S. Billings
(Printed Name)

(Signature)

Title: President

American Home Assurance Company
Surety Seal

By: David G. Jensen

Title: David G. Jensen, Attorney-in-Fact

KNOW ALL MEN BY THESE PRESENTS:

That American Home Assurance Company, a New York corporation, and National Union Fire Insurance Company of Pittsburgh, Pa., a Pennsylvania corporation, does each hereby appoint

---David G. Jensen, Linda Albert, Jacqueline M. Wanta: of Phoenix, Arizona---

its true and lawful Attorney(s)-in-Fact, with full authority to execute on its behalf bonds, undertakings, recognizances and other contracts of indemnity and writings obligatory in the nature thereof, issued in the course of its business, and to bind the respective company thereby.

IN WITNESS WHEREOF, American Home Assurance Company and National Union Fire Insurance Company of Pittsburgh, Pa. have each executed these presents

this 24th day of March, 1998.



Lawrence W. Carlstrom, Senior Vice President
National Union Fire Insurance Company of Pittsburgh, PA.
Vice President, American Home Assurance Company

STATE OF NEW YORK }
COUNTY OF NEW YORK }ss.

On this 24th day of March, 1998 before me came the above named officer of American Home Assurance Company and National Union Fire Insurance Company of Pittsburgh, Pa., to me personally known to be the individual and officer described herein, and acknowledged that he executed the foregoing instrument and affixed the seals of said corporations thereto by authority of his office.

DEBORAH A. HAYMAN
Notary Public, State of New York
No. 01HA5081428
Qualified in Suffolk County
Commission Expires June 30, 1999

CERTIFICATE

Excerpts of Resolutions adopted by the Boards of Directors of American Home Assurance Company and National Union Fire Insurance Company of Pittsburgh, Pa. on May 18, 1976:

"RESOLVED, that the Chairman of the Board, the President, or any Vice President be, and hereby is, authorized to appoint Attorneys-in-Fact to represent and act for and on behalf of the Company to execute bonds, undertakings, recognizances and other contracts of indemnity and writings obligatory in the nature thereof, and to attach thereto the corporate seal of the Company, in the transaction of its surety business;

"RESOLVED, that the signatures and attestations of such officers and the seal of the Company may be affixed to any such Power of Attorney or to any certificate relating thereto by facsimile, and any such Power of Attorney or certificate bearing such facsimile signatures or facsimile seal shall be valid and binding upon the Company, when so affixed with respect to any bond, undertaking, recognizance or other contract of indemnity or writing obligatory in the nature thereof;

"RESOLVED, that any such Attorney-in-Fact delivering a secretarial certification that the foregoing resolutions still be in effect may insert in such certification the date thereof, said date to be not later than the date of delivery thereof by such Attorney-in-Fact."

I, Elizabeth M. Tuck, Secretary of American Home Assurance Company and of National Union Fire Insurance Company of Pittsburgh, Pa. do hereby certify that the foregoing excerpts of Resolutions adopted by the Boards of Directors of these corporations, and the Powers of Attorney issued pursuant thereto, are true and correct, and that both the Resolutions and the Powers of Attorney are in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the facsimile seal of each corporation

this 19th day of November, 19 98.


Elizabeth M. Tuck, Secretary

INDEMNIFICATION

To the fullest extent permitted by law, the Contractor shall defend, indemnify and hold harmless the Flood Control District of Maricopa County, Maricopa County Department of Transportation, City of Goodyear, Union Pacific Railroad, Buckeye Irrigation District, Roosevelt Irrigation District, Phoenix Goodyear Airport, A-Tumbling-T-Ranch, Wood Family Enterprises, and Palo Verde Nuclear Generating Station, their agents, representatives, officers, directors, officials, and employees from and against all claims, damages, losses and expenses (including but not limited to attorney fees, court costs, and the cost of appellate proceedings), relating to, arising out of, or resulting from the Contractor's work or services. The Contractor's duty to defend, hold harmless and indemnify the District, its agents, representatives, officers, directors, officials, and employees shall arise in connection with any claim, damage, loss or expense that is attributable to bodily injury, sickness, disease, death, or injury to, impairment, or destruction of property including loss of use resulting therefrom, caused in whole or in part by any act or omission by the Contractor, anyone the Contractor directly or indirectly employs, or anyone for whose acts the Contractor may be liable, regardless of whether it is caused in part by a party indemnified hereunder, including the District.

The amount and type of insurance coverage requirements set forth below will in no way be construed as limiting the scope of the indemnity in this paragraph.

~~For all other hazards, liabilities, and exposures: To the fullest extent permitted by law, the Contractor shall defend, indemnify and hold harmless the Flood Control District of Maricopa County, Maricopa County Department of Transportation, City of Goodyear, Union Pacific Railroad, Buckeye Irrigation District, Roosevelt Irrigation District, Phoenix Goodyear Airport, A-Tumbling-T-Ranch, Wood Family Enterprises, and Palo Verde Nuclear Generating Station, their agents, representatives, officers, directors, officials, and employees from and against all claims, damages, losses and expenses (including but not limited to attorney fees, court costs, and the cost of appellate proceedings), relating to, arising out of or resulting from the Contractor's work or services. Contractor's duty to defend, hold harmless, and indemnify the Flood Control District of Maricopa County, Maricopa County Department of Transportation, City of Goodyear, Union Pacific Railroad, Buckeye Irrigation District, Roosevelt Irrigation District, Phoenix Goodyear Airport, A-Tumbling-T-Ranch, Wood Family Enterprises, and Palo Verde Nuclear Generating Station, their agents, representatives, officers, directors, officials, and employees shall arise in connection with any claim, damage, loss or expense that is attributable to bodily injury, sickness, disease, death, injury to, impairment or destruction of property including loss of use resulting therefrom, caused in whole or in part by any act or omission of the Contractor, anyone the Contractor directly or indirectly employs, or anyone for whose acts the Contractor may be liable, regardless of whether it is caused in part by a party indemnified hereunder, including the District.~~

11/19/9
DS
DLK
11/15/9

~~The amount and type of insurance coverage requirements set forth below will in no way be construed as limiting the scope of the indemnity in this paragraph.~~

INSURANCE REQUIREMENTS

Without limiting any of its obligations or liabilities, the Contractor, at the Contractor's own expense, shall purchase and maintain the hereafter stipulated minimum insurance with companies duly licensed, possessing a current A.M. Best, Inc. rating of B++6, or approved unlicensed to do business in the State of Arizona with policies and forms satisfactory to the County.

All insurance required herein shall be maintained in full force and effect until all work required to be performed under the terms of the Contract is satisfactorily completed and formally accepted; failure to do so may, at the sole discretion of the District, constitute a material breach of this Contract.

The Contractor's insurance shall be primary insurance as respects the District, and any insurance or self insurance maintained by the District shall not contribute to it.

Any failure to comply with the claim reporting provisions of the policies or any breach of the policy warranty

shall not affect coverage afforded under the policies to protect the District.

The policies, except Workers' Compensation, shall contain a waiver of transfer rights of recovery (subrogation) against the District, its agents, representatives, directors, officers, and employees for any claims arising out of the Contractor's work or service.

The policies may provide coverage which contain deductibles or self insured retentions. Such deductible and/or self insured retentions shall not be applicable with respect to the coverage provided to the District under such policies. The Contractor shall be solely responsible for the deductible and/or self insured retentions and the District, at its option, may require the Contractor to secure the payment of such deductible or self insured retentions by a surety bond or an irrevocable and unconditional letter of credit.

The District reserves the right to request and to receive, within 10 working days, certified copies of any or all of the above policies and/or endorsements. The District shall not be obligated, however, to review same or to advise the Contractor of any deficiencies in such policies and endorsements, and such receipt shall not relieve the Contractor from, or be deemed a waiver of the District's right to insist on, strict fulfillment of the Contractor's obligations under this Contract.

The insurance coverage, except Workers' Compensation and Professional Liability, required by this Contract shall name the District, its agents, representatives, officers, directors, officials, and employees as Additional Insureds.

General Liability. The Contractor shall maintain Commercial General Liability insurance with a limit of not less than \$5,000,000 for each occurrence with a \$5,000,000 Products and Completed Operations Limit and \$5,000,000 General Aggregate Limit, and include coverage for bodily injury, broad form property damage, personal injury, products/completed operations and blanket contractual covering, but not limited to, the liability assumed under the indemnification provisions of this Contract, which coverage will be at least as broad as the Insurance Service Office, Inc. Policy Form CG 00011093 or any replacements thereof. The coverage shall not exclude X, C, U.

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JG 11/19/98

Such policy shall contain a severability of interest provision, and shall not contain a sunset provision or commutation clause, nor any provision which would serve to limit third party action over claims.

The Commercial General liability additional insured endorsement will be at least as broad as the Insurance Service Office, Inc. Additional Insured, Form B, CG 20101093, or replacements thereof.

Any failure to comply with the reporting or other provisions of the policies including breaches of warranties shall not affect coverage provided to the District.

If required by this contract, the Contractor subletting any part of the work awarded to the Contractor shall purchase and maintain, at all times during prosecution of the work under this Contract, an Owner's and Contractor's Protective Liability insurance policy for bodily injury and property damage, including death, which may arise in the prosecution of the work or Contractor's operations under this contract. Coverage shall be on an occurrence basis with a limit not less than \$5,000,000 per occurrence, and the policy shall be issued by the same insurance company that issues the Contractor's Commercial General Liability insurance.

Automobile Liability. The Contractor shall maintain Commercial/Business Automobile Liability insurance with a combined single limit for bodily injury and property damage of not less than \$2,000,000 each occurrence with respect to the Contractor's any owned, hired, and non-owned vehicles assigned to or used in performance of the Contractor's work or services. Coverage will be at least as broad as coverage code 1, "any auto" (Insurance Services Office, Inc. Policy Form CA 00011293, or any replacements thereof). Such insurance shall include coverage for loading and off-loading hazards. If hazardous substances, materials, or wastes are to be transported, MCS 90 endorsement shall be included and \$5,000,000 per accident limits for bodily injury and property damage shall apply.

Workers' Compensation. The Contractor shall carry Workers' Compensation insurance to cover obligations imposed by federal and state statutes having jurisdiction of Contractor's employees engaged in the performance of the work or services; and Employer's liability insurance of not less than \$1,000,000 for each accident, \$1,000,000 disease for each employee, and \$1,000,000 disease policy limit.

In case any work is subcontracted, the Contractor will require the subcontractor to provide Workers' Compensation and Employer's Liability to at least the same extent as required of the Contractor.

Builders' Risk (Property) Insurance. The Contractor shall purchase and maintain, on a replacement cost basis, Builders' Risk insurance in the amount of the initial Contract amount as well as subsequent modifications thereto for the entire work at the site. Such Builders' Risk insurance shall be maintained until final payment has been made or until no person or entity other than the District has an insurable interest in the property required to be covered, whichever is earlier. This insurance shall include interests of the District, the Contractor, and all subcontractors and sub-subcontractors in the work during the life of the Contract and course of construction, and shall continue until the work is completed and accepted by the District. For new construction projects, the Contractor agrees to assume full responsibility for loss or damage to the work being performed and to the structures under construction. For renovation construction projects, the Contractor agrees to assume responsibility for loss or damage to the work being performed at least up to the full Contract amount, unless otherwise required by the Contract documents or amendments thereto.

Builders' Risk insurance shall be on an all-risk policy form and shall also cover false work and temporary buildings and shall insure against risk of direct physical loss or damage from external causes including debris removal, demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's service and expenses required as a result of such insured loss and other "soft costs" as required by the Contract.

Builders' Risk insurance must provide coverage from the time any covered property becomes Contractor's control and/or responsibility, and continue without interruption during construction or renovation or installation, including any time during which the covered property is being transported to the construction installation site, and while on the construction or installation site awaiting installation. The policy will provide coverage while the covered premises or any part thereof are occupied. Builders' Risk insurance shall be primary and not contributory.

If the Contract requires testing of equipment or other similar operations, at the option of the District, the Contractor will be responsible for providing property insurance for these exposures under a Boiler Machinery insurance policy.

Required coverages may be modified by an amendment to the Contract documents.

Certificates of Insurance

Prior to commencing work or services under this Contract, the Contractor shall furnish the District with Certificates of Insurance, or formal endorsements as required by the contract, issued by the Contractor's insurer(s), as evidence that policies providing the required coverages, conditions and limits required by this Contract are in full force and effect. Such certificates shall identify this Contract number and title.

Subcontractor: The Contractor shall include all subcontractors as insureds under its policies or shall furnish separate certificates and endorsements for each subcontractor. If a policy does expire during the life of the Contract, a renewal Certificate of the required coverage must be sent to the District at least fifteen (15) days prior to the expiration date.

In the event any insurance policy(ies) required by this Contract is(are) written on a "claims made" basis, coverage shall extend for two years past completion and acceptance of the work or services and as evidenced by annual Certificates of Insurance.

Insurance evidenced by this Certificate shall not expire, be canceled, or materially changed without fifteen (15) days prior written notice to the District. If a policy does expire during the life of the contract, a renewal Certificate must be sent to the District fifteen (15) days prior to the expiration date.

**FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
CERTIFICATE OF INSURANCE**

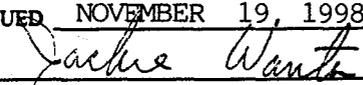
CONTRACT FCD 98-15 PROJECT TITLE: Bullard Wash Channel Improvements Project and Estrella Parkway (Bid Canal to Yuma Road) Improvements Project

NAME AND ADDRESS OF INSURANCE AGENCY AON RISK SERVICES, INC. OF AZ 3200 E. CAMELBACK ROAD, SUITE 210 PHOENIX, AZ 85018-2320 (602) 468-3200 FAX: (602) 808-3501	INSURANCE COMPANIES AFFORDING COVERAGES <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:15%;">Company Letter</td> <td style="width:5%;">A</td> <td>NORTHERN INS. (MARYLAND)</td> </tr> <tr> <td>Company Letter</td> <td>B</td> <td>NATIONAL UNION (AIG-PHNX)</td> </tr> <tr> <td>Company Letter</td> <td>C</td> <td></td> </tr> <tr> <td>Company Letter</td> <td>D</td> <td></td> </tr> <tr> <td>Company Letter</td> <td>E</td> <td></td> </tr> <tr> <td>Company Letter</td> <td>F</td> <td></td> </tr> </table>	Company Letter	A	NORTHERN INS. (MARYLAND)	Company Letter	B	NATIONAL UNION (AIG-PHNX)	Company Letter	C		Company Letter	D		Company Letter	E		Company Letter	F	
Company Letter	A	NORTHERN INS. (MARYLAND)																	
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Company Letter	C																		
Company Letter	D																		
Company Letter	E																		
Company Letter	F																		
NAME AND ADDRESS OF INURED FNF CONSTRUCTION, INC. ATTN: DONNA P.O. BOX 5005, TEMPE, AZ 85280-5005																			

This is to certify that policies of insurance listed below have been issued to the insured named above and are in force at this time

CO. LTR	TYPE OF INSURANCE	POLICY NUMBER	EFFECTIVE DATE (MM/DD/YY)	EXPIRATION DATE (MM/DD/YY)	LIMITS	
A	COMMERCIAL GENERAL <input checked="" type="checkbox"/> LIABILITY FORM <input checked="" type="checkbox"/> PREMISES OPERATIONS <input checked="" type="checkbox"/> CONTRACTUAL <input checked="" type="checkbox"/> BROAD FORM PROPERTY DAMAGE <input checked="" type="checkbox"/> EXPLOSION & COLLAPSE <input checked="" type="checkbox"/> PRODUCTS/COMPLETED OPERATIONS HAZARD <input checked="" type="checkbox"/> UNDERGROUND HAZARD <input checked="" type="checkbox"/> INDEPENDENT CONTRACTORS <input checked="" type="checkbox"/> PERSONAL INJURY	* EPA27553495 PER JOB SITE AGGREGATE	1/1/98	1/1/99	GENERAL AGGREGATE	\$5,000,000
A	COMPREHENSIVE AUTO <input checked="" type="checkbox"/> LIABILITY & NON-OWNED	ECA30097837	1/1/98	1/1/99	EACH OCCURRENCE	\$2,000,000
B	<input checked="" type="checkbox"/> EXCESS LIABILITY	BE3462761	1/1/98	1/1/99	NECESSARY IF UNDERLYING NOT ABOVE MINIMUM	\$4,000,000
A	<input checked="" type="checkbox"/> WORKERS' COMPENSATION AND EMPLOYERS' LIABILITY	TC91958331	1/1/98	1/1/99	STATUTORY each accident	\$1,000,000
	<input type="checkbox"/> ENGINEERS PROFESSIONAL LIABILITY				EACH CLAIM AND ANNUAL AGGREGATE	
	<input checked="" type="checkbox"/> OTHER	* In addition to the Flood Control District, add Maricopa County Department of Transportation, City of Goodyear, Union Pacific RR, Buckeye Irrigation District, Phoenix Goodyear Airport, Roosevelt Irrigation district, A-Tumbling-T-Ranch, Wood Family Enterprises, and the Palo Verde Nuclear Generating Station as additional insured.				

Except for Professional Liability Insurance and Workers' Compensation Insurance, the Flood Control District of Maricopa County is added as an additional insured on those types of policies described herein which are required to be furnished by this contract entered into between the insured and the Flood Control District. To the extent provided in this contract, insured shall hold harmless the Flood Control District of Maricopa County from liability arising out of any services provided or duty performed by insured as required by statute, law, purchase order or otherwise required, with the exception of liability for loss or damage resulting from the sole negligence of Flood Control District its agents, employees or indemnities. It is agreed that any insurance available to the named insured shall be primary of other sources that may be available. It is further agreed that no policy shall expire, be canceled, or materially changed to affect the coverage available to the District without thirty (30) days written notice to the District. THIS CERTIFICATE IS NOT VALID UNLESS COUNTERSIGNED BY AN AUTHORIZED REPRESENTATIVE OF THE INSURANCE COMPANY.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY 2801 West Durango Street Phoenix, Arizona 85009	DATE ISSUED NOVEMBER 19, 1998  AUTHORIZED REPRESENTATIVE
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It is further agreed that:

The Contractor hereby agrees to indemnify and save harmless the **Flood Control District of Maricopa County, Maricopa County Department of Transportation, City of Goodyear, Union Pacific Railroad, Buckeye Irrigation District, Roosevelt Irrigation District, Phoenix Goodyear Airport, A-Tumbling-T-Ranch, Wood Family Enterprises, and Palo Verde Nuclear Generating Station**, or any of their departments, agencies, officers or employees, from and against all loss, expense, damage or claim of any nature whatsoever which is caused by any activity, condition or event arising out of the performance or nonperformance of any of the provisions of this Agreement, with the exception of liability for loss resulting from the sole negligence of the Flood Control District, its agents, employees, or indemnities.

The **Flood Control District of Maricopa County, Maricopa County Department of Transportation, City of Goodyear, Union Pacific Railroad, Buckeye Irrigation District, Roosevelt Irrigation District, Phoenix Goodyear Airport, A-Tumbling-T-Ranch, Wood Family Enterprises, and Palo Verde Nuclear Generating Station** shall, in all instances, be indemnified against all liability, losses and damages of any nature for or on account of any injuries to or death of persons or damages to or destruction of property arising out of or in any way connected with the performance or nonperformance of this Agreement, except such injury or damage as shall have been occasioned by the sole negligence of the **Flood Control District of Maricopa County, Maricopa County Department of Transportation, City of Goodyear, Union Pacific Railroad, Buckeye Irrigation District, Roosevelt Irrigation District, Phoenix Goodyear Airport, A-Tumbling-T-Ranch, Wood Family Enterprises, and Palo Verde Nuclear Generating Station**.

The above cost of damages incurred by the **Flood Control District of Maricopa County, Maricopa County Department of Transportation, City of Goodyear, Union Pacific Railroad, Buckeye Irrigation District, Roosevelt Irrigation District, Phoenix Goodyear Airport, A-Tumbling-T-Ranch, Wood Family Enterprises, and Palo Verde Nuclear Generating Station**, or any of their departments, agencies, officers or employees, or others aforesaid shall include in the event of an action, court costs, expenses for litigation and reasonable attorneys fees.

DLK
11/15/98 *JRS*
11/19/98

Firm: _____
Principal: _____
By: _____
Title: _____
Date: _____

SUPPLEMENTARY GENERAL CONDITIONS

CONTRACT FCD 98-15

BULLARD WASH CHANNEL IMPROVEMENTS PROJECT
AND
ESTRELLA PARKWAY-BID CANAL TO YUMA ROAD PROJECT

**FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
CONTRACT FCD 98-15
BULLARD WASH CHANNEL IMPROVEMENTS PROJECT
AND
ESTRELLA PARKWAY-BID CANAL TO YUMA ROAD PROJECT**

SUPPLEMENTARY GENERAL CONDITIONS

SPECIFICATIONS

Except as otherwise amended in these Supplementary General Conditions and the Construction Special Provisions, construction of this project shall be in accordance with all applicable Maricopa Association of Governments (MAG) Uniform Standard Specifications and Uniform Standard Details, dated 1998, together with the Maricopa County Department of Transportation (MCDOT) Supplements to the Uniform Standard Details, dated 1993.

PRECEDENCE OF CONTRACT DOCUMENTS

This Contract and its designated documents, whether taken separately or together, are to be interpreted according to full intent, meaning, and spirit, and shall be deemed to mutually explain each other and to be descriptive of any materials to be furnished and the work to be performed under this Contract. In cases of any difference or discrepancy between the Contract documents, the order of precedence shall be (a) Addendum to the Invitation for Bids, (b) the Contract form, (c) Supplementary General Conditions, (d) Construction Special Provisions, (e) Project Plans, (f) MCDOT Supplements to the Uniform Standard Details, and (g) MAG Uniform Standard Specifications and Uniform Standard Details.

Subsection 101.2 - Definitions and Terms:

- (1) Change the definition of the phrase "Board of Supervisors" to being the Board of Directors acting under the authority of the laws of the State of Arizona and in their capacity of the Board of Directors of the Flood Control District of Maricopa County.
- (2) Change the definition of the phrase "Budget Project" to being a project financed by funds set aside in the annual budget or otherwise approved by the Flood Control District of Maricopa County Board of Directors.
- (3) Add to the definition of the phrase "Contract Documents," the phrase "Supplementary General Conditions."
- (4) Change the definition of the term "Engineer" to being the person appointed by the Flood Control District of Maricopa County Board of Directors to the office of Chief Engineer and General Manager of the Flood Control District of Maricopa County acting directly or through its authorized representative, the Chief of the Flood Control District of Maricopa County Planning and Project Management Division.
- (5) Change the definition for the phrase "Notice of Award" to a letter from the Flood Control District of Maricopa County advising Contractor that it is the successful bidder and the Flood Control District of Maricopa County has accepted its proposal.
- (6) Change the definition of the term "Owner" to the Flood Control District of Maricopa County, acting through its legally constituted officials, officers, or employees.
- (7) Add the definition for Maricopa County Minority Business Office (MBO), the office responsible for administering the Maricopa County Minority and Women Owned Business Enterprise Program.
- (8) Add the definition for the Maricopa County Minority and Women Owned Business Enterprise Program as being the Program adopted by the Board of Supervisors effective January 1, 1992.

Subsection 102.4 - Examination of the Plans, Special Provisions, and Site Work: Add the following:

The soil borings logs and geotechnical report, including ground water conditions, are available for review at the Owner's office, and Contractors are encouraged to do so. Boring logs adjacent to the MC 85 Bullard Wash Bridge

and boring logs along the Bullard Wash Channel are included in the plans. Existing moisture conditions shall be no basis for claim for additional monies or time extensions. The Contractor shall manipulate the existing soil as required to achieve stable soil conditions and the required densities, as well as safe and stable side slopes during construction activities.

In all likelihood, ground water will be encountered when constructing the drilled shaft foundations for the BID Canal Overchute structure. At the time of the preparation of the Supplementary General Conditions, ground water levels were higher than the bottom of the drilled shafts.

Subsection 102.5 - Preparation of Bid: Add the following:

Bids, including the Bidding Schedule, must be legibly written in ink or typed, with all prices given in numerals. In case of a conflict between the unit bid price and the extension, the unit bid price shall govern.

It shall be the responsibility of prospective bidders to determine, prior to submission of a bid, if any addenda have been issued by the Flood Control District. This may be accomplished by calling 602-506-1501. Any addendum issued, if not already bound into the Special Provisions, **shall be attached and included as part of the Specifications** and any quantities on the Bidding Schedule requiring change shall be adjusted to the new figure by pen and ink. **Bids which do not have appropriate addenda attached, show appropriate changes to the Bidding Schedule, and acknowledge receipt of addenda in the Proposal may be invalid.**

The bidder's Arizona State Contractor's License number and the classification under which it proposes to perform the work shall be shown on the proposal. An "A" **General Engineering License** is required for this contract. The two lowest bidders may be required to provide certification of prior satisfactory completion for similar construction and to furnish a copy of their license and the renewal certificate.

Subsection 102.6 - Subcontractors' List: Add the following:

A list of subcontractors and suppliers (including any M/WBE participation) intended to be used on the project shall be submitted with the bid, on the form provided in the Proposal. Although this list will not be considered as final commitment on the part of the successful proposer, any subcontractor changes from those listed must have Owners written approval prior to work performed on site by a subcontractor.

Subsection 102.7 - Irregular Proposals: Add the following:

- (F) If the Maricopa County Minority and Women-Owned Business Enterprises Assurances Affidavit is not completed and submitted.
- (G) If any addenda are not acknowledged and attached.
- (H) If the Owner's bond forms are not utilized.
- (I) If the entire specifications document is not returned.
- (J) If the statement from bidder's insurance carrier as required by Subsection 103.6 is not included.

Subsection 103.6 - Contractor's Insurance: Add the following:

A statement from bidder's insurance carrier shall be included in the proposal certifying that it will furnish the specified kind and amounts of insurance to the bidder if it is awarded the contract. As required by law, the statement will be from an insurance carrier or carriers authorized to do business in the State of Arizona, or countersigned by an agent of the carrier authorized to do business in the State of Arizona. Concurrently with the execution of the contract, Contractor shall furnish a Certificate of Insurance using the included Certificate, that names the additional insureds as set out in the Certificate. The Certificate shall also name the additional insureds as Certificate Holders. The types of insurance and the limits of liability shall be as indicated on the included form.

The Contractor shall also be required to obtain additional insurance as required in Exhibit B-1 of the Contractors Right of Entry Agreement with Union Pacific Railroad Company. A sample of the agreement is included in Appendix "A".

Subsection 103.6.1(D) - Contractor's Insurance: Add the following:

Include additional insureds as indicated on the included Certificate of Insurance.

Subsection 103.6.2 - Indemnification of the Contracting Agency Against Liability: Add the following:
Additionally, Contractor shall execute the Indemnification found in the Contract Documents.

Subsection 104.1 - Work to be Done: Add the following sentence to 104.1.1:

All water for construction purposes, drinking water, lighting, temporary electric power, heat, and telephone service shall be arranged and provided for as per requirements of the work by Contractor at his expense.

Add the following to 104.1.2:

Principal construction features for the project include a flood control channel from Lower Buckeye Road to the Gila River, approximately one-quarter mile east of Estrella Parkway, the reconstruction of Estrella Parkway and side street improvements from the BID Canal to north of Yuma Road, construction of a new bridge on MC 85 over the flood control channel, and associated improvements to MC85.

No interruption of traffic will be permitted on Estrella Parkway, MC 85, Elwood Street, Lower Buckeye Road, Lower Buckeye Parkway, Yuma Road, the south maintenance road for the Buckeye Irrigation District Canal, or the road at the Broadway Road alignment. Traffic during construction on Estrella Parkway, MC 85, and Yuma Road must be maintained on an all-weather surface at all times. This will require constructing a temporary fully paved diversion road on MC 85 to shift traffic away from the Bullard Wash Bridge construction site (see Roadway plans and the Special Provisions), and construction other temporary pavement as necessary to maintain traffic on a paved surface during construction on the new roadways.

The Contractor shall notify the BID at least 7 calendar days in advance of any work activities to be done within BID Canal right-of-way. The limits of access within BID right-of-way are shown in the plans, and includes access along the canal access roads from Estrella Parkway. The Contractor will obtain written permission from the BID for any other use of or access through BID Canal rights-of-way. The Contractor will also coordinate with the BID at least 14 calendar days in advance of any construction activities which may impact the canal in any way. Refer to Subsection 105.6 for more information.

The Contractor shall notify the adjacent farmers at least 7 calendar days in advance of any activities on or adjacent to active farming operations, and which may disturb in any way existing farm roads and/or irrigation delivery and tailwater systems. Contact Mr. Tim Smith at 936-9545 for farming activities north and west of the airport and east of Estrella Parkway from Elwood Street to ¼ mile south of Yuma Road, Mr. Ron Rayner at 932-1834 for farming activities south of MC85, Mr. Kent Sheppard at 932-0208 for farming activities west of Estrella Parkway from Elwood Street to Lower Buckeye Road, and Mr. Michael Brooks for farming activities on the west side of Estrella Parkway beginning ½ mile south of Yuma Road to ½-mile north of Yuma Road and on the east side from ¼-mile south of Yuma Road to ½-mile north of Yuma Road. The Contractor shall maintain as operational at all times during construction all existing irrigation delivery and tailwater systems. Where required in the plans, existing irrigation systems will be reconstructed. In either case, this may require the Contractor to provide temporary systems, which must be constructed and made operational to the satisfaction of the farm user. The Contractor shall also maintain access to all existing farm roads for the farmers during construction. This may require the Contractor to construct temporary bypass farm roads. The Temporary Construction Easements within which the new farm roads are located can also be used for Contractor access during construction. The Contractor will not prohibit the use of the new farm roads by the farmers during construction, and will repair any damage to the new roads and irrigation facilities caused by Contractor activities. Refer to Subsection 105.6 for more information.

The Contractor shall also maintain access to all perimeter security and access roads at the airport in the vicinity of and/or impacted by construction.

The Contractor shall notify the MCDOT at least 7 days in advance of any work activities to be done within MCDOT road right-of-way and notify the City of Goodyear at least 7 days in advance of any work activities to be done within Goodyear road right-of-way.

The Contractor shall notify the City of Goodyear "Public Safety" Department prior to working in the vicinity of the ELPNG and K-M (SFPP) gas and fuel lines.

Subsection 104.2.3 - Changes:

The Owner may at any time, by written order, and without notice to the sureties, if any, make changes within the

general scope of this contract in any one or more of the following:

- (A) Drawings, designs, or specifications;
- (B) Method or manner of performance of the work;
- (C) Owner-furnished facilities, equipment, materials, services, or site;
- (D) Directing acceleration in the performance of the work.

Any other written or oral order from the Owner that causes a change shall be treated as a change order under this section provided that the Contractor gives the Owner written notification within two work days after receipt of such direction stating:

- (A) The date, nature, and circumstances of the conduct regarded as a change;
- (B) The particular elements of the contract performance for which the Contractor is seeking an equitable adjustment under this section, including any price or schedule adjustments;
- (C) The Contractor's estimate of the time by which the Owner must respond to the Contractor's notice to minimize cost, delay, or disruption of performance.

The Contractor shall diligently continue performance of this contract to the maximum extent possible in accordance with its provisions. Except as provided in this section, no order, statement, or conduct of the Owner shall be treated as a change or entitle the Contractor to an equitable adjustment. If any change under this section causes an increase or decrease in the Contractor's cost of, or the time required for, the performance of any part of the work under this contract, the Owner shall make an equitable adjustment and modify the contract in writing.

The equitable adjustment shall not include increased costs or time extensions for delay resulting from the Contractor's failure to provide notice or to diligently continue performance. No proposal for the Contractor for an equitable adjustment shall be allowed if asserted after final payment under this contract.

Subsection 104.2.4 - Cost Estimates or Price Proposals:

The Contractor and any lower-tier subcontractors shall submit itemized cost estimates or price proposals for any owner-directed change order or Contractor-initiated claim.

Cost estimates or pricing proposals shall be itemized to include direct labor by man-hours, individual craft, hourly wage rate and verifiable labor burden. Other direct costs shall include rental and operator rates for rented or owned equipment, material trucking expenses and other costs clearly identified and directly allocable to contract performance. Material costs shall be itemized by item description, quantity(s) for each item, unit price per item, including applicable sales tax markup, and extended total price per item. The Contractor shall provide copies of material supplier quote sheets, invoices or purchase orders, as appropriate.

Lump sum cost estimates or price proposals shall be rejected and returned to the Contractor for itemization as described above. Failure of the Contractor to submit properly itemized cost estimates or price proposals shall not constitute an excusable delay and result in a change order being unilaterally priced as the Owner's fair estimated price.

Subsection 104.2.6 - Value Engineering:

- (A) **General.** The Contractor is encouraged to voluntarily develop, prepare, and submit value engineering change proposals (VECPs). The Contractor shall share in any instant contract savings realized from accepted VECPs, in accordance with paragraph (f) below. The Owner reserves the right to make alterations to the contract, in accordance with procedures elsewhere within this contract. Such alterations will not be eligible for inclusion in any VECP.
- (B) **Definitions.**
Contractor's development and implementation costs means those costs the Contractor incurs on a VECP in developing, testing, preparing, and submitting the VECP as well as those costs incurred by the Contractor to make the changes required by the Owner's acceptance of the VECP.

Owner costs means those owner costs that result directly from developing and implementing the VECP, such as any net increases in the cost of testing, operations, maintenance, and logistical support. The term does not include the normal administrative costs of processing the VECP.

Instant contract savings means the estimated reduction in Contract cost of performance resulting from acceptance of the VECP, minus the allowable Contractor's development and implementation costs, minus subcontractors' development and implementation costs (see paragraph (g) below).

Value engineering change proposal (VECP) means a proposal that (1) requires a change to the contract; (2) results in reducing the contract price or estimated cost without impairing essential functions or characteristics; and (3) does not involve a change in deliverable end item quantities, schedule, or a change to the contract type.

- (C) **VECP Preparation.** As a minimum, the Contractor shall include in each VECP the information described in subparagraphs (1) through (7) below. If the proposed change affects contractually required schedule and cost reporting, it shall be revised to incorporate proposed VECP modifications. The VECP shall include the following:
- (1) A description of the difference between the existing contract requirement and that proposed, the comparative advantages and disadvantages of each, a justification when an item's function or characteristics are being altered, and the effects of the change on the end item's performance. All design changes must be submitted on 24"x 36" standard drawing sheets along with supporting calculations. Each drawing sheet and at least the content sheet of the calculations shall be sealed by an Engineer registered in the State of Arizona.
 - (2) A list and analysis of the contract requirements that must be changed if the VECP is accepted, including any suggested specification revision.
 - (3) A separate, detailed cost estimate for the affected portions of the existing contract requirements and the VECP. The cost reduction associated with the VECP shall take into account the Contractor's allowable development and implementation costs, including any amount attributable to subcontracts under paragraph (g) below.
 - (4) A description and estimate of costs the Owner may incur implementing the VECP, such as test and evaluation and operating and support costs. This is an estimate based only on the Contractor's understanding of additional efforts to be expended by the Owner, should the VECP be accepted. The final cost will be determined by the Owner.
 - (5) A prediction of any effects the proposed change would have on collateral costs to the agency, i.e., costs of operation or maintenance.
 - (6) A statement of the time by which a contract modification accepting the VECP must be issued in order to achieve the maximum cost reduction, noting any effect on the contract completion time or delivery schedule.
 - (7) Identification of any previous submissions of the VECP, including the dates submitted, the agencies and contract numbers involved and previous Owner actions, if known.
- (D) **Submission.** The Contractor shall submit VECPs to the Owner's Engineer.
- (E) **Owner Action.**
- (1) The Owner shall notify the Contractor of the status of the VECP within 15 calendar days after receipt from the Contractor. If additional time is required, the Owner shall notify the Contractor within the 15-day period and provide the reason for the delay and the expected date of the decision. The Owner will process VECPs expeditiously; however, it shall not be liable for any delay in acting upon a VECP.
 - (2) If the VECP is not accepted, the Owner shall notify the Contractor in writing, explaining the reasons for rejection.

- (3) The Contractor may withdraw any VECP, in whole or in part, at any time before it is accepted by the Owner.
- (4) Any VECP may be accepted, in whole or in part, by the Owner's award of a change order to this contract, citing this subsection. The Owner may accept the VECP, even though an agreement on price reduction has not been reached, by issuing the Contractor a notice to proceed with the change. Until a notice to proceed is issued or a change order incorporates a VECP to this contract, the Contractor shall perform in accordance with the existing contract. The Owner's decision to accept or reject all or any part of any VECP shall be final and not subject to disputes or otherwise subject to litigation.
- (F) **Cost Sharing.**
- (1) **Rates.** The Owner's share of savings is determined by subtracting the Owner's costs from instant contract savings and multiplying the result by 50 percent. The Contractor's share shall be the remaining 50 percent.
- (2) **Payment.** Payment of any share due the Contractor for use of a VECP on this contract shall be authorized by a change order to this contract to accept the VECP, reduce the contract price or estimated cost by the amount of instant contract savings, and provide the Contractor's share of savings by adding the amount calculated to the contract price.
- (G) **Subcontracts.** The Contractor may include an appropriate value engineering clause in any subcontract. In computing any adjustment in this contract's price under paragraph (f) above, the Contractor's allowable development and implementation costs shall include any subcontractor's allowable development and implementation costs clearly resulting from a VECP accepted by the Owner under this contract, but shall exclude any value engineering incentive payments; provided that these payments shall not reduce the Owner's share of the savings resulting from the VECP.

Subsection 105.1 - Authority of Engineer: Add the following:

105.1.1 - Engineer's Evaluation: Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to subsections 105.2.1, 105.3.1 and 106.4, but such time shall not exceed 20 calendar days. Engineer will be the sole judge of acceptability. No "or-equal" or substitute will be ordered, installed or utilized without Engineer's prior written acceptance which will be evidenced by either a Change Order or an approved Shop Drawing. Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any "or-equal" or substitute. Engineer will record time required by Engineer and Engineer's Consultants in evaluating substitutes proposed or submitted by Contractor pursuant to subparagraphs 105.3.1 and 106.4(B) and in making changes in the Contract Documents (or in the provisions of any other direct contract with Owner for work on the project) occasioned thereby. Whether or not Engineer accepts a substitute item so proposed or submitted by Contractor, Contractor shall reimburse Owner for the charges of Engineer and Engineer's Consultants for evaluating each such proposed substitute item.

Subsection 105.2.1 - Plans and Shop Drawings: Add the following:

- A) Shop drawings means drawings, submitted to the Engineer by the Contractor pursuant to the contract, showing in detail (i) the proposed fabrication and assembly of structural elements and (ii) the installation (i.e., form, fit and attachment details) of materials or equipment. It includes drawings, diagrams, layouts, schematics, descriptive literature, illustrations, schedules, performance and test data, and similar materials furnished by the Contractor to explain in detail specific portions of the work required by the contract.
- B) Product Data is information on manufactured items, either stock or modified, and includes descriptive literature, operating data, performance curves, certified dimensional drawings, wiring or schematic control diagrams, piping, instrumentation, parts lists, and operating, maintenance and lubrication manuals.
- C) Shop drawings shall be submitted as follows: Three copies of the initial submittal for review, one of which will be returned to the Contractor within seven working days. Five copies of the final submittal for approval, two of which will be returned to the Contractor within seven working days.

Subsection 105.3 - Conformity with Plans and Specifications: Add the following:

105.3.1 - Substitute Construction Methods or Procedures: If a specific means, method, technique, sequence or procedure of construction is shown or indicated and expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence or procedure of construction acceptable to Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to

determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The procedure for review by Engineer will be similar to that provided in subparagraph 106.4(B).

Subsection 105.5 - Cooperation of Contractor: Add the following:

105.5.1 - Partnering

The Owner intends to encourage the foundation of a partnering relationship with the Contractor and its subcontractors. This partnering relationship will be structured to draw on the strength of each organization to identify and achieve reciprocal goals. The objectives are effective and efficient contract performance intended to achieve completion within budget, on schedule, and in accordance with plans and specifications.

This partnering relationship will be bilateral in makeup. Any cost associated with effectuating partnering will be covered by the bid item. The initial partnering workshop shall be scheduled after award of the contract, and prior to the Notice to Proceed, and shall be facilitated by a third party competent in the fundamentals of partnering, and mutually acceptable to Contractor and Owner. The Contractor shall be responsible for scheduling, coordinating, and hiring the third party facilitator, and planning all of the partnering meetings in consultation with the Engineer. The Owner will be responsible to notify and coordinate attendance at the partnering meetings by other agencies. To achieve the desired partnering relationships, the Contractor will need to encourage attendance by its major subcontractors on the project. Follow-up workshops will be held periodically throughout the duration of the contract as agreed to by the Contractor and Owner.

An integral aspect of partnering is the resolution of disputes in a timely, professional, and non-adversarial manner. Alternative dispute resolution (ADR) methodologies will be encouraged in place of the more formal dispute resolution procedures. ADR will assist in promoting and maintaining an amicable working relationship to preserve the partnering relationship. ADR in this context is intended to be a voluntary, non-binding procedure available for use by the parties to this contract to resolve any dispute that may arise during performance.

Payment for Partnering will be made on the basis of invoices of actual costs, and will be for a total amount not to exceed the amount shown in the bid schedule for the item.

ITEM 105-1 - PARTNERING

Subsection 105.5.2 - Pre-Construction Meeting:

After award of the contract and prior to the commencement of the work or mobilization, a pre-construction meeting shall be scheduled at a location and time to be agreed upon between the Owner 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 Engineer during the pre-construction meeting the following documents:

- 1) Mix design composition
- 2) Manufacturer's certification for all materials
- 3) Material data safety sheets
- 4) Preliminary work schedule
- 5) Preliminary traffic control plan
- 6) Shop drawings
- 7) Emergency telephone numbers
- 8) Signing authority letter
- 9) 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.

Subsection 105.5.3 –Construction Progress Meetings:

Construction progress meetings shall be scheduled weekly, or as considered necessary by the Owner. 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 Owner's representative 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 approved 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.

Subsection 105.6 - Cooperation with Utilities: Add the following:

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 strong 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 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)	
Mr. John Rael, Project Manager (Power) (Roadway)	(602) 371-6945
Mr. Steve Goodman, Senior Liaison Agent (Power)(Channel)	(602) 371-6965
Ms. Sarianne Rittenhouse (PVNGS)	(602) 393-1988
Buckeye Irrigation District	
Mr. Jackie Meck	(602) 386-2196
City of Goodyear (water & sewer)	
Mr. Larry Martinez	(602) 932-1637
Cox Communications	
Mrs. Angie Hardesty	(602) 558-1333
El Paso Natural Gas	
Mr. Bill Ward	(602) 438-4224
IXC	
Mr. Tom McGuire	(602) 520-9292

Kinder-Morgan (Santa Fe Pacific Pipelines)		
Mr. Dan Tarango		(602) 278-2320
MCI Telecommunications (fiber optics cable)		
Mr. Ed Visser		(602) 734-1273
Mr. Gary Nelson		(972) 498-5037
Phoenix-Goodyear Airport		
Mr. Shawn Arena (Manager)		(602) 932-1200
	Pager	(602) 201-6872
Mr. Dick Bartholomew (Wells)		(602) 953-5648
Ms. Cynthia Parker (Environmental)		(602) 273-2730
Qwest		
Mr. Jeff Davis		(303) 291-1764
Mr. George McElvain		(303) 291-1419
Roosevelt Irrigation District		
Mr. Stan Ashby, Superintendent		(602) 386-2046
Salt River Project		
Mr. Bill Phillips		(602) 236-8092
Southwest Gas		
Switchboard		(602) 942-8999
Mr. Wade Patrick		(602) 484-5649
Tucson Electric Power Company		
Mr. Phil Young		(520) 745-3479
Union Pacific Railroad Company		
Mr. Bob Prince		(817) 878-1011
Mr. Gary Houk (Track Operations)		(602) 257-2506
Ms. Mary Gross (Rights-of-Entry)		(402) 997-3623
Mr. Daniel Bonn (Signal Foreman)		(602) 257-2572
	Cell	(602) 799-7812
U.S. Sprint		
Mr. Colin Sword		(602) 254-3798
U.S. West Communications (US West)		
Mr. Bob Friese		(602) 630-5473
Western Area Power Administration		
Mr. Robert Johnson		(602) 352-2595
Maricopa County Department of Transportation		
Utility Coordinator		(602) 506-8603
Traffic Operations		(602) 506-8660

Arizona Public Service (APS):

APS maintains overhead and underground services in the vicinity of the Bullard Wash portion of the project. One power pole on the south side of the BID canal and a service drop pole on the north side of the canal will be relocated prior to construction. Two power poles will be relocated by APS prior to construction along the Broadway Road alignment.

APS also maintains overhead and underground facilities along Estrella Parkway and Yuma Road. The power poles for the overhead service will be relocated to steel poles in the newly acquired roadway right-of-way by APS.

APS will also install streetlights in the new median areas in the future (not part of this project). Pipe sleeves will be installed as part of this project to facilitate the future installation of the median streetlights. The Contractor shall provide all trench material and related trenchwork, install conduit and conduit-related material, traffic control, and vertical and horizontal survey control. APS shall provide electrical markers, prelubricated polyester flat strip pull line, and conduit system inspection. Contact John Kamrar at 550-8514 48 hours prior to the commencement of conduit installation to arrange for an APS inspector. Contractor shall not trench within 4' of an APS facility unless an APS representative is present.

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.

Palo Verde Nuclear Generating Station (PVNGS) Pipeline:

APS maintains a 96" water line that conveys reclaimed effluent water from the 91st Avenue Treatment plant to PVNGS. It crosses Bullard Wash north of the BID Canal. The pipeline, located near Bullard Wash Station 33+00, has been encased in concrete by APS. A portion of the top of this encasement will become the bottom of the new channel. A toe down structure and concrete channel lining will be constructed by the Contractor upstream and downstream of the encasement as shown on the plans. The 96" water line also crosses Estrella Parkway north of the BID Canal near Station 35+00, requiring the Contractor to construct the new roadway section and associated road side ditches over the pipeline. Prior to construction of the roadway over the pipeline it will be necessary to recondition the top 12 inches of backfill soil. The soil will need to be excavated, wetted, placed again, and compacted to 90% of a standard proctor density test. In addition, a minimum of 4 feet of cover is required for the pipeline except that a minimum of 2 feet is acceptable for the lined ditch on the east side of the roadway.

The contractor shall contact APS a minimum of 14 days prior to work in the on the roadway or the channel in the vicinity of the water line. An inspector will be provided by APS during construction activities impacting the encasement.

NOTE: Normal excavation equipment may operate on top of the pipeline encasement, which begins approximately 90 feet west of the channel centerline to approximately 101 feet east of the channel centerline. Additionally, the Contractor may operate equipment above the non-encased pipeline beyond these limits, provided that the depth of cover, which shall not be less than 5 feet nor exceed 8 feet, is maintained over the pipeline. No vibratory type equipment that may induce impact loadings on the pipe is allowed to operate over the encased or non-encased pipeline, or within 25 feet either side of the pipeline or encasement.

NOTE: The stockpiling of dirt will not be permitted within the PVNGS pipeline easement for either the roadway or the channel construction.

NOTE: The Contractor must at all times protect-in-place the pipeline, nearby pipeline manhole and encasement. Any damage to the pipeline, to the manhole or the encasement caused in any way by the Contractor will be the sole responsibility of the Contractor to correct to the satisfaction of APS, and solely at the cost of the Contractor. Any lost revenue to APS and PVNGS caused by the Contractor's actions will be the sole responsibility of the Contractor. Estimated damages as provided by APS, for any damage to the pipeline or manhole which causes a need for the pipeline to be shut down is \$514,000 per calendar day.

NOTE: The Contractor agrees to reimburse APS (the Operating Agent for PVNGS) for all expenses it may incur for repairing any damage to APS-PVNGS facilities resulting from the Contractor's work to construct the channel, roadway or ditches, or other project features upon receipt of itemized statement. The Contractor agrees to indemnify and hold APS-PVNGS harmless from any and all liability, damages, penalties, costs, expenses and charges of any kind and nature whatsoever resulting from personal injury or death or damage to or loss of property occasioned by and resulting from Contractor's operations, including by not limited to those upon APS-PVNGS property. At all times during the construction the Contractor shall comply with all applicable laws, ordinances, rules, regulations, and safety requirements.

NOTE: The Contractor shall maintain access through the construction site and along the PVNGS pipeline easement for access as required by the PVNGS operation and maintenance personnel at all times.

Buckeye Irrigation District (BID):

The Buckeye Irrigation District maintains an irrigation canal at the south end of the project. The BID typically schedules a two-week dry-up of the canal in November. No other dry up of this canal is anticipated. The overchute structure must be constructed over the BID canal without affecting the canal flow and O&M access for the BID along the canal. The south maintenance road access will be maintained during construction without closure. Any damage to the canal caused by the Contractor will be repaired by the contractor to the satisfaction of the BID at no cost to the project.

The Contractor shall notify the BID at least 7 calendar days in advance of any work activities to be done within BID Canal right-of-way. The limits of access within BID right-of-way are shown in the plans, and include along the canal access roads from Estrella Parkway. The Contractor will obtain written permission from the BID for any other use of or access through BID Canal rights-of-way. The Contractor will also coordinate with the BID at least 14 calendar days in advance of any construction activities, which may impact the canal in any way.

City of Goodyear:

The City of Goodyear maintains water lines, sewer lines and fire hydrants along all the roadways within the project limits. A 15" PVC sanitary sewer line along the Broadway Road alignment will require replacement and encasement under the channel. The Contractor will remove the 15" pipeline between the existing manholes east and west of the new channel, construct 16" ductile iron pipe, and encase a portion of the 16" DIP as shown in the plans. The Contractor shall manage sewer flows as required for the reconstruction of the sewer line. Flow data for the line for a period from March 5th 1998 to March 9th 1998 is provided in Appendix C. The contractor shall coordinate this work with the City of Goodyear a minimum of 7 calendar days in advance of any work impacting the sewer line.

The Contractor shall adjust to grade the City's sewer manholes and water valves as shown in the plans. The City will relocate all fire hydrants shown on the plans and lower water lines as necessary prior to the roadway construction.

Cox Communication :

Cox Communication maintains cable TV buried cables along Estrella Parkway north of Lower Buckeye Parkway and along Yuma Road. These buried cables will be lowered by Cox Communication at several locations for installation of new pipe culverts. Also, several cable TV boxes will require relocation prior to the roadway construction.

El Paso Natural Gas Company (ELPNG):

ELPNG maintains an 8" high-pressure gas line that crosses Estrella Parkway and the new Bullard Wash channel in the vicinity of the Phoenix-Goodyear Airport. This line will be lowered under the channel by ELPNG prior to construction. The Contractor shall exercise extreme caution when working near this facility. The Contractor shall contact ELPNG Gas a minimum of 14 calendar days in advance of any work to be done in the vicinity of this facility. An inspector will be provided by the utility on site as required during these construction activities to monitor the work.

ELPNG would like to refurbish their 8" gas line where it crosses Estrella Parkway during construction before pavement is placed. The Contractor shall accommodate this work by ELPNG. ELPNG will commence their work within 14 calendar days of written notification from the contractor and complete their work within 7 working days. The work may need to be split up to accommodate the Contractors traffic control plan. If only half the pipe can be worked on at a time, then the Contractor shall allow ELPNG 5 working days for each section of the pipe.

IXC Communication :

IXC has recently installed conduit along MC 85 that will carry a fiber optic cable. The conduit is located about 10 feet south of the existing MC 85 south edge of pavement and within the roadway right-of-way. The Contractor shall exercise extreme caution when working near these facilities. The Contractor shall contact IXC a minimum of 14 calendar days in advance of any work to be done in the vicinity of these facilities. An inspector will be provided by the utility on site as required during these construction activities to monitor the work. This line has been lowered at the new tailwater pipe location on MC 85 west of the new Bullard Wash Bridge. The old conduit has been abandoned in place. However, the Contractor shall verify that the line has been lowered sufficiently to avoid any conflicts with construction.

MCI Fiber Optics Cable:

MCI maintains an underground fiber optics cable south of the UPRR railroad tracks within the railroad right-of-way that crosses Estrella Parkway and the proposed Bullard Wash channel. This fiber optics cable will be lowered by MCI prior to the channel construction. The contractor shall exercise caution when working near this facility and notify MCI a minimum of 14 days prior to work in this area.

Q-West :

Q-West maintains an underground fiber optic cable line located in the UPRR railroad right-of-way north of MC 85. This line will be lowered by QWEST prior to construction. The Contractor shall exercise extreme caution when working near these facilities. The Contractor shall contact QWEST a minimum of 14 calendar days in advance of any work to be done in the vicinity of these facilities. Using milepost reference number 88716, call 1-800-AT-FIBER. An inspector will be provided by the utility on site as required during these construction activities to monitor the work.

Roosevelt Irrigation District (RID):

Construction of the Bullard Wash Channel and the East Tributary Channel will require the relocation of RID dirt tailwater ditches as shown in the plans. Tailwater flow capacity from these ditches to the farm fields south of MC 85 must be maintained at all times during construction. The contractor shall construct the new facilities which will permanently maintain these flows as shown in the plans. The Contractor must maintain these tailwater flows for delivery to the farm fields located south of MC 85. Temporary reconstruction by the Contractor of this tailwater delivery system may be required in order to maintain these flows, and shall be done in such a manner that maintains the flows for use by the farming operations. This work will be coordinated with RID and with Ron Rayner at least 7 calendar days in advance of any construction activities impacting these ditches.

Construction of the roadway improvements will require the relocation of a RID dirt tailwater ditch, several RID concrete lined ditches, pipe culverts and structures. The Contractor shall construct the new RID facilities prior to removal of existing facilities. Construction of temporary facilities may be necessary to maintain delivery of irrigation water to active farming operations. A minimum flow rate of 7 cubic feet per second (cfs) shall be maintained in the RID dirt tailwater ditches and lined ditch on the south side of Yuma Road and on the east side of Estrella Parkway. A minimum flow rate of 12.5 cfs shall be maintained in RID's Lateral 5 1/2 located 1/4 mile west of Estrella Parkway. Temporary bypass ditches must be constructed to have sufficient capacity to maintain the above flows. **The 1998 RID "dry-up" is scheduled for November 9th to November 23rd. Short 24-hour "dry-ups" can be scheduled with RID in December and January. No dry ups can be allowed after February 1st.** The Contractor shall notify RID at least 48 hours prior to beginning any work on RID facilities. The Contractor shall complete all RID work on Lateral 5 1/2 at Yuma Road and Lower Buckeye Road by February 1, 1999.

Salt River Project (SRP):

SRP maintains 500 kV transmission power lines that crosses the channel alignment north of the BID.

NOTE: Because of overhead clearances and low clearances in the heat of the summer, the Contractor shall use extreme caution when working in these areas. . 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.

NOTE: A minimum clearance of 27 feet from lines to equipment must be maintained at all times. Construction activities or equipment placement of any kind will NOT be permitted to occur within 5 feet of any transmission tower foundation.

NOTE: Grounding of equipment and rigging used while working under the transmission lines may be required to minimize the affects of the transmission line electrical fields.

Kinder-Morgan (K-M) (formerly known as Santa Fe Pacific Pipelines (SFPP)):

K-M maintains two petroleum pipelines south of the UPRR railroad tracks within the railroad right-of-way that cross Estrella Parkway and the new Bullard Wash channel. Both the 20" and the 12" pipelines will be lowered by K-M prior to construction of the channel. The Contractor shall exercise extreme caution when working near these facilities. The Contractor shall contact K-M a minimum of 14 calendar days in advance of any work to be done in the vicinity of this facility. An inspector will be provided by the utilities on site as required during these construction activities to monitor the work. Three warning signs and a vent pipe need to be relocated in the vicinity

of Estrella Parkway prior to construction.

Southwest Gas Company (SWG):

SWG maintains 3"-4" gas lines along Estrella Parkway north of Lower Buckeye Parkway and along Yuma Road, and a regulator facility located on the southwest corner of Estrella Parkway and Yuma Road. The regulator facility will be relocated by Southwest Gas prior to the roadway construction. The gas lines require lowering at several locations along Yuma Road which will be relocated by SWG prior to construction. There are several gas valves near the southwest corner of Estrella Parkway and Yuma Road. The gas valves will be adjusted to grade by SWG during construction after the first lift of AC is placed and before the surface course is constructed. The Contractor shall notify SWG at least 48 hours in advance of the commencement of the work by SWG and allow at least 72 hours for SWG to complete the valve frame and cover adjustments. The Contractor shall provide SWG the finish elevation for each valve to be adjusted.

SWG also maintains a 1 1/4" gas line along the south side of the BID canal that will be lowered by SWG prior to construction. The Contractor shall exercise extreme caution when working near this facility. The Contractor shall contact SWG a minimum of 14 calendar days in advance of any work to be done in the vicinity of this facility. An inspector will be provided by the utility on site as required during these construction activities to monitor the work.

Tucson Electric Power Company (TEP):

TEP maintains 345 kV transmission power lines that crosses the channel alignment north of the BID canal.

NOTE: Because of overhead clearances and low clearances in the heat of the summer, the Contractor shall use extreme caution when working in these areas. 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.

NOTE: A minimum clearance of 27 feet from lines to equipment must be maintained at all times. Construction activities or equipment placement of any kind will NOT be permitted to occur within 5 feet of any transmission tower foundation.

NOTE: Grounding of equipment and rigging used while working under the transmission lines may be required to minimize the affects of the transmission line electrical fields.

US Sprint:

US Sprint maintains an underground fiber optic line along the Broadway Road alignment, on the west side of Estrella Parkway, and along the south side of Yuma Road. The line along Broadway Road will be lowered and placed in conduit under the Bullard Wash Channel by US Sprint prior to construction. US Sprint will also lower their line at several locations along Estrella Parkway and Yuma Road before the roadway construction begins. Warning signs, markers, closures, and risers will also be relocated by US Sprint before construction. There is a manhole near the southwest corner of Estrella Parkway and Yuma Road. The manhole will be adjusted to grade by US Sprint during construction after the first lift of AC is placed and before the surface course is constructed. The Contractor shall notify US Sprint at least 48 hours in advance of the desired commencement of the work by US Sprint and allow at least 72 hours for US Sprint to complete the manhole frame and cover adjustment. The Contractor shall provide US Sprint the finish elevation for the manhole to be adjusted. The Contractor shall notify US Sprint at least 48 hours prior to any work within 2 feet vertically of a US Sprint conduit. The Contractor shall exercise extreme caution when working near these facilities. An inspector may be provided by the US Sprint on site during these construction activities to monitor the work.

USWest :

US West maintains underground and overhead cables along Estrella Parkway, Broadway Road and Yuma Road. US West has an underground fiber optic line along the Broadway Road alignment. This line will be lowered and placed in conduit by US West prior to construction. The telephone cables along Estrella Parkway and Yuma Road require lowering by US West prior to installing pipe culverts at many locations. Overhead cables will be placed underground by US West prior to roadway construction. Many telephone risers also will be relocated by US West before roadway construction begins. There are several manholes on the east side of Estrella Parkway south of MC 85 and along the north side of Yuma Road that require adjustment to grade. The manholes will be adjusted to grade by US West during construction after the first lift of AC is placed and before the surface course is constructed. The Contractor shall notify US West at least 48 hours in advance of the desired commencement of the work by US West

and allow at least 72 hours for US Sprint to complete the manhole frame and cover adjustments. The Contractor shall provide US West the finish elevation for the manhole to be adjusted. The Contractor shall exercise extreme caution when working near these facilities. The Contractor shall contact USWest a minimum of 48 hours in advance of any work to be done in the vicinity of these facilities. An inspector may be provided by the utilities on site during these construction activities to monitor the work.

Western Area Power Administration (WAPA):

WAPA maintains 230 kV transmission power lines that cross the channel alignment north of the BID canal and north of the Broadway Road alignment.

NOTE: Because of overhead clearances and low clearances in the heat of the summer, the Contractor shall use extreme caution when working in these areas. . 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.

NOTE: In general, no equipment over 15 feet in height will be permitted on the new O&M roads at the top of the channel berms located under the WAPA transmission lines.

NOTE: Grounding of equipment and rigging used while working under the transmission lines may be required to minimize the affects of the transmission line electrical fields.

Subsection 105.6.2 – Work within a Railroad Right of Way: Add the following:

A portion of the work for this project is located with the Union Pacific Railroad Company's (UPRR) right-of-way. The Contractor will be required to execute three Contractor's Right-of-Entry Agreements with the Railroad prior to working within the railroad right-of-way. One is required for the jack and bore installation of the irrigation line, one for the general construction of channel project features, and one for the general construction of roadway project features. A sample copy of a Contractor's Right of Entry form is included in Appendix A. It will take approximately 3 weeks for the Railroad to process a Right-of-Entry agreement. An administrative handling charge for each Right-of-Entry of \$500 dollars will be paid by the Contractor to Union Pacific Railroad Company. Specific insurance requirements of the UPRR must be met as part of obtaining the Contractor's Right-of-Entry Agreement, and are outlined in Appendix "A". Contact Ms. Mary Gross to coordinate the Right-of-Entry agreements. No work will commence within the railroad right-of-way until after the fully executed Right-of-Entry agreement has been received by the Contractor. The Contractor will notify the Railroad Representative at least 48 hours in advance of the Contractor commencing its work within the railroad right-of-way.

Union Pacific Railroad Company forces will construct the at-grade railroad crossing surface, crossing arms and signals at the Estrella Parkway crossing located north of the MC 85 intersection. It is anticipated that the crossing surface work can be constructed no earlier than January of 1999, which is during the construction of this project. The Contractor shall not commence the roadway paving adjacent to the at-grade crossing until the installation of the at-grade crossing is complete. The contractor shall coordinate the crossing surface installation with Mr. Gary Houk of UPRR at (602)-257-2506. UPRR estimates that the crossing work should take no more than 3 working days. The crossing installation will require closure of Estrella Parkway for no more than 3 working days. The Contractor will coordinate the buried conduit installation for the crossing arms, railroad signal work, and UPRR communication line conduit work with the Railroad so that conduit is placed under the roadway during the 3-day closure of Estrella Parkway. The Contractor shall stake the horizontal location of the back of curb adjacent to the railroad crossing to assist UPRR personnel in the layout of their new facilities. Contact Mr. Daniel Bonn for the signal work coordination. The Contractor shall provide advance notice to the UPRR and schedule a coordination meeting with the UPRR at least 60 calendar days in advance of when the Contractor needs to have the crossing, signals, and crossing arms installed. The Contractor will also need to coordinate with the UPRR (Daniel Bonn) for the installation of temporary crossing arms during construction. The Contractor's traffic control plan will need to be coordinated with the UPRR. The Contractor will include in his construction schedule sufficient time to coordinate with the UPRR and to allow the UPRR time to complete all of their installations.

Union Pacific Railroad Company forces will also construct the at-grade railroad crossing for the Bullard Wash maintenance road and the new railroad bridge across the Bullard Wash prior to construction of this project. The Contractor will coordinate all work within the railroad right-of-way including stockpiling of dirt, removal and replacement of fence, and other activities including but not limited to those listed below, with Union Pacific during the construction of this project.

The Contractor will be jacking a 36" reinforced concrete pipe under the railroad tracks west of the Bullard Wash, constructing a dirt tailwater ditch, constructing concrete channel lining, and Bullard Wash maintenance road grading within the railroad right-of-way. The Contractor will also be boring a 2" electrical conduit under the railroad tracks at Estrella Parkway, constructing asphalt pavement, curb and gutter, raised median, and a 48" tailwater/drainage pipe and structure north of the railroad tracks all within the railroad right-of-way.

The contractor may be required by UPRR to provide for flagging services. The UPRR will supply the flagging services as required at a rate of approximately \$500 dollars per day. Flagging is generally required whenever the Contractor is working within 25 feet of the track centerline. The Contractor shall notify the Engineer and the UPRR at least 24 hours in advance of any time the Contractor will have equipment or personnel working within 25 feet of the track. Contact Gary Houk at 257-2507 or Sam Kephart at 257-2520 to coordinate flagging services.

Payment for the UPRR flagging service shall be made according to the allowance of \$500 per day for the days flagging is required by UPRR and approved by the Engineer, and will be paid from the allowance provided based on actual invoices from the UPRR for such flagging services.

ITEM 105-2 UPRR FLAGMAN ALLOWANCE

Subsection 105.6.3 – Work within Phoenix-Goodyear Airport:

A portion of the work for this project is located within the Phoenix-Goodyear Airport property or adjacent to it. The contractor will coordinate this work with the Airport by contacting the airport manager Shawn Arena at 932-1200 at least 7 calendar days in advance of any construction activities within the limits of the airport. The following are special requirements for work in or adjacent to the airport.

- Construction equipment shall not use existing airport perimeter roads. Ingress to and egress from the construction site shall only be from Lower Buckeye Road or access across the UPRR right-of-way using the at-grade crossing along the west side of the channel alignment. The Lower Buckeye Road access will require construction of a temporary culvert crossing of the Bullard Wash irrigation ditch. All airport access shall be coordinated with the Airport Manager. Other arrangements for construction access may be possible by contacting the airport manager.
- Contractor access within the airport perimeter will be limited to the construction site and acquired permanent and temporary easements as shown in the plans.
- There are a number of existing "Injection Wells" located near the southwest end of the airport for the purposes of mitigating the Superfund Site conditions located within the airport. The Contractor shall exercise extreme caution when working within the airport to ensure that these wells are not damaged in any way. Contact Dick Bartholomew at (602) 953-5648 for the locations of the wells at least 48 hours prior to any construction activity being done within the airport.
- Excess excavation material may be placed in locations within the airport as determined by the Airport Manager.
- Any existing fencing removed by the contractor shall be replaced with fencing conforming the MAG specifications with 3-strand barbed wire at the top tilted away from the airport. Perimeter fencing may be down during work hours; however, fencing must be in place, with no breaks at nightfall.
- The Contractor shall post a security guard at all ingress/egress locations to the site during working hours when the fence is removed.
- All work shall be performed during daylight weekday hours unless prior arrangements are made with the Airport Manager and the Engineer. All cranes and booms shall be flagged during daylight work hours and lowered at night.
- The Contractor shall also maintain access to all perimeter security and access roads at the airport in the vicinity of and/or impacted by construction. This will require the temporary re-routing of the perimeter security road in the vicinity of the East Tributary Channel Inlet construction, and possibly at other areas as required.
- An insurance certificate naming the City of Phoenix as additional insured will be provided prior to commencement of work.

Subsection 105.6.4 – Coordination With Farmers: This project is adjacent to irrigated farmland with existing irrigation facilities which will require relocation. Most of the irrigation facilities are privately owned and used by farmers that lease the property. The Contractor shall coordinate irrigation relocations with the appropriate farmer or Roosevelt Irrigation District representative to minimize disruption and negative impacts to facilities and farming operations. The Contractor shall notify the adjacent farmers at least 7 calendar days in advance of any activities on or adjacent to active farming operations, and which may disturb in any way existing farm roads and/or irrigation

delivery and tailwater systems. The Contractor shall maintain as operational at all times during construction all existing irrigation delivery and tailwater systems. Where required in the plans, existing irrigation systems will be reconstructed. In either case, this may require the Contractor to provide temporary systems, which must be constructed and made operational to the satisfaction of the farm user. The Contractor shall also maintain access to all existing farm roads for the farmers during construction. This may require the Contractor to construct temporary bypass farm roads. The following are names and telephone numbers for farm representatives along the new Bullard Wash Channel and Estrella Parkway.

Ron Rayner:	Phone: 932-1834, Mobil: 376-5971
Tim Smith	Phone: 936-9545
Michael Brooks	Phone: 386-7936, 932-3771, Mobil: 489-6699
Kent Sheppard	Phone: 932-0208, 932-1602, Mobil: 376-1136
Stan Ashby (RID)	Phone: 386-2046

Mr. Ron Rayner farms the property south of MC 85 on both sides of Bullard Wash Channel and Estrella Parkway. Property owned by the Wood Family is farmed by Mr. Tim Smith, which includes the area between Estrella Parkway and Bullard Wash Channel and the Airport from Elwood Street to ¼ mile south of Yuma Road. Kent Sheppard farms property on the west side of Estrella Parkway from Elwood Street to Lower Buckeye Parkway, while Mr. Michael Brooks farms the property on the west side of Estrella Parkway north of Lower Buckeye Parkway and on the east side north of Yuma Road.

The Contractor shall coordinate any disruption to farm traffic on the Broadway Road alignment with the farmer, Mr. Ron Rayner. The Contractor will give Mr. Rayner at least seven calendar days notice of any disruption to Broadway Road. Broadway Road can be closed to traffic for not more than three consecutive weeks during the construction of the channel and dip crossing.

The Contractor shall coordinate any disruption to farm traffic on the Lower Buckeye Road alignment with the farmer, Mr. Tim Smith. The Contractor will give Mr. Smith at least seven calendar days notice of any disruption to Lower Buckeye Road.

Subsection 105.7 – Cooperation Between Contractors: Add the following:

The UPRR may elect to remove the existing railroad bridge crossing of the main Bullard Wash located near the inlet end of the East Tributary Channel construction. The railroad embankment where the bridge will be removed would be backfilled by the UPRR Contractor, and the new irrigation tailwater pipe to be installed as part of the project would be extended by the UPRR to pass through and south of the railroad embankment. The UPRR has requested use of project excavation material for this purpose. And, the UPRR may make arrangements with the project Contractor for some assistance is performing the bridge removal and backfilling operations. The project Contractor shall cooperate with and coordinate with the UPRR Contractor as appropriate to minimize impacts to both the project and the railroad construction activities.

Tim Smith who farms the fields to the west of the channel alignment west of the airport may request the project Contractor to rebuild some concrete lined irrigation ditches. The farmer may contact the Contractor regarding this work. Tim Smith may also wish to construct himself the dirt tailwater ditches shown in the plans and located along the Lower Buckeye Road alignment, along the west side of the channel, and along the east side of Estrella Parkway south of Lower Buckeye Road. The Contractor shall contact Tim Smith at 936-9545.

Subsection 105.8 - Construction Stakes, Lines, and Grades: Add the following:

- A. The Engineer will furnish a Benchmark which the Contractor will use to set line and grade for all construction. All other surveying required for the project shall be the Contractor's responsibility. The Engineer will not set any construction stakes.
- B. Before any construction work is started, the Engineer shall perform all base surveys and cross sections of existing conditions that may be required as a basis for quantity determination.
- C. The Contractor shall submit original construction surveyor's notes duly signed by a Registered Land Surveyor to the Engineer at the end of the project. Copies of the survey notes shall be submitted to the Engineer at the first weekly meeting after being generated.

- D. As-built plans sealed by an Engineer registered in the State of Arizona shall be provided by the Contractor to the Owner prior to project close out.

The Contractor shall provide all survey and staking required for the roadway construction, including but not limited to the following:

- A. Right-of-way lines at 100-foot intervals on even stations for clearing, fencing, and control of the Contractor's operations.
- B. Slope stakes will be offset from the edge of the pavement at 100-foot intervals.
- C. Blue tops in subgrade at centerline and edge of pavement at 100-foot intervals except on curves.
- D. Blue tops in aggregate base course at centerline, edge of pavement, and ¼ points at 50-foot intervals. Contractor shall have all his material in place and compacted within 0.2 feet ± before the survey crew is called upon.
- E. Catch basins stakes will be offset at 10-feet and 15-feet to the center of the structure with cuts or fills shown to the top of grade.
- F. Grade and line stakes for all structures, pipe lines, culverts, and ditches.
- G. Straddle points for permanent monuments.

Payment for roadway construction staking and survey control shall be made on a lump sum basis.

ITEM 105-3 - ROADWAY CONSTRUCTION SURVEYING AND STAKING

Subsection 106.1 - Source of Materials and Quality: Add the following:

Select Material, Aggregate Base, Mineral Aggregate, concrete, steel products and pipe shall be obtained from commercial sources. Contractor shall pay all royalties, or any other charges or expenses, incurred in connection with the securing and hauling of the material. Contractor will be required to furnish Engineer with a list of its proposed commercial sources prior to use, and shall present certificates stating that the material produced from any commercial sources is in accordance with the Uniform Standard Specifications and these Supplementary General Conditions.

Subsection 106.4 - Trade Names and Substitutions: Replace with the following:

Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function and quantity required. Unless the specification or description contains or is followed by words reading that no like, equivalent or "or-equal" item or no substitution is permitted, other items of material or equipment of other Suppliers may be accepted by Engineer under the following circumstances:

- (A) "Or-Equal": If in the Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for acceptance of proposed substitute items.
- (B) Substitute Items: If in Engineer's sole discretion an item does not qualify as an "or-equal" item under subparagraph 106.4 (A), it will be considered a proposed substitute item. Contractor shall submit sufficient information as provided below to allow Engineer to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. The procedure for review by Engineer will include the following and may be supplemented in the Special Provisions and as Engineer may decide is appropriate under the circumstances. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor. If Contractor wishes to furnish or use a substitute item of material or equipment, Contractor shall first make written application to Engineer for acceptance thereof, certifying that the proposed substitute will perform adequately the functions and achieve the results called for by the general design, be similar in substance to that specified and be suited

to the same use as that specified. The application will state the extent, if any, to which the evaluation and acceptance of the proposed substitute will prejudice Contractor's achievement of completion on time, whether or not acceptance of the substitute for use in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for work on the project) to adapt the design to the proposed substitute and whether or not incorporation or use of the substitute in connection with the Work is subject to payment of any license fee or royalty. All variations of the proposed substitute from that specified will be identified in the application and available maintenance, repair and replacement service will be indicated. The application will also contain an itemized estimate of all costs or credits that will result directly or indirectly from acceptance of such substitute, including costs of redesign and claims of other Contractors affected by the resulting change, all of which will be considered by Engineer in evaluating the proposed substitute. Engineer may require Contractor to furnish additional data about the proposed substitute.

- (C) Contractor's Expense: All data to be provided by Contractor in support of any proposed "or-equal" or substitute item will be at Contractor's expense.

Subsection 106.5 - Contractors Marshaling Yards: Add the following:

The Contractor shall obtain approval of the Engineer when using vacant property 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 Engineer prior to use of the property.

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.

Subsection 107.2 - Permits: Replace with the following:

Contractor shall obtain all permits and licenses, including but not limited to those required by the City of Goodyear and the Union Pacific Railroad Company (UPRR); pay all charges, fees, taxes, and provide all notices necessary and incidental to the due and lawful prosecution of the work. The City permit will be at no cost. Permits for earth moving may be obtained from Air Pollution Control, Maricopa County Department of Environmental Management, 2406 South 24th Street, Suite E-214, Phoenix, Arizona 85034, telephone number 506-6700. The cost for the earth moving dust control permit is \$80 plus \$8 per acre. There are approximately (200) acres in this project. The above permit costs are subject to change. It is the responsibility of the Contractor to verify these costs.

Subsection 107.2.1 - NPDES Permit Requirements: Add the following:

- A. This project is subject to the National Pollutant Discharge Elimination System (NPDES) Storm water requirements for construction sites under the Environmental Protection Agency (EPA) General Permit for Arizona. Under provisions of that permit, the Contractor shall be designated as permittee, and shall take all necessary measures to assure compliance with the NPDES General Permit for Arizona as well as all other applicable Federal, State and local laws, ordinances, statutes, rules and regulations pertaining to Storm water discharge. As the permittee, the Contractor is responsible for preparing, in a manner acceptable to the EPA, all documents required by this regulation, including but not necessarily limited to:
1. Storm water Pollution Prevention Plan (SWPPP) for the project, including certification of compliance form. Contractor shall be required to develop, implement, update and revise the SWPPP, as necessary, in order to assure compliance with the EPA permit requirements. The SWPPP shall be retained on the project site at all times during construction.
 2. Notice of Intent (NOI) to assure compliance with the NPDES General Permit for Arizona, including certification of signatures.
 3. Notice of Termination (NOT) of coverage under NPDES General Permit for Arizona.
- B. Preliminary copies of the NOI and the SWPPP shall be submitted to Owner during the preconstruction meeting and shall be subject to review by Owner prior to implementation.
- C. Contractor shall submit the completed and duly signed NOI forms no later than forty-eight (48) hours prior to the initial start of construction on the project to the following agencies:

EPA Storm water Notice of Intent
P.O. Box 1215
Newington, VA 22122

A copy of the completed NOI form shall be submitted to the following:

Storm water Coordinator
Arizona Department of Environmental Quality
P.O. Box 600
Phoenix, AZ 85001-0600

Maricopa County, Current Planning
Planning and Development Division
301 West Jefferson, Third Floor
Phoenix, Arizona 85003
(602) 506-3301

Failure by the Contractor (or Subcontractors of any tier) to submit NOI's within the mandated time frame shall result in delay of the construction start date, and no claim for extension of time will be granted for such delay. A copy of the completed NOI shall be posted at the construction site.

- D. Inspections of all Storm water pollution control devices on the project shall be performed by Contractor on a monthly basis and following each rainfall of 0.50 inches or more in a 24-hour period at the project site as required under provisions of the NPDES General Permit for Arizona. Contractor shall prepare reports on such inspections and retain the reports for a period of three years following the completion of the project. Inspection reports shall be submitted monthly to Owner along with progress payment requests. Additionally, Contractor shall maintain all Storm water pollution control devices on the project in proper working order, which shall include cleaning and/or repair during the duration of the project.
- E. Contractor warrants that its employees and Subcontractors of any tier and their employees shall at all times comply with all applicable laws, ordinances, statutes, rules and regulations set forth by all federal, state and local governments and the Environmental Protection Agency in connection with NPDES Permitting requirements and laws and regulations pertaining to air, groundwater and surface water quality.
- Fines and penalties imposed by the EPA against Owner or the Contractor for Contractor's failure to comply with any of the requirements of NPDES General Permit of Arizona shall be borne by the Contractor.
- F. Upon project completion, acceptance and demobilization, Contractor shall submit its completed, duly executed NOT form to the EPA, with a copy to the Arizona Department of Environmental Quality (and the appropriate municipality), at the address listed in Section (B) above, thereby terminating all NPDES permit coverage for the project. Contractor shall then surrender to Owner copies of the SWPPP, inspection information and all other documents prepared and maintained by the Contractor in compliance of the NPDES General Permit. Contractor shall retain the originals of such documents for a period of three (3) years following the completion of the project.
- G. The Lump Sum price for the SWPPP shall include all material, labor, and all other costs relating to the preparation, installation and maintenance of the SWPPP during project construction, including assuring proper operation of the pollution control devices installed, and all maintenance, cleaning, and disposal costs associated with clean-up and repair following storm events, runoff or releases on the project. The Lump Sum price for the SWPPP shall be inclusive of all costs, and no additional claims shall be made by Contractor under any other specification provision of these documents, including Changed Conditions. Payment for this bid item shall be upon final completion and acceptance of the project, as per Section 109.1.
- H. Copies of all required forms and guidance for preparing the SWPPP are available in the "Drainage Design Manual for Maricopa County, Volume III Erosion Control." The manual is available at the Flood Control District, 2801 West Durango Street, Phoenix, Arizona 85009.

Payment for NPDES/SWPPP permit requirements shall be made on the basis of lump sum for all work described in Subsection 107.2 .1 for:

ITEM 107-1 NPDES/SWPPP PERMITS

Subsection 107.4 - Archeological Reports: Add the following:

Any cultural and/or paleontological resource (historic or prehistoric site or object) discovered by the Contractor, or any person working on his behalf, shall be immediately reported to the Engineer. The Contractor shall suspend all operations in the immediate area of such discovery until written authorization to proceed is issued by the Engineer. An evaluation of the discovery will be made by authorized personnel and the Engineer to determine appropriate actions to prevent the loss of significant cultural or scientific resources.

Subsection 107.5: Add the following:

The entire construction site shall be considered a "Hard Hat Area" and all personnel in the area will be required to wear a hard hat.

Subsection 107.5.2 - Compliance with the Arizona Communication Standard: Add the following:

Owner will provide Contractor with Material Safety Data Sheets (MSDS) for any products known to exist on the site that are deemed health hazards. Contractor will provide a copy of Owner-provided MSDS to all Subcontractors.

Contractor will provide Owner and all Subcontractors with MSDS for any products that have or are deemed health hazards that will be brought onto the site or created on the site by either Contractor or by any Subcontractors.

Contractor will provide Owner with a statement certifying that all personnel (Contractor and Subcontractor) employed by Contractor or by a Subcontractor on the job site have received the required Hazard Communication Standard training.

Subsection 107.5.4 Contractor Health & Safety Provisions: Add the following:

The Phoenix Goodyear Airport, at which the Contractor is to perform a portion of the work, is listed on the National Priorities List pursuant to Section 105 of the Comprehensive Environmental Compensation and Liability Act, 42 U.S.C. 9605, because of the presence of regulated substances at the facility. For this work, the Contractor will be in an area that has been studied, and has been found **NOT** to have soils concentrations for trichloroethylene above the EPA cleanup standards (by VLEACH Modeling). Regulated substances means those substances (including petroleum), included within the definitions of hazardous substance, hazardous chemical, hazardous material, regulated or toxic substance, or hazardous, solid or special waste under federal, state, and local laws presently in effect or that may be enacted, promulgated or adopted in the future or may be amended from time to time.

Contractor further understands and acknowledges that the work could, though unlikely, expose its employees and subcontractors to Regulated Substances. Therefore, it shall be the responsibility of the Contractor to conduct reasonable inquiry of the Flood Control District and the airport (Ms. Cynthia Parker) to ascertain whether the work will affect or disturb any regulated substances, or may result in any potential employee exposure that is known to be present at the airport site where the work is to be performed.

An old U. S. Navy Dump is located within the southwest corner area of the airport, and appears to exist within the limits of construction from approximately Station 77+00 to 80+00, and along the west end of the East Tributary Channel limits. Exact boundaries are not known. SCS Engineers characterized the disposal area in June 1998 for the City of Phoenix. A copy of the report is available from Cynthia Parker and from the District. Their investigation revealed that most of the observed debris consisted of construction, landscape, and other inert solid waste debris. However, SCS Engineers removed some containers of regulated materials (e.g., tanks containing waste oil). Therefore, there is some potential that containers of regulated materials may be buried in the area. According to SCS Engineers, groundwater or soil contamination is not suspected.

There is the possibility that the construction debris may include asbestos materials, considering the dates of use of the dump, though there is not direct evidence to support such a belief. Furthermore, the characterization conducted by SCS Engineers did not reveal any friable asbestos containing waste buried within the limits of testing. The investigation done by SCS Engineers did however identify the existence of some waste oil containers consisting of a waste oil tank, oil bowser, as well as three smaller tanks. The tanks and bowzers encountered were removed at the time of the testing by SCS. The oil tank and bowser did contain small amounts of waste oil. . If any containers or

other suspicious looking materials are encountered, or a change in soil color or smell is identified, possibly indicating the existence of some kind of contamination, the Contractor shall stop work in that area and immediately notify the Engineer. The Engineer will then have the material and/or soil inspected and/or tested to determine if asbestos or some other kind of contamination problem exists, which will require special handling.

If during construction, any unforeseen Regulated Substances are encountered, the Contractor shall immediately notify the Engineer of the encounter and shall not recommence work in that area until directed by the Engineer.

In order to minimize such disturbances to the construction activities, the Contractor will notify the Engineer at least 72 hours in advance of any planned construction activities within this area. The Engineer will notify the District Environmental staff, who will then be present at the site to monitor the construction activities, and to observe if any such substances or contamination is encountered.

NOTE: In order to minimize potential impacts to the project schedule, the Contractor shall program into the construction schedule an early start date for undertaking the removal of the area of the dump affected by the project as shown in the plans. This will be done in order to provide an opportunity for the disposal of any tanks uncovered and mitigation of any Regulated Substances that may be found.

Located immediately west of this area of the airport is the ISAMET Aluminum Recycling Plant. In 1993, a storage pond on the ISAMET property failed causing some inert aluminum oxide by product to flow across this area. This is evidenced by the existence of a thin (approximately 2-inche) layer of gray colored dust just below the existing ground surface. This material is not considered hazardous and does not require any special handling.

An active above ground diesel refueling tank is located near the southwest corner of Lower Buckeye Road and Estrella Parkway. This privately owned facility is used to re-fuel farm equipment and is located partially within the new right-of-way. There is evidence of fuel spillage at the site. Material excavated from this site shall not be used as fill material for the project or stockpiled with other excess fill material for future use. The contaminated material shall be properly disposed of following applicable federal and state regulations. See the roadway improvements Special Provisions.

Subsection 107.5.4.1 Contractor's Status During any Hazard Remediation:

If remediation of any discovered Regulated Substance, contamination or asbestos is necessary, the Owner will address the problem, and if this interferes with the project's critical path, then the CPM and project schedule will be reviewed and revised as mutually acceptable by the Engineer and Contractor to minimize the impact to the total project schedule. An extension in contract time for any delay to Contractor then resulting will be granted by Owner in accordance with Subsection 108.7.

If any Regulated Substance, asbestos, or other type of contamination is encountered that results in a changed condition, then a change order may be issued in accordance with the contract.

If the delay impacts the CPM in such a manner that Contractor is prevented from continuing work on any portion of the project, and Owner issues a suspension of work order, then Contractor shall be entitled to compensation in the form of a one-time payment of Demobilization and Remobilization costs, which shall be no more than 6 percent of the original bid item for mobilization.

Subsection 107.6.3 Public Information and Notification: Add the following:

The Contractor shall employ a specialty public information service as a subcontractor to provide the community relations program for the project as described herein. The name and address of the public information subcontractor shall be submitted with the bid as specified in subsection 102.6 of the Supplementary General Conditions.

Contractor shall work closely with his subcontractor in developing and carrying out the community relations program, but shall not expect to actually perform the work of providing the public information services. Contractor shall submit a history of the subcontractor's qualifications and experience in public information services at the pre-construction conference for acceptance by the Engineer. The community relations program shall be designed to run the full length of calendar days in the contract for this project. The program will include but not be limited to:

1. Distributing a preconstruction information letter to all residents, business, schools, farm operations, etc. within an area bounded by the BID Canal to the south and Yuma Road to the north, and on the west from one-half mile west of Estrella Parkway, to Bullard Avenue on the east.

2. Printing and distribution of public notices and/or newsletters.

The Contractor will use these or other means to inform the local citizens of necessary operations which create high noise levels, street closures, limited access, detour locations, haul route and material delivery routes, hours of construction and disruption of bus, trash, school bus and other delivery/pick-up routes.

The Contractor will be required to furnish a private line telephone to be used solely for receiving incoming calls from local citizens with questions or complaints concerning construction operations or procedures. The Contractor shall publish this phone number and maintain a 24-hour answering service. The answering service shall be operated by Contractor personnel during all hours that work is being performed on the job site. The Contractor shall maintain a log of incoming calls, responses, and action taken which shall be submitted to the Engineer weekly and/or upon request.

Prior to the start of work, the Contractor shall notify, by letter, all affected businesses and residents of construction plans and schedules within the geographic area identified above. In addition, all schools and emergency services which serve the geographic area will also be notified even though they may be located outside the geographic area described above. The letter shall contain, as a minimum, the following information:

1. Name of Contractor
2. 24-hour telephone complaint number
3. Brief description of the project
4. Name of Contractor project Superintendent
5. Name of Engineer
6. Name of area supervisor
7. Construction schedule including anticipated work hours
8. Traffic regulations including lane restrictions
9. City of Goodyear Public Works 24-hour phone number

The Contractor shall submit a Public Information and Notification Plan to the Engineer at the pre-construction meeting. No payments shall be made for this item until the Engineer approves the plan.

The plan and work which is eligible for reimbursement shall include: meetings with impacted businesses, schools, emergency services, residents, etc.; scheduling; preparation and distribution of newsletter at least bi-weekly; and maintaining a 24-hour telephone hot line for complaints.

The Contractor shall submit a final report/evaluation of the Public Information and Notification process performed for this project. This report shall be submitted before the Contractor receives final payment.

Payment will be based on invoices, and will be for a total amount not to exceed the amount shown in the bid schedule for the item, "PUBLIC INFORMATION AND NOTIFICATION ALLOWANCE", for work performed in notifying and coordinating with the local population impacted by this project. To cover the cost for administration and supervision, the General Contractor may add an amount equal to not more than 5 percent of the accumulated total invoiced billing for actual public information services provided by a Subcontractor. This cost for administration and supervision will be considered included in the "PUBLIC INFORMATION AND NOTIFICATION ALLOWANCE".

ITEM 107-2 - PUBLIC INFORMATION AND NOTIFICATION ALLOWANCE

Subsection 107.6.4 - Project Signs:

Contractor shall provide and install six project information signs before beginning construction. The signs will 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. Signs shall be constructed in accordance with the Project Sign Information drawing to be provided to the Contractor at the pre-construction meeting. The signs shall be installed at the location(s) approved by the Engineer. The Contractor shall maintain the signs as necessary, and update the information as requested by the Engineer. Payment shall be made according to the allowance in the Bidding Schedule in installments of 50% upon installation, and the remaining 50% upon final payment for the work.

ITEM 107-3 PROJECT SIGNS ALLOWANCE

Subsection 107.8 - Use of Explosives: Add the following:

Because of the proximity to Phoenix-Goodyear Airport and major utilities, the use of explosives will NOT be permitted for any construction activities on the project.

Subsection 107.9 - Protection and Restoration of Property: Add the following:

The Contractor shall protect-in-place all existing structures and other features as identified on the plans. This includes but is not limited to all structures and improvements of the Buckeye Irrigation District (BID) Canal, Union Pacific Railroad, Phoenix-Goodyear Airport, and irrigation ditches, pipes and headwalls, roadways and associated facilities.

The Contractor shall limit all construction activities to the areas shown in the plans 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.

Subsection 107.10 - Contractor's Responsibility for Work: Add the following:

- A. The project will include the construction of irrigation siphons for the adjacent property owners. Construction of these siphon structures and their related features will require irrigation deliveries or tailwater flow in the ditches to be bypassed around the construction area.
- B. The Contractor shall protect-in-place at all times the BID Canal facility. The Contractor shall be responsible for and shall repair at his expense any damage to the canal caused by the Contractor, to the satisfaction of the BID.
- C. Contractor shall be aware that a potential exists for seepage from the BID Canal to be encountered during excavation operations, especially for the overchute structure. Seepage from the BID Canal may create conditions of over saturated soils or free water in excavations within, or adjacent to, the canal prism area.
- D. No payment will be made for providing excavation protective works for such things as dewatering or for the temporary bypass construction of existing farm irrigation facilities. The cost thereof shall be included in the bid price for the construction or installation of the items to which said excavation protective works or temporary bypass facilities are incidental or appurtenant.
- E. Storm water runoff in the area generally flows to the southwest, ponding against the north side of the BID Canal. The Contractor shall take all necessary precautions to protect his work and the BID Canal from damage that may be caused by such runoff and ponding.
- F. The Contractor shall take all necessary action to protect the public from the construction work area.
- G. The Contractor shall take all necessary action to ensure that all construction materials are stored in such a manner that storm runoff from the storage area does not reach the following locations:
 - Gila River
 - BID Canal
 - Irrigation ditches
 - Cultivated fields
- H. There are a number of RID ditches that experience continual flow within the project site. These ditches are crucial to the operation of farms in the area. The concrete lined and dirt tailwater ditch located on the west side of Estrella Parkway south of Elwood Street conveys tailwater from fields on both sides of Estrella Parkway from Elwood Street to Lower Buckeye Parkway. This tailwater is conveyed under the UPRR tracks and MC 85 and is used to help irrigation fields south of MC 85 and west of Estrella Parkway. The Bullard Wash Channel and the East Tributary Channel will intercept and disrupt existing flowing irrigation tailwater from north and west of the airport as well as other irrigation facilities all along the project alignment. In particular, the existing Bullard Wash tailwater ditch flows constantly and this ditch crosses the channel alignment a number of times. Also, the irrigation ditch to the east of the East Tributary Channel inlet structure flows constantly. Concrete

lined lateral RID ditches located 1/8 mile west of Estrella Parkway and on the east side of Estrella Parkway will require relocation and may impact several farmers. All the farmers south of Yuma Road are dependent on the RID pipe crossing under Yuma Road which will be relocated on this project. Temporary diversions of these ditches may be necessary in order to complete construction, and as importantly, to maintain irrigation flows to the downstream farm users. Irrigation water management will be critical to the successful completion of the project. Any disruption of these flows to the farm users, and any associated costs to the farmers will be the responsibility of the Contractor, and shall be corrected by the Contractor to the satisfaction of the farmer, with the cost borne solely by the Contractor. The Contractor shall submit all plans for irrigation water management to the Engineer for review prior to implementation. These plans should also be submitted to the farmer and/or the RID (see subsection 105.6.4) for review as required to ensure good working relationships with the farmers who rely on the irrigation water.

- I. The contractor shall notify the City of Goodyear "Public Safety" Department at 5 working days prior to working in the vicinity of the ELPNG line and K-M (SFPP) fuel line so that the City can develop an emergency response plan.

Subsection 108.1 - Notice to Proceed: Delete Paragraph (A) and replace with the following:

- (A) Contractor shall commence work within seven (7) calendar days after the date of the Notice to Proceed and complete all work within three hundred and sixty-five (365) calendar days beginning the day following the effective date specified in the Notice to Proceed.

Subsection 108.2 - Subletting of Contract: Add the following:

For this project, Contractor shall perform, with its own organization, work amounting to 50 percent or more of the total contract cost.

Subsection 108.4 - Contractor's Construction Schedule: Delete in its entirety and replace with the following: Contractor shall submit a proposed work schedule to Engineer at the pre-construction meeting for review before starting work using the Primavera or other similar software program that is acceptable to the Engineer. Weekly updates shall be submitted to Engineer at the weekly coordination meeting.

Contractor shall be solely responsible for the planning, scheduling and execution of the work to assure timely completion of the project.

Subsection 108.4.1 - Contractor's Billing Schedule: The Contractor shall furnish the Engineer an Estimated Billing Schedule which shall include the estimated amount of each billing for the total project at the preconstruction conference, and thereafter at monthly intervals as agreed to between the Contractor and Engineer.

Subsection 108.5 - Limitation of Operations: Add the following:

Should Contractor elect to perform any work after regular working hours, on weekends, or legal holidays, with or without written approval of Engineer, any charges incurred by Owner for inspection of the work, surveys or tests of materials will be deducted from monies due or to become due to Contractor.

Subsection 108.9 - Failure to Complete on Time: Add the following:

The actual cost per calendar day incurred by the District for Administrative and Inspection Services on this project will be added to the daily charges as indicated by TABLE 108, LIQUIDATED DAMAGES, and will be deducted from monies due or to become due to the Contractor for each and every calendar day that work shall remain incomplete after the time specified for the completion of the work in the proposal, or as adjusted by the Engineer. Nothing contained in this provision shall prohibit the Owner from deducting from monies due or to become due to the Contractor for any other costs incurred by the Owner directly attributable to the delay in completing this contract.

Subsection 109.2 - Scope of Payment: Add the following:

In addition to the contained provisions, the work under this section shall consist of preparatory work and operations, including but not limited to, the movement of personnel, equipment, supplies and incidentals to the project site; the establishment of all offices, buildings and other facilities necessary for work on the project, and for all other work operations that must be performed and costs incurred prior to beginning work on the various items on the project site.

The "complete-in-place" rate shall include but not necessarily be limited to all labor, material and equipment costs for preparation, installation, construction, modification, alteration or adjustment of the items, which shall include all costs for salaries and wages, all payroll additives to cover employee benefits, allowances for vacation and sick leave, company portion of employee insurance, social and retirement benefits, all payroll taxes, contributions and benefits imposed by any applicable law or regulation and any other direct or indirect payroll-related costs. The rate shall also include but not necessarily be limited to all costs for indirect charges or overhead, mileage, travel time, subsistence, materials, freight charges for material to Contractor's facility or project site, equipment rental, consumables, tools, insurance to the levels specified in Section 103.6, CONTRACTOR'S INSURANCE, all applicable taxes, as well as Contractor's fee and profit. This rate shall further include all site clean-up costs and hauling of construction debris to disposal sites designated by the Engineer.

Payment will be made for only those items listed in the proposal and will not be made in accordance with the measurement and payment provisions of the MAG Standard Specifications where this differs from the items listed in the proposal. All materials and work necessary for completion of this project are included in proposal items. Any work or materials not specifically referred to in these items are considered incidental to the item and are included in the unit price.

Payment shall not be made for unused materials.

It is the responsibility of the bidders to contact all municipalities in the area to determine if they will charge Contractor sales taxes or any other fees for work on this project. Any such taxes or fees shall be paid by Contractor.

Subsection 109.7 - Payment for Bond Issue and Budget Projects:

(A) To third paragraph, add:

Payment or release of retained funds shall be made to the Contractor within thirty (30) days following final payment to the Contractor [reference (B) following], and Contractor furnishing to Engineer satisfactory receipts for all labor and material billed and waivers of liens from any and all persons and Subcontractors holding claims against the work. Additionally, Contractor shall furnish a completed Certificate of Performance to Engineer evidencing it has satisfactorily discharged all its duties in connection with the work to be performed under this Contract. The form of Certificate of Performance shall be provided to Contractor by the Engineer.

(B) Delete second and third paragraphs and replace with the following:

The final payment will be made to Contractor by Owner within thirty (30) days following receipt of Engineer's final estimate and receipt by Owner of Consent of Contractor's Surety to said final payment. If payment will be longer than thirty (30) days as aforesaid, Owner will provide Contractor specific written findings for reasons justifying the delay in payment.

(C) The Contractor's monthly pay estimates will be initially processed by the Engineer during the last week of the month covered.

SECTION 111 - MOBILIZATION

Add this section to the MAG Uniform Standard Specifications.

Subsection 111.1 - Description

The work under this section shall consist of preparatory work and operations, including but not limited to, the movement of personnel, equipment, supplies and incidentals to the project site; the establishment of all offices, including a field office for the exclusive use of the Engineer as described below, buildings and other facilities necessary for work on the project, and for all other work and operations that must be performed and costs incurred prior to beginning work on various items on the project site.

Field Office:

This work shall consist of providing and maintaining a furnished field office for the exclusive use of and occupancy by the Engineer and the Engineer's staff.

The office shall be a building or mobile trailer erected at a location convenient to the project. The Contractor's office and the Engineer's office shall not be located in the same building or mobile trailer, although the offices should be located next to each other or within a reasonable walking distance.

The Contractor shall obtain approval from the property owner upon site selection of the field office.

The Contractor may furnish equivalent facilities in an existing building provided such facilities and building are located to provide convenient service.

The field office shall be an approved and weatherproof building or mobile trailer providing a minimum of 528 square feet of clear floor space, not including the toilet area. The structure shall have a minimum ceiling height of seven (7) feet and shall be provided with weatherproof doors equipped with adequate locking devices. Windows shall also be provided with adequate locking devices. The Contractor shall also provide the following:

- a. Lighting - Electric light, non-glare type luminaries to provide a minimum illumination level at desk height level.
- b. Heating & Cooling - Adequate electrically powered equipment to maintain an interior ambient air temperature of 72 degrees F plus or minus 6 degrees.
- c. Telephone, telephone with answering machine, and plain paper FAX machine, and plain paper copy machine (Xerox 5016ZTA or equivalent) - Two outside telephone lines will be provided for the exclusive use of the Engineer, one for the telephone and one for the FAX machine. The Contractor will pay for the cost of the line and local calling charges. Long distance charges made on this line will be paid for by the District.
- d. Toilet - A commode and wash sink in a separately enclosed room within the building or mobile trailer, properly ventilated and complying with applicable sanitary codes. Contractor shall provide water service.
- e. Maintenance - The contractor shall maintain all facilities and furnished equipment in good working condition.
- f. Fire Extinguisher - Two non-toxic, dry chemical, fire extinguishers meeting Underwriters Laboratories, Inc. approval for Class A, Class B, and Class C fires with a minimum rating of 2A: 20B: 10C.
- g. Electricity - Contractor shall provide electric power (available 24 hours a day) and pay for all electric services.
- h. Furnishings - Three office desks with lockable drawers, three office chairs (padded, swivel type), one drafting table (adjustable height 3 feet by 6 feet), one conference table (96" x 30"min), ten folding chairs, one draftsman's stool, and a lockable four drawer legal file cabinet.

The office shall be fully equipped and made available for the Engineer's use and occupancy prior to the start of any Contract work and not later than 10 days after the date of notice to proceed. The Engineer will notify the Contractor, in writing, of the acceptability of the Field Office provided. The Contractor shall maintain the field office in operating condition until seven (7) days after acceptance of the Contract work.

Contractor shall provide the same level of security for the Engineer's field office as is being provided for the Contractor's field office.

All facilities shall be maintained in good operating condition and appearance by the Contractor for the designated period, after which all portable buildings or trailers, fencing, surfacing, and utilities shall be removed from the site, the areas cleaned and seeded if required and left in a neat and acceptable condition.

Subsection 110.2 - Payment

Payment shall be made on the basis of the lump sum price bid and shall be full compensation for supplying and furnishing all materials, facilities, and services and performing all work involved as specified herein. The lump sum price bid shall not exceed three (3%) percent of the total project bid amount exclusive of mobilization. No additional payment will be made for occupancy and services during periods of contract extension of time due to engineering changes.

ITEM 111-1 MOBILIZATION

SPECIAL PROVISIONS

CONTRACT FCD 98-15

BULLARD WASH CHANNEL IMPROVEMENTS PROJECT
AND
ESTRELLA PARKWAY-BID CANAL TO YUMA ROAD PROJECT

**FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
CONTRACT FCD 98-15
BULLARD WASH CHANNEL IMPROVEMENTS PROJECT**

SPECIAL PROVISIONS

SECTION 201 - CLEARING AND GRUBBING

Clearing and grubbing shall conform to Section 201 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 201.1 – Description

Add the following:

The work consists of the removal and disposal of all vegetation including shrubs, trees of all sizes, farm field vegetation, and other plants and objectionable material within the channel right-of-way and as necessary for the construction of this project within temporary construction easements or limits of construction, unless otherwise directed by the engineer. Prior to starting this work the Contractor must verify the location of existing utilities which may be damaged during this work.

Subsection 201.6 – Measurement

Add the following:

Though generally no payment is made for clearing and grubbing as such, payment will be made for this work between Stations 18+00 and 29+00, and between 119+43 and 132+61, along the Bullard Wash Channel, and along the East Tributary Channel between Stations 19+50 and 23+50. Measurement for clearing and grubbing will be made on the basis of acres cleared and grubbed, including the removal of all trees regardless of size, and the disposal of all resulting materials. No measurement or payment shall be made for clearing and grubbing in temporary construction easements.

Subsection 201.7 – Payment

Payment will be made on the basis of the price bid per acre, including the removal of all trees.

ITEM 201-1 – CLEAR AND GRUB

SECTION 206 - STRUCTURE EXCAVATION AND BACKFILL

Structure excavation and backfill shall conform to Section 206 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 206.1 – Description

Add the following:

This work consists of the removal, placing and compaction of material around concrete structures such as box culverts, wingwalls, overchute structures, and inlet and outlet structures.

Subsection 206.2 - Foundation Material Treatment

Add the following:

It has been determined from the geotechnical investigation that the existing sandy clay beneath the proposed BID overchute structure foundation and concrete box culverts exhibit moderate consolidation potential. The soil beneath these structures shall therefore be over-excavated and replaced with compacted granular fill material as identified in Section 215.

Foundation bearing surfaces shall be compacted and free of debris and water softened materials prior to placing concrete and reinforcing steel. All foundation excavations shall be inspected and approved by the Engineer prior to placing the foundation material. Any loose or disturbed zones shall be removed and replaced with compacted granular fill or lean concrete. Granular fill shall conform to Type A Select Material as defined in Section 702 of the MAG Standard Specifications while lean concrete shall conform to ½ Sack controlled low strength material as

specified in Sections 604 and 728 of the MAG Standard Specifications.

Subsection 206.4 - Structure Backfill

Add the following:

Compaction of structure backfill soils against embedded footings or walls shall be Backfill Type III in accordance with Section 601, Table 601-2 of the MAG Uniform Standard Specifications which provides a minimum density requirement of 95 percent of the maximum density determined by ASTM D698.

Compaction within 3 feet, measured horizontally, of wing walls shall be accomplished using non-wheeled, hand-operated compaction equipment only.

Backfill behind subsurface walls designed to support utilities, pavement, or other facilities shall be compacted to density criteria from Section 211. Backfills shall consist of free draining granular soils, which exhibit low expansive potentials.

Compaction operations shall be accomplished by mechanical methods. Water settling or jetting shall not be permitted.

On-site or imported soil used for fills under, or backfill around the overchute structure, and piping shall be granular soils free of vegetation, debris, organic contaminants, and fragments larger than three inches in size, and shall conform to the following requirements:

Maximum Particle size:	2 inches*
Percent Passing #4 sieve	30-75
Percent Passing #200 sieve	0-12

* Maximum size may be reduced at the Engineer's direction to satisfy trenching requirements, etc.

On-site or imported soils with a P.I. > 5 shall not be used in structure fills or backfills.

Based on the borings completed for this project, most of the material adjacent to the channel will not meet the above structure backfill granular material requirements listed above. The Contractor is strongly encouraged to review a copy of the Geotechnical Report prepared for this project, which is available at the District.

Subsection 206.5 - Payment

No separate payment will be made for structure excavation and backfill. The cost thereof shall be considered as being included in the price bid for construction of the items to which structure excavation and backfill is incidental or appurtenant.

SECTION 211 - FILL CONSTRUCTION

Fill construction shall conform to Section 211 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 211.1 - Description

Add the following:

Fill construction shall consist of the placing and compacting of fill material along the Bullard Wash and the East Tributary Channels, and along the Lower Buckeye Road alignment as shown on the plans. The work shall also consist of placing and compacting fill material in the irrigation ditches to be abandoned which are outside the limits of the project channels as shown on the plans. These ditches shall be backfilled to prevailing grades along the ditches and shall be compacted to 95% percent of the maximum ASTM D698 density. The ditches shall be cleared of vegetation and water prior to the placement of fill material.

Subsection 211.2 - Placing

Add the following:

Soils removed during excavation with a plasticity index greater than 5 shall not be used in any structure backfills.

Existing ground upon which fill material is to be placed shall be prepared as specified in Section 211.3 of the MAG Standard Specifications. Unsuitable material shall be removed from ditches prior to backfilling ditches. The maximum ditch backfill lift thickness shall not exceed 1 foot.

Subsection 211.3 - Compacting

Add the following:

Compaction shall meet the following density criteria:

<u>Material</u>	<u>Minimum Percent Compaction (ASTM D698)</u>
Subgrade Soil:	
Below structural elements	95
Below AC or ABC Pavement	95
Below Farm Roads	90
Backfill:	
Below channel and riprap lining Structures	95
Abandoned Irrigation Ditches	95
Along Lower Buckeye Road	95
Farm Roads	85
Landscape Berm	85
Above Gabion Mattress Apron and Gabion Mattress Channel Bottom	85
Aggregate base course:	
Below pavement	100
Below overchute apron slabs and access road slabs, Dip crossings, and channel lining	95
O & M Road	95
Above gabion mattress bank lining on maintenance ramps	85

Compaction over the gabion mattresses shall be accomplished by non-vibratory, pneumatic tired rollers. The backfill material shall be placed in lifts not to exceed 6 inches in thickness and compacted as required.

Compaction of backfill or excavated areas over the PVNGS 96" reclaimed water pipeline encasement shall be accomplished by standard non-vibratory type compaction equipment. Areas over the 96" reclaimed water line beyond the encasement shall be compacted by standard non-vibratory type compaction equipment provided there is at least 5 feet of cover and less than 8 feet of cover at all times.

Compaction of on site soils in scarified zones or in new fills more than 3 feet below final grade shall have a moisture content between optimum and optimum plus 2 percent. Compaction of granular soil below the dip crossing, overchute and concrete box culverts, or footings shall have a moisture content of optimum and optimum plus or minus 2 percent. Compaction of exposed soil and fill material within 3 feet of asphalt pavement shall have a moisture content 2 percent below optimum or lower.

Before the embankment material used on the channel fill sections and the Lower Buckeye Road embankment is placed, the existing ground shall be scarified and compacted to 95 percent of the ASTM D 698 maximum density and to a depth of 12 inches. The embankment material shall be placed in compacted layers not greater than 10 inches thick. All layers shall be placed horizontally and the slopes trimmed to the slopes shown on the plans. Each layer shall be compacted to 95 percent of the maximum laboratory dry density and within 2 percent of the optimum moisture content as determined by ASTM D 698, Standard Procter. The material used for the embankment shall have a Plasticity Index greater than 5 but less than 12 and shall meet the following criteria:

<u>Sieve Size</u>	<u>Percent Passing by Weight</u>
2"	100

No. 40
No. 200

30-75
10-60

Material complying with the above requirements is not generally available from channel excavation within the project limits according to the geotechnical report prepared for this project. The Contractor is strongly encouraged to obtain a copy of the report and review it prior to bidding on the project. Embankment material used may need to be a mixture of different materials available on the project, and possibly including the importation of additional material in order to meet the requirements of these Special Provisions.

On-site undisturbed soils or compacted soils subsequently disturbed or removed by construction operations shall be replaced by materials compacted as specified above.

Subsection 211.5 – Measurement

Measurement in cubic yards shall be made for the placement and compaction of fill material within the existing and abandoned irrigation ditches outside the channel section or berm section, for the channel embankment fill north of the BID Canal and south of Broadway Road, for the landscaping berm, and the access road berm along Lower Buckeye Road as shown on the plans. No measurement will be made for the placement of other fill along the channels, for the BID Canal Bypass road, or the Broadway Road dip crossing, as these placements will be considered incidental to the channel excavation.

Subsection 211.6 - Payment

Payment will be made for the placement and compaction of fill material for the irrigation ditches, the berm along Lower Buckeye Road, the landscaping berm, and the channel embankment fill north of the BID Canal and south of Broadway Road on the basis of the price bid per cubic yard to the neat lines shown in the plans, complete in place, and including the removal of vegetation, and preparation of subgrade. No payment shall be made for placement of other fill along the channels, for the BID Canal Bypass road, or the Broadway Road dip crossing, as these items are considered incidental to the channel excavation.

ITEM 211-1 – IRRIGATION DITCH FILL CONSTRUCTION

ITEM 211-2 – CHANNEL EMBANKMENT FILL CONSTRUCTION

ITEM 211-3 – LANDSCAPING BERM FILL CONSTRUCTION

ITEM 211-4 – LOWER BUCKEYE ROAD BERM CONSTRUCTION

SECTION 215 - EARTHWORK FOR DRAINAGE CHANNELS

Earthwork shall conform to Section 215 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 215.1 - Description

Add the following:

The work in this section consists of excavation, construction debris landfill excavation, over-excavation, fill, grading, and disposal of excavated material for construction of the trapezoidal concrete drainage channels, gabion lined channel sections, gabion lined channel inlet. In addition, excavation, grading, and disposal of excavated material will be required for the installation of grouted riprap north of the Union Pacific Railroad tracks, and at the BID overchute outlet transition.

The bottom of the East Tributary Channel and the bottom of the trapezoidal concrete lined channel sections of the Bullard Wash Channel shall be over-excavated to a depth of 6-inches below the finished subgrade (bottom of the concrete lining) shown on the plans. The over-excavated reaches of the trapezoidal concrete drainage channel shall be backfilled and compacted with 6-inches of granular material conforming to aggregate base, per MAG Standard Specification Section 702.

The bottom of the grouted riprap channels shall be over-excavated to a depth of 10-inches below the finished subgrade (bottom of the grouted riprap lining) shown on the plans. The over-excavated reaches of the grouted riprap sections shall be backfilled and compacted with 2-layers (6-inch and 4-inch) of filter blankets per Section 220 of these Special Provisions.

The bottom of the BID overchute structure and the concrete box culvert south of the BID Canal shall be over-excavated to a depth of 6-inches below the finished subgrade (bottom of the concrete) shown on the plans. The

over-excavated reaches of these structures shall be backfilled and compacted with 6-inches of granular material conforming to aggregate base, per MAG Standard Specification Section 702.

Suitable on-site or imported granular material used for backfill as described above shall be free of vegetation, debris, organic contaminants, and fragments larger than three inches in size; and shall conform to the following requirements:

Maximum Particle size:	3 inches*
Percent Passing #4 sieve	40-100
Percent Passing #200 sieve	0-25
Plasticity Index	≤5

* Maximum size may be reduced at the Engineer's direction to satisfy trenching requirements, etc.

The work shall also include the removal and disposal of any buried utilities and utility services encountered during excavation which have been abandoned; including, but not limited to gas, telephone, electrical lines, and irrigation structures.

The work shall also include the removal and disposal of an existing construction debris landfill located within the channel cross section and project limits from approximately Station 77+00 to Station 80+00, and along the west end of the East Tributary Channel. Refer to Subsection 107.5.4 and Section 350 regarding the construction debris landfill and the disposal of the material. The channel bottom and side slopes within these reaches shall be over-excavated to a depth of 36-inches below the finished grades shown on the plans. The excavated material shall be screened with a 3-inch screen. The material retained on the screen shall be removed and disposed of in a municipal or commercial landfill, unless otherwise directed by the Engineer or Environmental staff as directed in Subsection 107.5.4. Some material passing through the screen may also require special disposal to a landfill. The soil material passing through the 3-inch screen may be used as fill material, provided it meets the requirements in Section 211 of the MAG standard specifications and the requirements contained in these Special Provisions.

Where construction debris remains exposed at the surface of the excavation limits as shown in the plans, the Contractor shall over-excavate locally to a depth of 3 feet beyond the design finished grade or subgrade to remove the debris, and then replace with backfill material to neat line finished grade or subgrade, compacted to 95%. The cost of the replacement of backfill shall be considered incidental to the drainage excavation.

Channel excavation material not required for constructing the Bullard Wash and East Tributary channels, shall first be used as fill material for the construction of Estrella Parkway, MC 85, Elwood Street, Lower Buckeye Road, Lower Buckeye Parkway, and Yuma Road in accordance with the Estrella Parkway – BID Canal to Yuma Road Project plans and Special Provisions included in this project as W.O. No.s 68877 and 68947. Fill material placed under the roadway shall be treated as specified in Section 309 of the roadway improvement Special Provisions. A Geotechnical investigation has been completed for soils along the channel alignment. The results are summarized in the Geotechnical Report available at the Flood Control District.

Excavation material from the removal of the farm irrigation sump pond berms north of the Lower Buckeye Road alignment, estimated to be approximately 4650 cubic yards shall be stockpiled at a disposal site owned by Sunchase Estrella Limited Partnership (Sunchase) and located on the south side of Yuma Road and west of the Phoenix Goodyear Airport. Sunchase, as the owner of the property between this area of the project and the disposal site will permit hauling across their property from the project site north of Lower Buckeye Road to the disposal site. Contact Todd Tupper of Sunchase at 468-1090 to coordinate this activity and the haul route. See Appendix "B" for a location map of the spoil site.

Excess material remaining after the channel fill requirements (per Section 211) and the roadway construction fill needs have been met will then be used on the airport property to backfill and compact the abandoned irrigation ditches resulting from the project and as shown on the plans. Contact the Airport Manager, Shawn Arena at 932-1200 prior to these placement activities.

The City of Goodyear and Sunchase have also expressed interest in obtaining excess fill material once all project needs have been satisfied. The City of Goodyear has identified a stockpile site located on the City's property on the northwest corner of Yuma Road and Estrella Parkway. The Contractor shall coordinate stockpiling of material on this site with Andrew Cooper, Interim Public Works Director, at 932-1637. Contact Todd Tupper of Sunchase at 468-1090 for coordination of the disposal of any excess material on properties owned by Sunchase located north of Lower Buckeye Road and south of MC 85.

Subsection 215.3 - Excavation

Add the following:

Excavation for Concrete Channel Lining and Grouted Riprap Lining - Excavation for the channel includes all the excavation specified below, performed to the lines and grades shown on the plans or established by the Engineer. The channel sections are shown on the plans. Channel side slopes shall be excavated to the required side slope rate specified in the plans and shall be scarified six inches. The channel bottom shall be overexcavated to allow for the installation of aggregate base under the concrete lined sections and for the installation of filter blankets under the grouted riprap sections. Both the invert and side slopes shall then be moistened and compacted by mechanical means per MAG Section 215 to the prism subgrade elevations identified on the plans with the exception that the required density shall be a minimum of 95 percent when tested in accordance with Section 211.3.

All excavated surfaces of the channel prism shall be trimmed and finished prior to the placement of aggregate base, filter blanket, concrete lining or grouted riprap lining thereon as identified in Constructing Channel Embankments below.

Excavation for Step Gabion Basket Bank Lining - Excavation for step gabion bank lining shall include overexcavation behind the gabion baskets and for the gabion mattress aprons as shown on the typical sections in the plans.

Excavation for Gabion Mattress Bank Lining - Excavation for gabion mattress bank lining shall also include overexcavation for gabion mattress aprons and toedowns as shown in the plans. The channel side slopes shall be excavated to the required side slope rate specified in the plans and be scarified six inches and compacted.

Removal of Existing Farm Pond Dikes - The existing dikes adjacent to the sump ponds located north of Lower Buckeye Road shall be removed. The dike removal includes portions of the dike north of the north end of the Bullard Wash Channel approximately (Station 119+43) to Station 132+61. The bottom of the dike excavation is defined in the plans. The Contractor shall exercise care when removing the dike material so that bottom of the dike and dirt tailwater ditch remain in tact and that no dike material falls into the tailwater ditch. Any dirt that does fall into the irrigation tailwater ditch shall be immediately removed. Dirt which falls into the sump ponds shall be removed prior to acceptance of the work.

Subsection 215.4 - Fill and Backfill

Add the following:

Constructing Channel Embankments - Materials for channel embankments shall be suitable materials, as defined in Section 211 of these Special Provisions, and may be obtained from required excavation.

The Contractor's operations in the excavation of materials for embankments shall be such as will result in an acceptable gradation of materials that will provide for impermeability and stability when compacted as defined in Section 211 of these Special Provisions. The maximum dimensions of stones placed in embankments to be compacted shall not exceed 3 inches. Stones and indurated material larger than 3 inches shall be removed prior to compacting operations. The channel shall be excavated to a subgrade and section as shown on the plans or as directed to provide for the prescribed thickness of lining and the foundation for the lining shall be trimmed as detailed below. The new channel prism shall require the construction of channel embankment from 12 inches below the existing ground to the top of lining. Embankments to be compacted shall be prepared as follows:

Concrete Channel Lining and Grouted Riprap Lining - Before the material for the first layer of the embankment

is placed, the foundation for the embankment shall be prepared and shall be moistened and compacted in the manner hereinafter specified for each layer of compacted embankment to be placed thereon. The upper 12 inches of the existing natural ground below the embankment shall be scarified. Side slopes shall also be scarified to a depth of six inches. Both the existing ground and side slopes shall then be moistened and compacted. The embankment shall be constructed in lifts no larger than ten inches per MAG Section 215 to the top of lining elevations identified on the plans; with the exception that the required density shall be a minimum of 95 percent. The embankments shall be compacted to the elevation and to the top widths and side slopes shown on the drawings or prescribed by the Engineer.

The Contractor shall trim and finish earth surfaces of the channel prism to provide a firm foundation for the concrete lining and grouted riprap. The bottom and side slopes, including the surfaces of compacted embankment and compacted backfill, over which concrete lining or grouted riprap are to be placed shall be finished to the dimensions shown on the plans. If at any point material has been excavated beyond the neatlines required to receive the concrete lining or grouted riprap, the excess excavation shall be refilled in horizontal layers with select material, Type A as specified in Section 702 of the MAG Standard Specifications, moistened if required, and compacted in accordance with MAG Section 215. Provided, that where placing and compacting refill on a sloping foundation, the layers may be placed parallel to the surface of the foundation. If at any point the foundation material is disturbed or loosened during the excavation process or otherwise, it shall be moistened, if required, and thoroughly compacted by tamping, rolling, or other approved methods to form firm foundations upon which to place the concrete lining or grouted riprap.

Step Gabion Basket Bank Lining – The gabion mattress apron and lower gabion basket shall be installed to the elevation and location specified in the plans including placement of the geotextile fabric. Backfill material shall then be placed and compacted to 95 percent such that the top of the compacted backfill shall be equal in elevation to the top of the gabion mattress apron. Backfill material shall then be placed over the gabion mattress in lifts of 6 inches or less to the required channel bottom elevation and compacted to 85 percent of the maximum density. Backfill shall then be placed behind the lower gabion basket in lifts of 10 inches or less to the top of the lower basket and compacted to 95 percent of the maximum density. The next gabion course shall then be placed on top of the lower gabion basket, compacted backfill and geotextile fabric and backfilled and compacted to 95 percent in lifts of 10 inches or less to the top of the gabion basket. This process shall be repeated for each successive course of gabion basket. When the existing ground level is encountered, it shall be scarified to 12 inches and compacted. The embankment shall then be constructed as described above for each successive course of gabion baskets.

Gabion Mattress Bank Lining – Embankment construction for gabion mattress bank lining shall be as specified for concrete and grouted riprap lining sections. The toedown and gabion basket aprons shall be backfilled as stated for the Step Gabion Basket Bank Lining Section above.

Care shall be taken to prevent overbreakage or loosening of material on bottoms and side slopes upon or against which lining is to be placed.

Through sections containing hard and compact material, coarse gravel, cobbles, and boulders that cannot be excavated and trimmed efficiently with excavating and trimming machinery, the channel shall be excavated so that there will not be less than 3 inches between any point of the excavated surface and the underside of the lining. Surfaces so excavated shall be refilled with compacted embankment material. Special care shall be taken to prevent overbreakage outside of the limits to which measurement for payment will be made. Any such overbreakage and refill thereof shall be at the expense of the Contractor.

At the end panels of existing lining against which new lining is to be placed under these specifications, all loose material shall be removed and all voids beneath the existing lining shall be refilled and thoroughly compacted.

The cost of constructing channel embankments not included in items for Section 211, and all earthwork for the maintenance access ramps, O&M roads, BID bypass road, Broadway Road dip crossing, and low flow channel, shall be included in the bid price for the construction of items to which the channel embankment construction is incidental or appurtenant.

Subsection 215.7 - Measurement

Add the following:

Measurement for payment for excavation for the trapezoidal concrete and grouted riprap drainage channels, concrete box culverts, and the overchute structure including the aprons will be made according to the quantity of material excavated from natural ground to finished subgrade as shown in the plans, plus over-excavation, and including the construction debris landfill excavation. Additional structure excavation and backfill will be considered incidental to the applicable concrete structure feature as required.

The Engineer will verify excavation quantities by a method, which in his opinion, is best suited to obtain an accurate determination.

Subsection 215.8 - Payment

Payment for excavation for the trapezoidal concrete and grouted riprap drainage channels, concrete box culvert, Broadway Road dip crossing, stepped gabion basket and gabion mattress channels, BID overchute structure including apron slabs, and the removal of the existing sump pond dikes, shall be made on the basis of the price bid per cubic yard to the neat lines shown in the plans, including over-excavation as applicable. Price bid shall include all labor, material, and equipment necessary for excavation, grading, compacting and disposal of excess materials in accordance with the plans.

NOTE: Disposal of excess material shall include the cost of hauling such channel excavation material as is required for the construction of the roadways per Sections 301 and 309 of the roadway Special Provisions. The placing, shaping, grading, and compacting of the fill material for roadway related construction purposes and placement, mixing, and compacting of the lime/fly ash stabilized fill material shall be paid for as part of the appropriate bid items in the roadway Special Provisions Sections 301 and 309 and the Bidding Schedule for roadway construction

ITEM 215-1 EARTHWORK FOR DRAINAGE CHANNELS

SECTION 216 - EARTHWORK FOR IRRIGATION DITCHES

Add this section to the MAG Uniform Standard Specifications.

Subsection 216.1 - Description

The existing irrigation delivery and tailwater ditches located all along the project, and including the Bullard Wash irrigation ditch operated by the Roosevelt Irrigation District (RID) located between MC85 and Lower Buckeye Road will need to be realigned temporarily in order to facilitate the construction of the Bullard Wash Channel.

The earthwork required for the temporary ditch construction shall consist of excavation, fill, grading, and temporary stockpiling of excavated material. The temporary bypass ditches are generally an excavated earthen "V" ditch. No temporary ditch section or location is given in the plans. The Contractor shall confer with the ditch owners and users and determine an appropriate section and location for the temporary ditches. After the completion of all construction that requires temporary bypass ditches, the Contractor shall remove, fill, compact, level and restore all works, and dispose of all material. All fill material used to restore the temporary bypass ditches shall be compacted to a minimum compaction of 85%, unless located within the limits of the airport in which case they will be compacted to a minimum of 95%.

Permanent earthen "V" ditches and 4' bottom dirt tailwater ditches shall be constructed by the contractor in the locations shown on the plans and according to the details in the plans. An RID dirt ditch located north of the railroad tracks will require clean out and reshaping. The Contractor shall coordinate the construction of these permanent ditches with the affected farmer or RID as applicable. Tim Smith has indicated that he may want to construct some of the ditches shown on the plans himself north of Station 104+00.

Subsection 216.2 - Contractors Responsibility

Temporary Bypass Ditches - The Contractor shall at all times during construction of the Project, insure the operation of all irrigation delivery and tailwater ditches impacted by the channel project as required for farming operations. This will include as required the construction of temporary bypass ditches. A continuous irrigation

delivery capacity of a minimum of 7 cubic feet per second will be maintained in the Bullard Wash tailwater irrigation ditch. The Contractor shall contact the RID for clarification on any need for greater capacity.

The construction sequencing and schedule for the use of temporary ditches shall be coordinated with RID and the farm users. At no time shall irrigation tailwater in the RID ditch be interrupted.

The Contractor shall be fully responsible for the conveyance, construction, maintenance, operation, and removal of all temporary features. In the event of any interruption in the flow of irrigation tailwater due to any construction activities or failure of any features of the bypass system, the Contractor shall immediately take necessary action to repair all damage to the temporary ditch system and restore the irrigation flow. All repairs shall be done to the satisfaction of the RID or farm users and the Engineer and at no cost to the project. Any costs associated with any crop losses associated with any failure on the part of the Contractor to maintain the flows of irrigation water, will be the responsibility of the Contractor at no cost to the project. The Contractor shall coordinate and schedule with the Engineer and the RID or farm user all activities, which in any way impact the irrigation delivery and flow of tailwater ditches.

Subsection 216.3 - Measurement

Measurement for payment for temporary ditches will be made on a lump sum basis, and will include all work necessary to construct and maintain the temporary systems, including but not limited to material excavated from natural ground, temporary lining that may be installed, temporary pipes that may be installed, fill or berm construction, stockpiling and disposal of excess material, the restoration of the existing and temporary bypass ditch alignments to original or better condition.

Measurement for payment for permanent irrigation ditches described above will be made on the contract unit price bid per lineal feet of ditch as measured at the centerline of the ditch.

Subsection 216.4 - Payment

Payment for diversion of irrigation flows and construction of the temporary bypass system, and other items necessary to care for the temporary bypass of irrigation water during construction, shall be made on the basis of the lump sum price bid, and which shall include the cost of furnishing all labor, equipment, and materials for constructing and maintaining the ditches, and restoring the alignments, after the bypass ditches are no longer required.

ITEM 216-1 - TEMPORARY BYPASS DITCH

Payment for permanent dirt irrigation ditches shall be made at the unit price bid per lineal foot of dirt ditch constructed, which price shall include all labor, equipment, and materials necessary for the item in place.

ITEM 216-2 - GRADED V-DITCH

ITEM 216-3 - DIRT IRRIGATION DITCH (4' BOTTOM)

SECTION 220 - RIPRAP CONSTRUCTION

Riprap construction shall conform to Section 220 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 220.1 - Description

Add the following:

Riprap construction for this project shall consist of furnishing and installing grouted riprap and dumped riprap as shown on the plans. Sacked concrete riprap shall not be permitted.

Riprap to be installed includes grouted riprap protection at the BID overchute outlet and at the drop structure north of the Union Pacific Railroad bridge. Placement of dumped riprap will be provided at the outlet of the low flow irrigation pipe near the East Tributary Channel inlet structure, at the south side of the west and east ends of the MC 85 bridge, and at the outlet of the irrigation siphon south of MC85.

Subsection 220.2 - Materials

Add the following:

Grout for grouted riprap shall be an approved batch per MAG Uniform Standard Specifications and shall develop a minimum 2,500 psi compressive strength within 28 days. Add 2 pounds per cubic yard FIBERMESH, or approved equal, fibrous reinforcing. Fibrous reinforcing shall consist of 100 percent virgin polypropylene, fibrillated fibers containing no reprocessed olefin materials and specifically manufactured to an optimum gradation for use as secondary reinforcement, and having the following characteristics:

1. Specific Gravity 0.91
2. Tensile Strength 60 ksi (min.)
3. Fiber length graded ½, ¾, 1 ½, and 2-inch lengths

Fibrous reinforcement shall be installed to the manufacturer's specifications.

The grouted riprap and dumped riprap thickness shall be as shown in the plans.

Placement of fill material will be required in order to place the overchute outlet transition riprap to the lines and grades shown in the plans. The fill will be placed in accordance with Section 211, and the cost of such fill will be incidental to the earthwork for drainage channels.

Subsection 220.3 - Preparation of Ground Surfaces

Existing subgrade shall be overexcavated to allow for the installation of a 10-inch thick filter blanket under the grouted riprap sections. The subgrade shall first be moisture conditioned, then proof-rolled with a minimum of two passes of a non-vibratory roller. The filter blanket shall conform to requirements in section 310 in these Special Provisions.

Subsection 220.4 - Plain Riprap

Plain riprap shall be placed at the outlet ends of pipe culverts where shown on the plans. The stone shall conform to Section 703 of the MAG Standard Specifications with a D50 of 6 inches. The riprap shall be dumped and spread to the lines and grades shown in the plans.

Subsection 220.5 - Grouted Riprap

Add the following:

Grouted riprap shall conform to the requirements set forth in Section 703 with D50 of 15 inches. The rock shall be angular or rounded and the gradation shall be as follows:

<u>Stone Size Range (in)</u>	<u>Percent of Stone Smaller</u>
22	100
18	85
15	50
12	15
8	0

No riprap rock shall be smaller than 8 inches in diameter or larger than 22 inches.

Place grouted riprap to line and grade as shown on the plans. The thickness of the grout material shall be at least 18 inches. Riprap shall be washed prior to placement so riprap stones are free of soil and fines. The concrete grout shall be placed by injection methods by pumping under low pressure, positive displacement methods, through a 2-inch maximum diameter hose to ensure complete penetration of the grout into the stone layer. The grout thickness shall be as shown on the plans, with a rock projection above the grout of 3-inch minimum and 5-inches maximum.

The operator shall be able to stop the flow and will place grout in the voids and not on the surface rock. Clean and wash any spillage before the grout sets. A "pencil" vibrator will be used to ensure all voids are filled between and under rock and that full depth penetration of the grout to subgrade or filter blanket is achieved. The intent is to fill all voids from the filter blanket level through the rock layer. In all cases, grout must penetrate to subgrade or filter blanket. The pencil vibrator may be used to smooth the appearance of the surface. If at any time the Engineer does not believe that full penetration has been achieved with the complete filling of voids, or that the method of

placement and vibration is not achieving the desired objective, the Contractor will stop work as directed by the Engineer and will not restart work until directed by the Engineer. The construction of the grouted riprap section of channel lining is a critical element to the function of the channel and all necessary placement and quality control measures will be undertaken by the Contractor to ensure a satisfactory installation of the grouted riprap sections

The grout mix shall be stiffened and other measures taken to retain the grout in steep locations.

The grout for the grouted riprap shall be colored using the following color admixture as manufactured by Davis Colors, or approved equal, added at the following rate:

“Spanish Gold” Number 5084, added at a rate of 3 pounds per 94-pound sack of cement

A 12' x 12' test panel shall be made and the grout placement and color shall be approved by the Engineer prior to use. The cost of the coloring and the test panel are incidental to the cost of the grouted riprap. Excess grout and grout splatter shall be removed from the exposed surfaces of the riprap without causing damage to the grouted riprap placement. Removal and cleanup of grout from the exposed surfaces of the riprap shall be done to the satisfaction of the Engineer, and shall be done in such a manner and to a level of quality to enhance the aesthetics of the completed project, and that allows the natural texture and color of the rock to remain visible.

The Contractor shall install 2" PVC for weep holes upstream of the concrete cut-off walls as shown in the details on the plans prior to applying the grout. The top of the PVC shall be covered during grouting so that grout material will not go into the PVC pipe. The PVC pipe shall extend 2-inches above the finished grout surface and 3-inches below the top of the aggregate filter. The installation of these weep holes including 2" PVC, aggregate, filter fabric, and stainless steel mesh shall be considered incidental to the grouted riprap construction.

The work shall also consist of constructing the tree wells at the locations shown on the plans including backfill and concrete cap as detailed on the plans. These tree wells will be used in the future to plant trees in the grouted riprap section of the channel.

The tree well shall be a 48" diameter reinforced concrete pipe conforming to ASTM C-76, Class III. The concrete cap shall be constructed of Class B concrete per Section 725 of the MAG Standard Specifications. The contractor shall take necessary precautions so that the concrete cap will not bond to the concrete pipe so the concrete cap can easily be removed in the future without damaging the concrete pipe. The tree well will be backfilled with clean native material.

Subsection 220.7 - Measurement

Grouted and dumped riprap shall be measured per cubic yard in place to the neat lines shown on the plans.

Subsection 220.8 - Payment

Payment for grouted and dumped riprap construction shall be made on the basis of the price bid per cubic yard to the neat lines shown on the plans, and shall include all labor, materials, including grout and color, weep holes and associated drainage material, tools and equipment, and including subgrade preparation and placement of fill material as required to install the riprap.

ITEM 220-1 - GROUTED RIPRAP

ITEM 220-2 - DUMPED RIPRAP

Payment for the tree wells shall be made on the basis of the price bid per each and shall include all materials, pipe, concrete caps, dirt backfill, and labor and equipment complete in place.

ITEM 220-3 - TREE WELLS

SECTION 221 - GABION CONSTRUCTION

Add this section to the MAG Uniform Standard Specifications.

Subsection 221.1 - Description

The work under this section shall consist of furnishing all materials, equipment, labor and incidentals required to

construct metallic/PVC-coated steel wire gabion baskets and mattresses at the locations and to the line and grade as shown on the plans.

Subsection 221.2 – Materials

The material used for gabion fill shall be clean, hard, well graded rock. The rock size for the 9-inch thick gabion mattresses shall range from three to six inches with D50=4.5 inches, while the rock size for the 12-inch gabion mattress and stepped gabion baskets shall be from four to eight inches with D50=6 inches. Placement of stone filling shall not exceed a 12-inch vertical drop above the gabion basket or mattress. Placement of the rock shall be done in such a manner as to minimize damage to the PVC coating on the basket wire.

Rock shall be sound and durable, free from clay or shale seams, cracks or other structural defects. The Bulk specific Gravity (SSD) shall be determined in accordance with the requirements of AASHTO T-85 and shall be a minimum of 2.4. Rock may be rounded stones. Rock shall have a least dimension not less than one-third of its greatest dimension and a gradation in reasonable conformity with that shown herein. Control of the gradation will be by visual inspection.

The source and acceptability of the stone will be approved by the Engineer. If testing is required, suitable samples of stone shall be taken in the presence of the Engineer at least 25 days in advance of the time when its use is expected to begin. The approval of some rock fragments from a particular quarry site shall not be construed as constituting the approval of all rock fragments taken from that quarry.

Gabion basket units shall be of non-raveling construction and fabricated from a double twist by twisting each pair of wires through three half turns developing the appearance of a triple twist per ASTM A 975-97. The double twisted mesh shall be manufactured from zinc-5% Al coated steel wire conforming to ASTM 856 Zinc-5% Aluminum – Manganese Alloy Coated Carbon Steel. The nominal diameter of the wire shall be 0.0866 inches for the gabion mattresses and 0.120 for the gabion baskets. The metallic-coated steel wire shall have a 3.0 mm thick zinc-5% Al coating with at least 275 g/m² per DIN 1548, as manufactured by Maccaferri Gabions, Inc. (GalMac® wire) or approved equal. The zinc-5% Al coated wire shall have an additional PVC coating extruded onto the metallic-coated steel wire. The PVC coating shall conform to material requirements listed in ASTM A 975-97, Paragraph 8.2. The coating shall be gray in color and have a nominal thickness of .02165 inches and shall nowhere be less than 0.015 inches in thickness. The metallic coated wire used shall be coated prior to weaving into mesh. All gabion diaphragms and frame wires shall equal or exceed the requirements for Style 3 in ASTM A975-97. The mesh opening shall be hexagonal in shape and uniform in size measuring not more than 3 ¼ inches by 4 ½ inches for Gabion Baskets and measuring not more than 2 ½ inches by 3 ¼ inches for gabion mattresses and slope blanket gabions. Seldge or perimeter basket frame wire shall be of a heavier gauge than the mesh wire with a diameter of 0.150 inches after the zinc-5% Al coating. Lacing and connecting wire shall meet the same specifications as the wire used in the gabion body except that its diameter shall be of 0.091 inches (US gauge 13) after zinc-5% Al coating. The use of alternate wire fasteners shall be permitted in lieu of tie wire providing the alternate fastener produces a four (4) wire seldge joint with a strength of 1,400 lbs. per linear foot while remaining in a locked and closed condition. Properly formed interlocking fasteners shall be spaced from 4 to 6 inches and have a minimum ¾ square inch inside area to properly confine the required seldge wires. The interlocking wire fastener shall meet material specification ASTM A-764, Finish 2, Class 1, Type 3. All of the above wire diameters are subject to tolerance limit of 0.004 inches in accordance with ASTM A-641. All wire used in the fabrication of the mattresses and baskets and in the wiring operations during construction shall have extruded onto it a coating of polyvinyl chloride (PVC).

Geotextile filter fabric shall be used behind and under the gabions baskets and mattresses and shall be a non-woven fabric consisting only of long chain polymeric filaments such as polypropylene or polyester formed into a stable network such that the filaments retain their relative position to each other. The fabric shall be inert to commonly encountered chemicals, which adversely affect or alter its physical properties. The physical requirements for the geotextile fabric shall meet the following minimum average roll values:

<u>PROPERTY</u>	<u>REQUIREMENT</u>	<u>TEST METHOD</u>
Grab tensile strength, lbs.	200	ASTM D4632-86

Grab elongation at break, %	45 min., 115 max.	ASTM D4632-86
Puncture strength, psi	80	ASTM D3787
Burst strength, lbs.	475	ASTM D3786
Trapezoidal tear strength, lbs.	50	ASTM D4533-85
Permittivity, cm/sec - 1	.48 max	ASTM D4491-85
Apparent opening size, U.S. Standard sieve size	150-200	ASTM D4751-87
UV stability, %	70	ASTM D4355-84

Minimum average roll values represent the average test results for a lot in the weaker direction when sampled according to ASTM D4354 and tested according to the test method specified above.

The identification, packaging, handling and storage of the geotextile fabric shall be in accordance with ASTM D4873. Fabric rolls shall be furnished with suitable wrapping for protection against moisture and extended ultraviolet exposure prior to placement. Each roll shall be labeled or tagged to provide product identification, sufficient to determine the product type, manufacturer, quantity, lot number, roll number, date of manufacture, shipping date, and the project number and name to which it is assigned. Rolls will be stored on the site or at another identified storage location in a manner that protects them from the elements. If stored outdoors, they shall be elevated and protected with a waterproof, light colored, opaque cover. At no time, shall the fabric be exposed to sunlight for a period exceeding 14 days.

Steel "stakes" shall be installed at slope mattress gabion locations as shown on the plans and as detailed in Detail 10b in the plans. Each gabion mattress shall have at least two "stake" anchors tied to the center of gabion dividers parallel to the channel centerline. The "stakes" shall be 1" nominal galvanized steel pipes, 4 feet long.

Subsection 221.3 – Assembling and Placing

The gabion bed subgrade shall be excavated to the width, line and grade as shown on the plans. The gabions shall be founded on this bed and laid to the lines and dimensions required.

Excavation for toe or cut-off walls shall be made to the neat lines of the wall.

Gabions shall be fabricated in such a manner that the sides, ends, lid and diaphragms can be assembled at the construction site into rectangular units of the specified sizes. Gabions are to be of single unit construction, the base, ends and sides either to be woven into a single unit or one edge or these members connected to the base section of the unit in such a manner that strength and flexibility at the point of connection is at least equal to that of the mesh.

Gabion basket dimensions shall conform to standard manufactured sizes as follows:

DIMENSIONS	NO. OF CELLS	CAPACITY (CU YDS)
6' X 3' X 3'	2	2
9' X 3' X 3'	3	3
12' X 3' X 3'	4	4
6' X 3' X 1'6"	2	1
9' X 3' X 1'6"	3	1.5
12' X 3' X 1'6"	4	2
6' X 3' X 1'	2	0.666
9' X 3' X 1'	3	1
12' X 3' X 1'	4	1.33
12' X 3' X 0.75'	4	1

Tolerances. All gabion dimensions shall be within a tolerance limit of $\pm 5\%$ of the manufacturer's stated sizes.

The contractor shall submit for review by the engineer, shop drawings prepared by a Professional Engineer

registered in the State of Arizona for the gabion layout at the locations shown in the plans. Said shop drawings will be based on the layout shown on the plans and shall include, but not be limited to: -plan and sections, basket sizes and locations.

Where the length of the gabion exceeds its horizontal width, the gabion is to be equally divided by diaphragms, of the same mesh and gauge as the body of the gabions, into cells whose length does not exceed the horizontal width. The gabion shall be furnished with the necessary diaphragms secured in proper position on the base section in such a manner that no additional tying at this juncture will be necessary.

All perimeter edges of gabions are to be securely selvedged or bound so that the joints formed by tying the selvedges have at least the same strength as the body of the mesh.

Gabions shall be placed to conform with the project plan details. Stone shall be placed in close contact in the unit so that maximum fill is obtained. The units may be filled by machine with sufficient handwork to accomplish requirements of this specification, however the stone filling shall not exceed a 12-inch vertical drop above the gabion basket. The exposed face or faces shall be hand-placed using stones to prevent bulging of the gabion cell and to improve appearance. Each stepped gabion basket cell shall be filled in three lifts.

Two connecting tie wires shall be placed between each lift in each cell. Care shall be taken to protect the vertical panels and diaphragms from being bent during filling operations.

The last lift of stone in each cell shall be level with the top of the gabion in order to properly close the lid and provide an even surface for the next course.

All gabion units shall be tied together each to its neighbor along all contacting edges in order to form a continuous connecting structure.

Empty gabions stacked on filled gabions shall be laced to the filled gabion at the front, side and back.

Filter fabric shall be placed in the manner and at the locations shown on the project plans. The surface to receive the fabric shall be free of obstructions, depressions and debris. The filter shall be loosely laid and not placed in a stretched condition.

The strips shall be placed to provide a minimum 24 inches of overlap for each joint. On horizontal joints, the uphill strip shall overlap the downhill strip. On vertical joints, the upstream strip shall overlap the downstream strip.

The gabions shall be carefully placed on the filter fabric in such a manner as not to damage the fabric. If, in the opinion of the Engineer, the fabric is damaged or displaced to the extent that it cannot function as intended, the contractor shall remove the gabions, regrade the area if necessary, and replace the filter fabric.

Filter fabric shall be placed on the inside of the gabion mattresses along the channel side edge of the gabion mattress ramps as shown in the plans. This will be done to help confine the aggregate base material to be used as surfacing on the gabion mattress ramps.

Subsection 221.4 – Measurement

The quantity of gabions shall be measured for the completed bid item in place to the limits and dimensions as shown on the plans. The Engineer will compute the quantities of gabions by a method which, in his opinion, is best suited to obtain an accurate determination.

Subsection 221.5 – Payment

Payment for gabion construction shall be made on the basis of the price bid per cubic yard, and shall be full compensation for all materials, equipment, labor, excavation, backfilling, preparing the ground area, filter fabric, rock, zinc-5% Al steel wire with PVC coating and all incidentals required to complete this item in place.

ITEM 221-1 – GABION BASKETS
ITEM 221-2 – GABION MATTRESS

SECTION 301 - SUBGRADE PREPARATION

Subgrade preparation shall conform to Section 301 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 301.1 - Description

Add the following:

Subgrade preparation shall be accomplished for the BID South Maintenance Road Bypass, Broadway Road dip crossing, operation and maintenance access roads, and farm roads as shown on the plans.

Subsection 301.3 – Relative Compaction

Add the following:

Compact the subgrade beneath the farm road and BID Canal road to 90 percent of the maximum density determined by ASTM D 698, Method A.

Subsection 301.7 - Measurement

Except for the farm roads and BID Canal road, no separate payment will be made for subgrade preparation. The cost thereof shall be considered as being included in the price bid for the construction or installation of items to which subgrade preparation is incidental or appurtenant.

Subsection 301.8 - Payment

Payment for construction of the farm roads and BID Canal road as shown on the plans will be made on the basis of the price bid per linear foot, complete in place including compaction and fill material.

ITEM 301-1 – FARM AND BID CANAL ROADS

SECTION 310 - UNTREATED BASE

Untreated base shall conform to Section 310 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 310.1 - Description

Add the following:

The work under this section consists of furnishing labor, materials, and equipment to install aggregate base course or granular filter blanket material to the lines and grades shown on the plans at the specified locations. These locations include 6" of aggregate base under concrete channel lining and box culvert and BID overchute structure, 4" and 6" layers of filter blanket under grouted riprap channel sections, 6" of aggregate base under the Broadway Road concrete dip crossing, 4" of aggregate base course on the operation and maintenance road and airport security road, and 4" of aggregate base course over gabion mattresses for the maintenance ramps.

Aggregate base shall comply with Section 702 of the MAG Standard Specifications.

The filter blanket shall consist of well-graded gravel. Type I filter blanket shall be 4" thick and placed on the subgrade while Type II filter blanket shall be placed on top of the Type I layer and below the grouted riprap section. The filter blanket materials shall conform to Section 702 of the MAG Standard Details except for the gradation of the material. The gradation as expressed in percent passing by weight shall be as follows:

<u>Standard Sieve Size</u>	<u>Type I</u>	<u>Type II</u>
3 inches	-	90 to 100
1-1/2 inches	-	-
¾ inch	-	20 to 90
3/8 inch	100	-
#4 (4.75 mm)	95 to 100	0 to 20
#16 (1.18 mm)	45 to 80	-
#50 (0.30 mm)	10 to 30	-

#100 (0.15 mm)
#200 (0.075 mm)

2 to 10
0 to 2

-
0 to 3

Subsection 310.2 Placing

Add the following:

Aggregate base shall be compacted to 95 percent of the maximum density as determined by ASTM D 698, Method A, except for the maintenance ramp locations. The Contractor shall take all reasonable precautions to avoid damaging the gabion mattress during placement and compaction of the aggregate material over the mattress. The aggregate base course over the gabion mattresses shall be compacted to 90 percent with pneumatic tire rollers. Steel wheel and vibratory compactors shall not be used in these locations.

The filter blanket courses shall be compacted to 95 percent of the maximum density as determined by ASTM D 698, Method A.

Subsection 310.3 Measurement

Aggregate base course and filter blanket material shall be measured in-place tons to the neat lines shown on the plans.

Subsection 310.4 - Payment

Payment for aggregate base course and filter blanket material shall be made on the basis of the price bid per ton. Price bid shall include all labor, material, and equipment necessary to place aggregate base course and filter blanket in accordance with the plans.

ITEM 310-1 - AGGREGATE BASE COURSE

ITEM 310-2 - FILTER BLANKET (TYPE I)

ITEM 310-3 - FILTER BLANKET (TYPE II)

SECTION 350 - REMOVAL OF EXISTING IMPROVEMENTS

Removal of existing improvements shall conform to Section 350 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 350.1 - Description

Add the following:

The work required for this project includes, but is not limited to, the following:

- The removal and disposal of two existing concrete lined irrigation ditches south of Broadway Road and one north of the Elwood Street alignment.
- The removal of existing 24-inch RCP irrigation culverts on the Lower Buckeye Road alignment and near the Elwood Street alignment to the limits shown on the plans.
- The removal of five existing 48-inch metal pipes and concrete rubble and miscellaneous debris located just north of the existing Union Pacific railroad trestle (See the East Tributary Channel plans).
- The removal of the existing airport perimeter chain link fence as shown on the plans.
- The removal of the concrete rubble and miscellaneous debris around the irrigation sump ponds located north of Lower Buckeye Road alignment.
- The removal of AC millings airport perimeter road.
- The work shall include the removal and disposal of construction debris from an existing construction debris landfill located within the project limits from approximately Station 77+00 to Station 80+00, and along the west end of the East Tributary Channel. Refer to Subsection 107.5.4 regarding the construction debris landfill.
- The work shall include the removal and disposal of construction and landscape debris in the Gila River

overbank area between the south bank of the BID Canal and Station 18+00. If what appears to be Regulated Substances are encountered in this area the Engineer shall be immediately notified, and direction as provided in Subsection 107.5.4 shall be implemented as required.

Holes, cavities, and trenches resulting from the removal of improvements shall be backfilled to proposed finish grade in accordance with Sections 206 and 211. The project construction limits shall be cleared of all trash and construction debris.

The disposal of all waste material removed under this item shall be the responsibility of the Contractor. The Contractor shall provide documentation to the Engineer that all waste material has been properly disposed. Documentation shall include copies of permits, receipts, and landfill weigh tickets. Letters of acceptance from public agencies, businesses, or private property owners will be accepted as proof of proper disposal for clean fill.

If a Maricopa County landfill is selected for disposition of waste materials and/or debris, a Maricopa County Landfill Use Permit is required. Application for permit can be made at the Maricopa County Solid Waste Office, located at 2801 West Durango Street, Phoenix, Arizona 85009 (telephone (602) 506-7060). Charges will be levied on a volume basis for each load delivered to the landfill in accordance with the current fee schedule.

All collected material shall be disposed of at an approved landfill site and shall be subject to landfill fees so assessed, which will be included in the unit price bid for this item.

Subsection 350.4 - Payment

Payment for the removal and disposal of existing concrete lined ditches, irrigation culverts, chain link fences, etc. shall be made on the basis of the lump sum price bid, and shall include all labor, materials and equipment necessary to remove and dispose of the items.

ITEM 350-1 - REMOVE CONCRETE LINED DITCH

ITEM 350-2 - REMOVE IRRIGATION CULVERTS

ITEM 350-3 - REMOVE CHAIN LINK FENCE

Payment for the removal and disposal of concrete rubble and construction and landscape debris, as from the landfill, the sump ponds, and the overbank area of the Gila River shall be made on the basis of the price bid per ton, and shall include all labor, materials and equipment necessary to remove and dispose of the items, and all landfill disposal fees, and will be made only for the actual tonnage of material removed and disposed of.

ITEM 350-4 - RUBBLE AND DEBRIS REMOVAL

Payment for the removal and disposal of existing items not included in the above listed bid items shall be made at on the basis on the lump sum price bid, and shall include all labor, materials and equipment necessary to remove and dispose of the items.

ITEM 350-5 - MISCELLANEOUS REMOVALS

SECTION 401 - TRAFFIC CONTROL

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

Refer to the Estrella Parkway – BID Canal to Yuma Road project Special Provisions for specific direction on traffic control pertaining to the roadway and bridge construction activities.

Subsection 401.1 - Description

Add the following:

All traffic control shall conform to the Construction Specifications for this project, Part IV of the "Manual On Uniform Traffic Control Devices For Streets And Highways" (U.S. Department of Transportation, Federal Highway Division) and all revisions thereto, and the request of the Engineer.

It shall be the Contractor's responsibility to provide, erect and maintain, and remove after completion of the work, all necessary signs, barricades, barriers, berms, lights, high level warning devices, delineators, and any other

required devices, uniformed officers, and flagman necessary to properly mark and control the construction area for the safe and efficient movement of traffic.

Temporary traffic control devices shall be installed as required prior to the start of any work. County (MCDOT), and as required by the City of Goodyear, approval of Contractor's traffic control method shall not relieve Contractor of its responsibility to protect the work, Contractor's personnel, or the general public.

Contractor shall provide and maintain all necessary signs, barricades and centerline vertical panels for five (5) working days beyond the concrete cure time or acceptance of the project by the Engineer, whichever period is greater.

Subsection 401.5 General Traffic regulations

Add the following:

Traffic regulations must comply with Part VI of the "Manual On Uniform Traffic Control Devices For Streets And Highways" (U.S. Department of Transportation, Federal Highway Division) and all revisions thereto.

A lane(s) closure for the convenience of the Contractor is not authorized, except as specified in these Special Provisions, without the prior approval of the County, and Goodyear. Traffic restrictions are not permitted on major or collector streets during peak traffic hours of 6:00 a.m. to 8:30 a.m. and 4:00 to 7:00 p.m. weekdays.

Channelization, including "KEEP RIGHT" signs, shall be provided whenever traffic is moved across the street center line, the existing center line is removed, or opposing traffic is maintained in other than the normal traffic lanes.

All temporary traffic control devices shall be ballasted with sandbags or other approved ballast.

For construction or trenching diversions that require movement of traffic from the normal through lanes, temporary bypasses shall be utilized only during daylight hours and the normal traffic shall be restored during nighttime hours. Traffic plates and temporary pavement shall be used to restore traffic lanes. Exceptions may be authorized by the Engineer under unusual conditions.

The "SPEED LIMIT 25" sign shall be used where traffic is maintained on unpaved shoulders, on temporary detour roads, on road sections where the existing pavement has been removed, or on traffic lanes that are severely restricted.

Access to all adjacent properties shall be maintained. When access cannot be maintained, Contractor shall notify the adjacent residents at least 48 hours in advance of the access closure. In no case shall the access be closed for more than four hours. Access for fire stations, hospitals, sheriff stations and schools shall be maintained at all times.

Contractor shall maintain or relocate all existing signal indications, warning signs, STOP, YIELD, and street name signs erect, clean and in full view of the intended traffic at all times. Portable signs should be used to supplement blocked or removed signs. Contractor shall reset all disturbed signs to permanent locations when construction is completed. Unnecessary or surplus signs shall be removed and delivered to the MCDOT Traffic Operations Sign Shop at 2901 West Durango Street, Phoenix. Contractor is responsible for the cost of replacing lost or damaged traffic warning signs.

Contractor shall erect portable jersey barriers when deemed necessary by the Engineer. The approach ends of all portable barriers shall be flared a minimum of ten feet away from the travel lane in order to lessen the severity of an accidental impact.

Rope, flagging, fencing, and woven plastic tape may be used between barricades and channeling devices to provide additional safety.

Contractor shall install deceleration sand berms in the blocked traffic path or at other hazardous sites, if required by the Engineer, in order to prevent vehicles from entering the construction and/or hazard area. The deceleration sand

berms shall be constructed of washed sand and shall be approximately five feet (5') high.

Subsection 401.5.1 - Special Traffic Regulations

Add the following:

MC 85 will remain open to traffic in all directions and at all times during the entire duration of the construction contract. This will include construction of the MC85 bridge over the channel and of the channel itself. Refer to the Estrella Parkway – MC85 Roadway Improvements Project Special Provisions for specific direction on traffic control pertaining to the roadway and bridge construction activities at the channel crossing.

Access will be provided at all times during construction for operation and maintenance access for the BID Canal personnel along at least one side of the canal. The Contractor shall coordinate this access with the BID by contacting Jackie Meck at least 7 calendar days in advance of any planned disruption to the canal access.

Access along the Broadway Road alignment (this is not a dedicated public road) for the purposes of farming operations shall be maintained at all times with the exception of a three week period where such access can be reduced or if necessary closed, for the purposes of constructing all channel and dip crossing related features of the project at this location. The Contractor shall coordinate this access with the farmer, Mr. Ron Rayner at 932-1834, at least 7 calendar days in advance of any planned disruption to the Broadway Road alignment.

Access along the Lower Buckeye Road alignment and along the Bullard Wash RID irrigation ditch along the mid-section line north of Lower Buckeye Road for the purposes of farming and irrigation maintenance operations shall be maintained at all times. The Contractor shall coordinate this access with the farmer, Mr. Tim Smith at 936-9545, and with the RID, Mr. Stan Ashby at 386-2046, at least 7 calendar days in advance of any planned disruption to these areas.

Access at the Phoenix Goodyear Airport, and along the airport perimeter road shall be in accordance with Subsection 105.6.3. Access for airport personnel along the perimeter road shall be maintained at all times.

Construction shall not commence or proceed without an approved Traffic Control Plan (TCP). At the pre-construction conference, the Contractor shall submit for review his plan for the sequence of construction, any planned lane closures, signing for construction, and the traffic flow. A TCP covering the signing and staging shall be submitted and approved prior to the start of each stage of construction. The TCP shall address all construction staging and special provisions requirements, including any flagging to be used on the project.

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 Engineer and shall supervise and direct the work. Instructions and information given by the Engineer to this individual shall be considered as having been given to the Contractor.

Subsection 401.7 - Payment

Payment for traffic control, for channel construction related activities, including all activities, coordination, installations, and removals incidental to the approved traffic control plan, shall be made on the basis of the lump sum price bid.

ITEM 401-1 - TRAFFIC CONTROL

SECTION 405 - MONUMENTS

Monuments shall conform to Section 405 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 405.1 – Description

Add the following

The work in this section shall consist of installing brass caps and frames at the locations shown on the plans for survey monuments. The brass caps will be furnished by the Contractor and the surveying necessary to establish the exact locations of the new survey monuments will be provided by the Contractor.

Subsection 405.5 – Payment

Payment for installing new survey monuments shall be made on the basis of the price bid per each for survey monuments complete in place.

ITEM 405-1 - SURVEY MONUMENT

SECTION 415 – BARRICADES

Barricades shall conform to Section 415 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 415.1 – Description

Add the following:

Barricades shall be installed as shown on the plans, including locations at the BID Canal north and south access roads, on the west side of the Bullard Wash Channel at the end of the Lower Buckeye Road alignment, and the east side of the Bullard Wash Channel at the end of the East Tributary Channel O&M road. Barricades shall conform to MAG Standard Detail 130, Type "B".

Subsection 415.5 – Payment

Payment for barricades shall be made on the basis of the price bid per linear foot and shall include all materials, equipment, and labor necessary for the installation complete in place.

ITEM 415-1 - BARRICADES

SECTION 420 – CHAIN LINK FENCES

Chain link fences shall conform to Section 420 of the MAG Uniform Standard Specifications and MAG Standard Detail 160 except as modified herein.

Subsection 420.1 - Description

Add the following:

The work in this item consists of constructing chain link fence and gates at the Phoenix-Goodyear Airport property line along the east side of the Bullard Wash Channel improvements and along the north side of the East Tributary Channel as shown on the plans. This item does not include temporary security fence required to protect the project site or security fencing required at the Phoenix-Goodyear Airport, as directed in Subsection 105.6.3. The three-strand barbed wire shall be tilted away from the airport.

Subsection 420.5 - Payment

Payment for chain link fence and gates, including all mobilization, materials, equipment, labor to install chain link fence, shall be made on the basis of the price bid per linear foot of fence and gate installed complete in place.

ITEM 420-1 – CHAIN LINK FENCE AND GATES

SECTION 421 - WIRE FENCES

Add this section to the MAG Uniform Standard Specifications.

Subsection 421.1 – Description

The work under this section shall consist of furnishing all materials and constructing 3-wire plain wire fence at the location and in accordance with the details shown on the plans. Fence shall be of the type and size shown on the plans and shall be constructed in accordance with the requirements of these specifications. Fence locations include along the south side of the East Tributary Channel, along the west side of the Bullard Wash Channel improvements north of the airport, around the inlet end of the Bullard Wash Channel improvements north of Lower Buckeye Road, and along both sides of the Bullard Wash Channel improvements from the airport to MC85, and other locations as shown in the plans.

Subsection 421.2 – Materials

Plain wire shall be 12-1/2 gauge steel wire and shall be either zinc-coated or aluminum coated. Zinc-coated steel wire shall conform to the requirements of ASTM A 121, Class 1 coating. Aluminum-coated steel wire shall conform to the requirements of ASTM A 585, Type 1, Class 1 coating.

Posts, rails, braces, and bars shall conform to the requirements of ADOT Standard Specifications Section 902, and ADOT Standard Detail C-12.10.

Portland cement concrete shall conform to the requirements of Section 725, Class B.

Subsection 421.3 – Construction

The Contractor shall clear the fence lines of all earth, trees, brush, and other obstructions, which interfere with the proper construction of the fences. Clearing the fence line shall be along and within the project right-of-way. Disposal of removed material shall be in accordance with the requirements of Section 201.

Fence shall be constructed as shown on the plans.

Fence posts shall be spaced at the intervals and set to the depths shown on the plans.

In determining the post spacing, measurements shall be made parallel to the ground slope, and all posts shall be placed in vertical position, except in unusual locations where the Engineer may direct that the posts be set perpendicular to the ground surface.

Line posts may be driven into undisturbed earth provided driving does not injure the posts. All voids around the post shall be backfilled and the material thoroughly tamped.

End, corner, and pull posts, and braces shall be set in concrete footings and crowned at the top to shed water.

Any high points which interfere with the placing of fence wire shall be excavated to provide the clearance shown on the plans.

Changes in the horizontal alignment of the fence line where the angle of deflection is fifteen (15) degrees or more shall be considered as corners and a corner post assembly shall be installed. Changes in fence alignment where the angle of deflection is less than fifteen (15) degrees, but more than five (5) degrees shall be considered as alignment angles and diagonal tension wires shall be installed. The diagonal tension wires shall consist of two (2) twisted steel wires and shall be attached to the adjacent posts.

Intermediate post assemblies shall be installed at not more than five hundred (500) foot intervals between other braced posts. After post assemblies have been placed the wire shall be pulled taut to the satisfaction of the Engineer, and each longitudinal wire shall be cut and securely fastened to the braced post with devices suited for the purpose. Wire shall not be carried past a post assembly, but shall be cut and fastened to the post independently of the adjacent spans. A maximum of two (2) splices of wire will be permitted between post assemblies, but not on the same wire. No splice shall be placed closer than one hundred (100) feet to any post assembly.

After the tensioning of the wire between the post assemblies, all longitudinal wires shall be attached to each intervening line post at the height and spacing as shown on the plans. The distance from the bottom wire to the ground may vary at one point from that shown on the plans four (4) inches plus or minus. Where abrupt changes occur in the fence line grade, intermediate line posts may be required to maintain proper distances between the bottom wire and the ground.

Spacing of the twisted vertical wire stays shall be as shown on the plans for each type of fence. The vertical wire stays shall be oven into every horizontal wire.

At all grade depressions where stresses tend to pull the posts from the ground, the affected fence posts shall be anchored in concrete or the fence wires shall be weighted with concrete sag weights. The volume of concrete required to anchor the posts shall be not less than one (1) cubic foot. Fence sag weights shall weigh not less than one hundred (100) pounds and shall be made with a wire loop hanger embedded in the concrete. A double strand of wire shall be attached to each horizontal line of wire and tied to the wire loop hanger of the sag weight.

Subsection 421.4 – Measurement

Wire fence shall be measured on the fence line along the top of the completed fence from center of end posts.

Subsection 421.5 – Payment

Payment shall be made on the basis of the price bid per lineal foot, and shall be full compensation for furnishing and installing the wire fence as specified, including removal of obstructions and all incidental costs not specifically covered in other items complete in place.

ITEM 421-1 – WIRE FENCE

SECTION 432 - GRAVEL MULCH

Add this section to the MAG Uniform Standard Specifications.

Subsection 432.1 - Description

The work consists of providing all labor, materials and equipment to install gravel mulch on the side slopes as shown on the plans. Gravel mulch shall conform to the requirements of Section 701.2.2 of the MAG Uniform Standard Specifications.

Subsection 432.2 - Materials

Gravel mulch shall be graded material and shall be free of debris, fines and soil particles. Gravel mulch will consist of a combination of crushed and rounded material with a minimum of 50 percent by weight crushed material. Crushed rock shall have at least 50 percent of the rock having three fractured faces. A sample must be approved by the engineer prior to delivery to the site.

The percentage wear of the material to be used as gravel mulch will be determined by the test procedure of ASTM Standard C-131, Grading B. The percentage of wear of the material shall not exceed 40 after 500 revolutions.

The aggregates shall be well graded when tested in accordance with ASTM C-136 and ASTM C-117. the percentage composition by weight shall be within the following limits:

<u>SIZE OF OPENING</u>	<u>PERCENTAGE PASSING SIEVE</u>
1-inch	100
3/4-inch	0 - 25

Gravel mulch shall be gray in color. Color shall be approved by the Engineer prior to delivery to the site.

Subsection 432.3 - Subgrade Preparation

The subgrade surfaces shall be the neat lines and grades shown on the drawings.

The sites where equipment can safely operate, (generally slopes 3. 5:1 or flatter), and designated to receive gravel mulch shall be adequately loosened. Disking or cultipacking or both may be necessary, as determined by the Engineer.

The finished surface for both equipment and hand-tilled areas shall be left in a roughened condition as approved by the Engineer. This is the normal surface resulting from the tillage operations.

Rocks larger than 3 inches in diameter, trash, weeds, and other debris that will interfere with gravel placement shall be removed and disposed of as determined by the Engineer.

Subgrade preparation shall be discontinued when soil moisture conditions are not suitable for the preparations of a satisfactory subgrade as determined by the Engineer.

Gravel mulch shall not be placed until the subgrade surfaces have been inspected and approved by the Engineer.

Subsection 432.4 - Placement

The gravel mulch shall be placed by equipment on the prepared surfaces. The mulch shall be constructed to the full

course thickness in one operation and in such a manner as to avoid serious displacement of the underlying materials and native seed mix. The gravel mulch shall be delivered and placed in a manner that will ensure that the in-place mulch layer shall be reasonably homogeneous and the fractions uniformly distributed. Hand placing of gravel cover shall be required to the extent necessary to prevent damage to the permanent works. The thickness of the gravel mulch shall be not less than 2 inches and shall be applied at an average of 150 pounds/square yard.

The gravel mulch will be hand raked and smoothed prior to water spray settling. The application of a uniform spray of water will be made at a rate not exceeding the infiltration rate to minimize run off. The use of pressure pumps and spray bars on all sprinkling equipment used for the application of water will be required. The use of gravity flow spray bars and splash plates will not be permitted.

Subsection 432.5 - Payment

Payment for gravel mulch shall be made on the basis of the price bid per square yard, and will be considered full compensation for all labor, materials, equipment, and all other items necessary and incidental to the placement of the gravel mulch. No separate payment will be made for water to settle the gravel mulch.

ITEM 432-1 - GRAVEL MULCH

SECTION 502 – DRILLED SHAFT FOUNDATIONS

Add this section to the MAG Uniform Standard Specifications

Subsection 502.1 – Description

The work under this section shall be for the construction of the foundations for the BID Canal overchute structure as shown on the plans, including furnishing all materials and constructing reinforced concrete shafts formed within a drilled excavation. Each drilled shaft foundation shall consist of a shaft section with or without casing left in place, as directed or specified, and shall be constructed in reasonably close conformity with the details and dimensions shown on the project plans and the requirements of these specifications.

NOTE: It is anticipated, based on the available geotechnical borings data that groundwater may be encountered at elevations higher than the design bottom of drilled shaft elevations. The Contractor shall perform his work accordingly to install the drilled shafts.

Subsection 502.2 – Materials

502.2.1 – Concrete

Concrete shall conform to the requirements of Section 725 for the class and strength shown on the project plans. Where concrete is placed in drilled shaft excavations containing bentonite slurry or water, the cement content of the concrete shall be between 658 and 752 pounds per cubic yard and the size of the coarse aggregate shall not exceed one inch.

Reinforcing steel

Reinforcing steel shall conform to the requirements of Section 727.

502.2.3 – Metal Casing

Casing may be of unit or sectional construction and shall be of sufficient strength to withstand handling stresses, the pressure of concrete and the surrounding earth and to prevent seepage of water.

Subsection 502.3 – Construction Requirements

502.3.1 – Excavation

The Contractor shall perform all excavation required for the shafts, through whatever substances encountered, to the dimensions and elevations shown on the project plans or required by the site conditions. Unless otherwise shown on the project plans, the maximum deviation from plumb shall be not more than one percent, and the maximum permissible variation of the center axis at the top shall be three inches from its project plan location.

Any excavation beyond the dimensions shown on the project plans, where shells are not used, shall be filled with concrete at the contractor's expense.

The project plans and soils reports for the project are indicative of anticipated subsurface conditions and depths where satisfactory bearing material may be encountered. The project plans may be used as a guide for the contractor to become familiar with the site subsurface condition but shall not be construed as a warranty of the subsurface condition except at locations actually drilled.

If satisfactory material is not encountered at plan elevation in the opinion of the Owner's geotechnical engineer, the bottom of any drilled hole may be lowered, with written approval of the Engineer. Alteration of the plan depth will be made to satisfactorily comply with design requirements. Reinforcing steel and concrete shall not be placed in the shaft until this final elevation has been established. The Engineer shall approve raising of the foundation elevation.

When the drilling operation reaches a point where caving conditions are encountered, no further drilling will be allowed until a construction method is employed that will prevent excessive caving and which is acceptable to the Engineer. If steel casing is proposed, the shell shall be clean and shall extend to the top of the drilled shaft excavation. The inside diameter of the casing shall not be less than the specified size of the shaft.

If the Engineer determines that the amount of caving is within acceptable limits and the contractor elects to drill under the same methods and procedures, the excavation shall be filled with concrete at the contractor's expense, regardless of the extent.

Casing specified on the project plans to be left in place shall be installed in such manner that there will be no voids between the earth and the casing.

If the use of drilling slurry is to be employed, either with or without the use of casing, the contractor shall use a method of construction, which will allow completion of the drilled shaft in a continuous manner without any mixing of concrete and drilling slurry.

Material excavated from shafts and bells and not incorporated elsewhere on the project shall be disposed of by the Contractor.

When the project plans indicate drilled shafts are to be constructed within embankments, the embankments shall be constructed prior to drilling, except when directed otherwise by the Engineer.

After the completion of the drilled shaft excavation and prior to the placement of the reinforcing steel cage and concrete, all slough and other loose material shall be machine cleaned from the shaft. A flight auger or other equipment, approved by the Engineer, shall be used for cleaning dry excavations where slurry or ground water is not present. Where slurry or ground water is present, the excavation shall be cleaned with a bucket auger or similar type of equipment, as approved by the Engineer.

Open excavations that are deemed by the Engineer to be potentially hazardous shall be covered at the end of each shift by the Contractor.

502.3.2 – Drilling Slurry

When slurry is used by the contractor to maintain an excavation, the contractor shall provide for a specialist, experienced in slurry drilling, to design and monitor the slurry. The slurry shall consist of a stable suspension of commercial bentonite in water. The contractor's specialist shall submit slurry design criteria, including density; viscosity, shear strength, pH, and suspended sand content, for drilling and concrete placement operations to the Engineer for review and approval prior to commencement of any slurry drilling. During the drilling operations, the contractor shall monitor the properties of the slurry for conformance to the submitted design criteria. The density of the slurry shall be the minimum required to maintain the excavation.

Just prior to placement of the reinforcing steel, the contractor shall conduct tests on the slurry, including samples obtained from the bottom of the excavation, to establish conformance with the submitted criteria. The consistency of the slurry shall be adjusted as required to maintain the excavation and to provide a suitable environment for the concreting operation.

The slurry shall be mixed in an approved mixer before being placed into the excavation. No dry material will be allowed to be placed in the excavation and mixed with water by the drilling auger.

Slurry shall be fed into the excavation as drilling progresses, keeping the holes filled to the top or maintained within any casing.

The contractor shall be responsible for the slurry design and control as well as the resulting drilled shaft foundation produced by this method.

502.3.3 – Inspection

Drilled shaft excavations will be inspected by the Engineer. The contractor shall provide suitable equipment and facilities so that the Engineer may inspect completed excavations and check the shafts for alignment and dimensions.

Reinforcing steel and concrete shall not be placed in the drilled shaft excavation until the Engineer has made his inspection and given his approval.

502.3.4 – Reinforcing Steel

The reinforcing steel cage for the drilled shaft, consisting of longitudinal bars and spiral hooping or lateral ties shall be completely assembled and placed into the shaft as a unit. The reinforcing steel unit shall not be placed until immediately before concreting operations are to be started and shall be placed in accordance with the details shown on the project plans.

The reinforcing cage shall be adequately supported and anchored to prevent movement from the required location during and for four hours after completion of concrete placement. Spacers shall be at sufficient intervals along the shaft to insure concentric spacing for the entire length of shaft. The type of spacer used shall be approved by the Engineer.

If the shaft is lengthened and the project plans indicate full depth reinforcement, the bars in the lower portion of the shaft shall be extended accordingly, to the bottom of the hole. These bars may be lap spliced or spliced by other connecting procedures approved by the Engineer and in accordance with the requirements of Section 505.5.1.

502.3.5 – Concrete

502.3.5.1 – General

Concrete shall be placed as soon as possible after the completion of the drilled shaft excavation and placement of the reinforcing steel cage. Concrete shall be placed in accordance with the requirements of Section 505 and as specified herein. Unless otherwise specified in the project documents, or as otherwise directed by the Engineer, the slump shall be 8 inches \pm one inch.

Prior to concrete placement, the contractor shall make all necessary arrangements to assure the uninterrupted delivery of concrete so that all drilled shaft foundations will be constructed without cold joints.

502.3.5.2 – Placement in Dry Excavations

For placement in dry excavations, concrete shall be placed through a suitable tube or tremie, or by pumping, to prevent segregation of materials.

Concrete vibration for the full height of the shaft is not necessary to achieve proper consolidation of the concrete. However, all shafts shall be vibrated in a least the top ten feet.

502.3.5.3 – Placement under Slurry or Water

Care shall be taken to ensure that all the fluid and suspended solids is expelled from the hole during concrete placement. The concrete shall be placed by pumping. The pumping equipment shall be of suitable type and shall have adequate capacity for the work. The concrete shall not flow either over or through any piping, fittings or equipment, which is, fabricated of aluminum or aluminum alloys. The operation of the pump shall be such that a continuous stream of concrete without air pockets is produced. Excessive segregation due to high velocity discharge of the concrete will not be permitted. When pumping is completed, the concrete remaining in the pipeline, if it is to be used, shall be ejected in such a manner that there will be no contamination of the concrete or segregation of the ingredients. Standby equipment shall be readily available to replace initial pumping equipment should breakdown occur. In order to prevent contamination of the concrete placed initially, the lower end of the pump pipe shall be provided with a valve or plug. The discharge end of the pump pipe shall always remain between one and three diameters of the drilled shaft below the surface of fluid concrete.

Slurry ejected during concrete placement may be reused provided that it is screened to remove gravel chips or other granular materials, and providing the slurry meets acceptance criteria. Slurry to be discarded shall be disposed of in a manner approved by the Engineer.

Concrete placed under slurry or water shall not be vibrated, except that the top 5 feet of the shaft shall be vibrated after the slurry or water and contaminated concrete has been totally expelled from the shaft.

502.3.6 – Casing Removal

During removal of any casing, a sufficient head of not less than five feet of fluid concrete shall be maintained above the bottom of the casing except at the top of the shaft. All contaminated concrete shall be removed from the shaft. If any upward movement of the concrete and/or reinforcing steel occurs at any time during the pulling operation, the following criteria shall govern:

- (1) If the upward movement is one inch or less, the casing may continue to be pulled provided no further movement occurs and if the concrete is vibrated or rodded to reconsolidate the concrete. Vibration or rodding shall not be used to attempt to break the casing loose for extraction.
- (2) If the upward movement is greater than one inch, the casing shall be left in place as a permanent sleeve at the contractor's expense. A load test may be required by the Engineer to determine the adequacy and acceptability of the drilled shaft.

Subsection 502.4 – Measurement

Drilled shafts will be measured by the linear foot from the actual bottom of the shaft, to the elevation of the top of the shaft as indicated on the project plans.

Subsection 502.5 – Payment

Payment for the accepted quantities of drilled shaft foundations, measured as provided above, will be made on the basis of the price bid per linear foot complete in place, including excavation, drilling slurry, metal casing, steel reinforcing, Portland cement concrete, and any needed forming, curing and finishing. No additional payment will be made for metal casing that is to remain in place.

When load tests are required by the Engineer to determine the adequacy and acceptability of drilled shafts, payment for load tests for drilled shafts determined to be adequate and acceptable will be made in accordance with the provisions of MAG Section 109.

ITEM 502-1 DRILLED SHAFTS

SECTION 505 - CONCRETE STRUCTURES

Concrete structures shall conform to Section 505 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 505.1 - Description

Add the following:

The work under this section shall consist of furnishing all labor, materials and equipment for the construction of all cast-in-place concrete including, but not limited to the BID overchute structure, concrete box culvert, wingwalls, headwalls, aprons, spillways, inlet and outlet structures, catch basins, irrigation and storm drain system structures, the low flow channel, channel lining, and various cutoff walls.

The work under this section shall also consist of supplying and installing the reinforced concrete channel lining for the overchute transition, channel lining under the Union Pacific Railroad bridge and MC 85 bridge, and the East Tributary Channel as shown on the plans.

The construction of structures and headwalls for the irrigation and for the storm drain systems will be measured as each items.

Concrete shall conform to the requirements of Section 725 of the MAG Standard Specifications, and mix designs shall additionally meet the requirements of Chapter 5, Section 5.3 of ACI STANDARD 318-89. The Contractor shall submit mix designs and certifications of conformance with the above requirements for the written approval of the Engineer.

Class "A" Concrete, $f_c = 3,000$ psi, shall be used for all concrete structures, culverts, wingwalls, headwalls, cutoff walls, aprons, spillways, low flow channel, overchute abutments and drilled shafts, irrigation and storm drain system structures and concrete lining except for the overchute structure.

Class "AA" Concrete, $f_c = 4,000$ psi, shall be used for the overchute deck slab, approach slab and walls as shown on the structure sheets in the plans.

The use of Class F fly ash will be permitted in all concrete mixes, subject to approval of mix design by Engineer.

Transit concrete mixers used on the project must carry current certification from ADOT or Arizona Rock Products Association.

The reinforcing steel shall conform to Section 727, Grade 60, of the MAG Standard Specifications.

The 3" PVC weep holes and drains shall be installed in accordance with plans. Weep holes shall be constructed in the concrete bank lining approximately 18 inches above the finished invert. Weep holes shall be spaced 50 feet on center horizontally, and shall include the installation of 3/16" stainless steel mesh, aggregate, and burlap sack or filter fabric.

Subsection 505.6 - Placing Concrete

No concrete shall be placed until all formwork, installation of items to be embedded, and preparation of surfaces involved in the placement have been approved by the Engineer.

Before placing the concrete channel lining, the earthwork shall be completed to subgrade and base course material installed and graded to grade, and the earth foundations shall be trimmed to the subgrade neat lines as shown on the plans and detailed below. The channel prism shall be kept moist between the time the channel is trimmed and the concrete lining is placed.

All surfaces of forms and embedded materials shall be free from curing compound, dried mortar from previous placements, and other foreign substances before the adjacent or surrounding concrete placement is begun.

Subsection 505.6.1 - Joints

A construction joint is defined as a planned joint where two placements of concrete meet, across which development and maintenance of bond are required, and through which any reinforcement that may be present is not interrupted. Construction joints shall be located at the end of a day's pour or when concrete placement stops for more than 45 minutes. Reinforcing steel shall be continuous through lining construction joints for a minimum of 2'-0" beyond the

end of pour unless noted otherwise on the plans. The end of the pour shall be a roughened surface. Box culvert joint spacing shall conform to ADOT requirements; however, plywood shall not be used and left in place in the joints.

After initial cleanup and at the last opportunity prior to placing concrete, concrete surface shall be thoroughly washed with water or air-water jets, and shall be uniformly surface dried. Elastomeric (mastic) sealant designated on the construction joint detail shall be Sikaflex 1-a as manufactured by Sika Corporation, Santa Fe Springs, California, or an approved equal.

When concrete lining placing operations for the overchute slope protection, and channel lining and channel lining transitions are stopped for the day, interrupted because of breakdowns, or delayed by other causes, the edge of the fresh concrete lining shall be bulkheaded to a surface normal to the placement along transverse or longitudinal lines. Before placing operations are resumed, the surface of the hardened concrete shall be cleaned as specified for a construction joint.

The joint between the concrete channel bottom and the existing concrete encasement for the PVNGS (APS) 96" reclaimed water line shall include a 1/2" expansion joint and dowels. The dowel shall consist of a #5 rebar and shall extend a minimum of 8 inches into the APS encasement and 10 inches into the new concrete footing as shown on the plans. The Contractor shall avoid the existing rebar in the concrete encasement and determine the location of the rebar by use of a rebar detector prior to drilling holes for the dowels. The holes shall be drilled on an angle such that the epoxy adhesive will not drain out of the hole before setting. The Contractor shall submit product data on the proposed epoxy material for approval by the Engineer prior to use on this project.

Expansion joints - Expansion joints shall be constructed between the channel lining and structures as shown on the drawings. The surfaces of all joints shall be cleaned thoroughly of accretions of concrete or other foreign material by scraping, chipping, or other means approved by the Engineer. All concrete expansion joint concrete surfaces shall be free of curing compound when adjoining concrete is placed. Sponge rubber filler shall be placed in all expansion joints. The Contractor shall furnish and place the sponge rubber filler in the joints between the concrete canal lining and structures as shown on the drawings.

The sponge rubber filler shall be cut to the size and shape of the joint surface. The filler shall be secured to the concrete in an approved manner, with copper nails embedded in the first-placed concrete in such a manner that the nails will protrude from the joint surface to be covered at approximately 12-inch centers, or by adhesive applied between the filler and the first-placed concrete.

Joints between adjoining portions of the filler material shall be sufficiently tight to prevent concrete from seeping through such joints. Where elastomeric (mastic) sealer material is required, the joint filler shall be set back from the edge of the joint to provide the proper recess for installing elastomeric (mastic) sealer. Elsewhere, unless otherwise shown on the drawings or directed, the edges of the sponge rubber filler shall be placed flush with the finished surface of the concrete or to the bottom edge of chamfers.

Materials:

Sponge rubber - Sponge rubber shall conform to Federal Specification HH-F-341F, type 2, class A, sponge rubber: provided, that the load required to compress the test specimen to 50 percent of its thickness before test shall be not less than 50 pounds per square inch nor greater than 150 pounds per square inch. Sponge rubber shall be stored in as cool a place as practicable, preferably at 70°F or less and in no case shall the rubber be stored in the open, exposed to the direct rays of the sun.

Copper nails - Copper nails shall conform to Federal Specification FF-N-105B for common copper wire nails.

Adhesive - Adhesive for fastening the sponge rubber in place shall be a non-bituminous adhesive as recommended by the manufacturer of the filler material.

Elastomeric sealer - Elastomeric (mastic) sealer shall be Sikaflex 1-a as manufactured by Sika Corporation, Santa Fe Springs, California, or approved equal.

Waterstop – Waterstop of synthetic rubber shall be placed in accordance with the details shown on the plans for the overchute structure. Where movement at the joint is provided for, the waterstop shall be of a type permitting such movement without injury. They shall be spliced, welded or soldered, to form continuous watertight joints.

Synthetic rubber waterstop shall be either molded or extruded. The waterstop shall be formed with an integral cross section, which shall be uniform within $\pm 1/8$ inch in width and the web thickness or bulb diameter within $+1/16$ inch and $-1/32$ inch. No splices will be permitted in straight strips and special connection pieces shall be well cured in a manner such that any cross section shall be dense, homogeneous and free from porosity or other defects. All junctions in the special connection pieces shall be full-molded. During the vulcanizing period the joints shall be securely held by suitable clamps. The material at the splices shall be dense and homogeneous throughout the cross section.

Field splices shall be vulcanized; mechanical, using stainless steel parts; or made with a splicing union of the same stock as the waterstop, at the option of the contractor. All finished splices shall have a tensile strength of not less than 50 percent of the unspliced material.

Certificates of Compliance conforming to the requirements of Subsection 106.2 shall be submitted.

Synthetic rubber waterstop shall be formed from a compound made exclusively from neoprene or SBR (styrene butadiene rubber), reinforcing carbon black, zinc oxide, polymerization agents and softeners and shall conform to the following requirements:

Neoprene or SBR Content, by volume, percent	Minimum	70
Tensile Strength (ASTM D 412), pounds per square inch	Minimum	2500
Elongation at Breaking (ASTM D 412), percent	Minimum	425
Shore Durometer (Hardness) (ASTM D 2240)		50 to 70
Tensile Strength at Breaking (ASTM D 572), after seven days in air at 158 degrees (± 2 degrees) F., or after 48 hours in oxygen at 158 degrees (± 2 degrees) F., and 300 pounds per square inch = percent of original	Minimum	65

Subsection 505.8 - Curing

Add the following:

→ Curing methods for concrete where color stain will be applied must be compatible with the concrete color stain application. Curing compound may be used for concrete surfaces not receiving color stain.

No vehicular loads will be permitted on the box culvert structures before the period of twenty-one (21) days from the date of the last pour of concrete unless approval is obtained in writing from the Engineer. In no case shall traffic be allowed on the structure until the specified concrete strength has been attained. The Contractor shall take special precautions to keep the area properly barricaded, lighted, and marked to prevent automotive traffic from crossing the new box culvert structures prior to the Engineer's approval.

Subsection 505.9 - Finishing Concrete

All exposed concrete surfaces of structures or portions thereof (except the underside) for the BID Canal overchute structure, the trapezoidal concrete channel sections, concrete O&M road ramps and curvilinear concrete paths through the riprap structures, the interior of the box culvert, box culvert wingwalls, headwalls and aprons, pipe outlet headwalls within the limits of the Bullard Wash Channel, the underside and channel side of the MC 85 Bridge

and UPRR Bridge, and the East Tributary Channel concrete lining from Station 0+00 to Station 3+00 shall be stained using the following color requirement.

Lithochrome Chemstain product number CS-16 "Faded Terracotta" as manufactured by the L. M. Scofield Company, at 1-800-800-9900, or an approved equal.

The color shall conform to the color requirements with respect to hue, value, and chroma. A 5'x5' test panel shall be made for the concrete stain color, and the color shall be approved by the Engineer prior to use.

The concrete stain color test panel will be considered incidental to the cost of the concrete. Staining of concrete shall be measured on a square foot basis and paid for separately.

Concrete surfaces outside the visual limits of the Bullard Wash Channel and all concrete surfaces associated with the East Tributary Channel, except as noted above, shall not be stained. These include all spillways, inlet headwalls, and irrigation structures, catch basins and aprons.

The surfaces of the Bullard Wash Channel and the East Tributary Channel concrete lining bottom, concrete operations and maintenance road ramps, the curvilinear concrete path through the riprap structures, and the invert of the box culvert barrel in line with the concrete pathway shall have a heavy raked finish applied parallel to the channel centerline (north/south direction). The side slopes of the Bullard Wash and East Tributary concrete channels, the invert of the other barrels of the box culvert, the large spillway at the BID Canal, and the low flow channel shall have a heavy broom finish.

Form liner shall be used for the full height on the inside and outside face of the walls, including wingwalls, of the overchute structure. The form liner shall be VA D.O.T. Trapezoid design, No. 304, uni-cast and/or multi-cast sheets as manufactured by Greenstreak, or approved equal. Form liners will be prepared, placed and stripped per the manufacturer's requirements, recommendations and specifications. The form liner shall not infringe on or reduce the required thickness of the walls as detailed in the plans. A test panel shall be made of the form liner and shall be approved by the Engineer prior to use. The test panel shall be 5' by 5' in size and shall remain on the project site until the completion of the overchute structure construction. The cost of the form liner is incidental to the cost of the overchute structure.

Subsection 505.10 - Payment

Payment for the overchute structure including the approach slabs, but not including the drilled shafts as paid for in bid item 502-1, the four-barrel 12'x10' box culvert, box culvert wingwalls, headwalls, barrier walls and aprons, and various cutoff walls including the low flow cutoff wall and the Broadway Road ford crossing cutoff walls, as cast-in-place construction shall be made on the basis of the price bid per cubic yard, and shall be full compensation for all labor, material, including concrete, joint material, waterstop, form liner, structure excavation and backfill, and equipment necessary for construction of the structure in accordance with the plans complete in place.

ITEM 505-1 - STRUCTURAL CONCRETE (CLASS A)

ITEM 505-2 - STRUCTURAL CONCRETE (CLASS AA)

Payment for reinforcing steel for the overchute structure including the approach slabs, but not including the drilled shafts as paid for in bid item 502-1, the four-barrel 12'x10' box culvert, box culvert wingwalls, headwalls, barrier walls, and aprons, and various cutoff walls including the low flow cutoff wall and the Broadway Road ford crossing cutoff walls as cast-in-place construction shall be made on the basis of the price bid per pound.

ITEM 505-3 - STEEL REINFORCEMENT

Payment for the concrete channel lining for the trapezoidal Bullard Wash and East Tributary channels, including the overchute transition lining, the East Tributary Channel inlet apron (Section B6) and Concrete Inlet Channel (Section G1), and for the Broadway Road ford concrete crossing shall be made on the basis of the price bid per square yard, and shall include all labor, concrete and reinforcing steel, joint material, and equipment necessary for construction of the concrete lining in accordance with the plans complete in place.

ITEM 505-4 - CONCRETE CHANNEL LINING

ITEM 505-5 - BROADWAY ROAD FORD CROSSING

ITEM 505-6 – CONCRETE INLET CHANNEL

Payment for concrete spillways at the BID Canal and the dip crossing spillway at the East Tributary Channel shall be made on the basis of the price bid per square yard of lining surface, and shall include all labor, concrete and reinforcing steel, joint material, and equipment necessary for construction of the concrete spillways in accordance with the plans complete in place.

ITEM 505-7 - SPILLWAYS

Payment for the concrete low flow channel (Sections B4 and B5) and the meandering O&M path (Section D1c), shall be made on the basis of the price bid per linear foot, and shall include all labor, concrete and reinforcing steel, joint material, and equipment necessary for construction of the low flow channel and O&M path in accordance with the plans complete in place.

ITEM 505-8 – O&M PATH

ITEM 505-9 – LOW FLOW CHANNEL

Payment for irrigation and storm drain system inlet and outlet headwalls and drop structures shall be made on the basis of the price bid per each, and including all concrete, rebar, trash racks, pipe access barriers and other materials, labor and equipment necessary to construct the headwalls complete in place.

ITEM 505-10 – INLET AND OUTLET STRUCTURES, MAG DET. 501-4

ITEM 505-11 – INLET AND OUTLET STRUCTURES, MAG DET. 502-1

ITEM 505-12 – INLET AND OUTLET STRUCTURES, MAG DET. 501-1

ITEM 505-13 – INLET AND OUTLET STRUCTURES, SPECIAL DETAIL 25

ITEM 505-14 – OUTLET STRUCTURE, SPECIAL SECTION 10c

ITEM 505-15 – INLET AND OUTLET STRUCTURES, MAG DET. 501-5

ITEM 505-16 – OUTLET STRUCTURE, SPECIAL DETAIL 22

Payment for East Tributary Channel inlet structure, Detail 13 on sheet 61 shall be made on the basis of the lump sum price bid, and including all concrete, rebar, trash racks, barriers, weir and other materials, labor and equipment necessary to construct the inlet structure complete in place.

ITEM 505-17 – INLET STRUCTURE DETAIL 13

Payment for catch basins will be made on the basis of the price bid per each, and including all concrete, rebar, grates, aprons, and other materials, labor and equipment necessary to construct the catch basins complete in place.

ITEM 505-18 – CATCH BASIN, MAG DET. 535, TYPE F

Payment for concrete staining shall be made on the basis of the price bid per square foot complete in place in accordance with the manufacturer recommendations.

ITEM 505-19 – CONCRETE STAINING

SECTION 506 – PRECAST PRESTRESSED CONCRETE MEMBERS

Precast prestressed concrete members shall conform to Section 506 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 506.1 – Description

Add the following:

The work shall consist of providing and installing precast prestressed concrete AASHTO concrete slabs for the deck of the BID Canal overchute structure in accordance with the plans and these Special Provisions.

Subsection 506.3 – Prestressing Steel

Add the following:

Prestressing steel shall conform to ASTM A-416, Uncoated Seven-Wire Stress Relieved Steel Strand for Prestressed Concrete, Low-Relaxation ½-inch nominal diameter, Grade 270.

Subsection 506.10 – Payment

Payment for providing and installing precast prestressed concrete slabs shall be made on the basis of the price bid per each, complete in place.

ITEM 506-1 – PRECAST SLABS

SECTION 515 – STEEL STRUCTURES

Steel structures shall conform to Section 515 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 515.1 – Description

Add the following:

The work includes the installation of access gates, safety posts, removable safety posts and delineators as shown on the plans and in accordance with these Special Provisions. The work also includes the installation of trash racks for the irrigation structures and the East Tributary Channel inlet structure in accordance with the plans.

Safety posts shall be in accordance with MAG Standard Detail 140, using 6-inch diameter steel posts. The reflective tape shall be wrapped continuously around the post down to the concrete base.

All safety posts, access gates, pipe access barrier, and trash racks shall be galvanized in accordance with MAG Section 771.

Removable safety posts shall be obtained from the Flood Control District of Maricopa County (FCDMC). The Contractor shall contact Mr. Fred Fuller, Chief of the Construction Branch at 506-4728 to order the number of removable safety posts needed. Contact shall be made a minimum of three weeks prior to the date the posts are needed. The concrete for the base of the removable safety posts shall be Class B. The FCDMC will supply all of the items for the removable safety posts except for the concrete base, the 6-inch diameter steel pipe and the rebar.

Subsection 515.6 – Measurement

No measurement will be made for the trash racks, the cost of the trash racks being considered incidental to the structures for which the trash racks are required.

Subsection 515.7 – Payment

Payment for the safety posts, the removable safety posts, access gates and delineators shall be made on the basis of the price bid per each, and shall include all materials, galvanizing, equipment, and labor required to install them complete in place.

ITEM 515-1 – ACCESS GATES

ITEM 515-2 – SAFETY POSTS

ITEM 515-3 – REMOVABLE SAFETY POSTS

ITEM 515-4 - DELINEATORS

SECTION 520 - STEEL HANDRAILS

Steel handrails shall conform to Section 520 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 520.1 - Description

This work shall consist of furnishing and installing 42-inch handrail along the top of slope of the channel on both the east and west sides from north of the BID canal to MC 85, at the top slope of the concrete channel lining on the west side north of Union Pacific Railroad, and other locations shown in the plans. The work also includes the 10" handrail on the concrete box culvert barriers.

Subsection 520.2 - Fabrication

Steel pipe shall be - ASTM A 53, Types E or S, Grade B.

Anchor bolts and nuts shall be as shown on the drawings and shall be stainless steel conforming to Federal Specification QQ-S-763d, any 300 class. The length of bolt threads shall be in accordance with ANSI B18.2.1. Threads shall be class 2 free fit, American National coarse-thread series.

All handrail shall be painted in accordance with MAG Section 790. The primer and enamel paint color shall be similar in color to the color used for the adjacent or nearby concrete features as specified in Subsection 505.9. A color chart containing the proposed colors to be used shall be submitted to the Engineer for approval prior to use.

Subsection 520.5 - Payment

Payment for handrails shall be made on the basis of the price bid per linear foot. Price bid shall include all labor, material, including concrete foundations, paint coatings, grounding, and equipment necessary for installation of the handrails complete in place.

ITEM 520-1 – HANDRAIL (42")

ITEM 520-2 – HANDRAIL (10")

SECTION 525 – PNEUMATICALLY PLACED CONCRETE

Pneumatically placed concrete shall conform to Section 525 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 525.1 – Description

Add the following:

This work shall include the placement of shotcrete lining at the BID Canal spillway as shown on the plans.

Subsection 525.4 – Reinforcing Steel

Add the following:

The shotcrete lining shall be reinforced with 6x6-W2.1xW2.1 welded wire fabric conforming to Section 727 of the MAG Standard Specifications

Subsection 525.12 – Payment

Payment for pneumatically placed concrete (shotcrete) lining shall be made on the basis of the price bid per square yard and shall be full compensation for all materials, labor and equipment necessary for the installation complete in place to the lines and grades shown on the plans.

ITEM 525-1 – SHOTCRETE LINING SPILLWAY

SECTION 602 – BORING AND JACKING PIPE

Boring and jacking pipe shall conform to Section 602 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 602.1 - Description

Add the following:

The work in this section consists of boring or jacking necessary to place a 30" RGRCP culvert under the UPRR railroad tracks at the location, lines and grades shown in the plans and according to Detail 23 on Sheet 64 and Pipe Profile No. 6 in the plans.

Subsection 602.2 – General

Add the following:

The casing pipe and joints shall be of steel and of leakproof construction capable of withstanding railway loading. The steel casing pipe shall be tongue and groove circular pipe with a minimum yield strength of at least 35,000 psi.

Subsection 602.3 – Jacking Pipe

Add the following:

The jacking operation shall be done by an experienced specialty contractor normally engaged in performing this type of service. The jacking contractor must strictly conform to all Federal, State, and local regulations and in particular, the requirements of the Occupational Safety and Health Administration (OSHA).

The jacking operation shall be done in a continuous manner to minimize the tendency of the material to "freeze" around the pipe. Lubricants such as bentonite slurry are available to minimize the freezing tendency. The approach trench shall be properly sheeted and braced on the sides and working face. The excavation should not be carried more than a few inches ahead of the pipe.

Excessive voids shall not be permitted in the jacking process. Grout points shall be installed in pipe and all voids shall be filled by pressure grout as soon as possible after the completion of the jacking process.

Jacking frames shall be so constructed as to avoid breaking the pipe or forcing it out of alignment. The pipe shall preferably be jacked upgrade in order to provide drainage at the heading during excavation. Satisfactory means shall be provided for maintaining the lead pipe at the correct line and grade.

The pipe shall be installed according to specially prepared plans and specifications. The Contractor shall set forth the construction procedure, extra pipe reinforcement and jack shield (if required), jacking pit location and shoring, and other special features for the safe and satisfactory completion of the work. Plans prepared by the Contractor giving the construction details shall be submitted for review by the Engineer at least 10 working days before the desired start of the jacking operation. The jacking work or any part of it shall not begin prior to approval of construction details by the Engineer.

Straw filler shall be inserted into voids created by excavation during jacking operations. Locations shall be recorded and after mining is completed, grout holes are to be drilled through the pipe and the voids filled with grout.

The Contractor shall provide a survey crew to continually monitor the elevation and alignment of the railroad track above during the jacking procedures. Jacking must be stopped and any problems corrected if track movement is detected.

Subsection 602.7 – Measurement and Payment

Payment for the pipe jacking operation shall be made at the price bid per linear foot of pipe jacked which shall include 30" RGRCP drainage culvert, 48" steel pipe casing, treated redwood runners, grout, and other materials, labor, and equipment for the item complete in place.

ITEM 602-1 - JACK AND BORE PIPE

SECTION 615 - SEWER LINE CONSTRUCTION

Sewer line construction shall conform to Section 615 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 615.1 - Description

This work shall consist of the installation and encasement of a new 16-inch diameter DIP sanitary sewer line between 2 existing manholes on an existing City of Goodyear 15-inch PVC sanitary sewer line located along the Broadway Road alignment as shown on the plans. Raising the manhole rim and covers of the existing manholes per MAG Standard Detail 422, and other related work shall be completed as identified in Section 625.

The existing 15-inch PVC shall be removed throughout this reach and shall be replaced with 16-inch DIP. Upon the Engineer's review of the conditions at the existing manhole, and at the Engineer's option, the Contractor may leave a short PVC stubout extending from the existing manhole and connect to the proposed DIP pipe with a transition coupling; but in no case shall PVC remain beneath the proposed stepped gabion channel lining or channel bottom.

The Contractor shall contact City of Goodyear at 932-1637 at least 72 hours in advance of any need to temporarily bypass the sewage flows for the purpose of connecting the new sewer line and manhole work to the existing sewer line and manhole system. Sewerage flow rates and other peak usage information can be provided by the City by contacting Larry Martinez at 932-1637.

The new DIP sanitary sewer shall be protected with reinforced concrete encasement as shown in the plans.

Ductile iron pipe (DIP) sanitary sewer line pipe shall be push-on joint and shall be designed in accordance with AWWA C-150 and shall be manufactured in accordance with AWWA C-151 and section 750 of the MAG

specifications. The DIP sewer line shall be internally lined with Protecto 401 Ceramic Epoxy as provided by Pacific States Cast Iron Pipe Company, Provo, Utah, or approved equal, and externally protected using an 8-mil thick polyethylene encasement in accordance with AWWA C-105.

Trenching and backfill shall be accomplished in accordance with MAG Section 601.

Prior to the placement of the concrete encasement, the Contractor shall contact Steve Ruppenthal at the City of Goodyear Public Works Department at 932-1637, so that a visual inspection of the new 16" DIP sewer can be made, including "lamping" from manhole to manhole.

Subsection 615.13 - Payment

Payment for 16-inch DIP sanitary sewer line construction shall be made on the basis of the price bid per linear foot, and includes full compensation all labor, materials, equipment, and incidental items including the removal of the existing 15-inch PVC sewer pipe and management of sewerage flows necessary to install the sanitary sewer line, and concrete encasement.

ITEM 615-1 - SANITARY SEWER LINE INSTALLATION

SECTION 618 - STORM DRAIN & IRRIGATION CULVERT CONSTRUCTION

Storm drain and irrigation culvert construction shall conform to Section 618 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 618.1 - Description

This work shall consist of the installation of rubber gasket reinforced concrete pipe (RGRCP), and ductile iron pipe (DIP), and cleanouts for irrigation and storm drain culverts at the locations and grades shown on the plans.

Ductile iron pipe (DIP) and fittings shall utilize push-on restrained joints and shall be designed in accordance with AWWA C-150 and shall be manufactured in accordance with AWWA C-151 and Section 750 of the MAG specifications. The DIP shall be externally protected using an 8-mil thick polyethylene encasement in accordance with AWWA C-105.

Subsection 618.5 - Measurement

Measurement for all pipe shall be measured on a linear foot basis complete in place, including all cleanouts, and additional concrete lining reinforcement per Detail 24 on Sheet 64.

Subsection 618.6 - Payment

Payment for the storm drain and irrigation culvert construction shall be made on the basis of the unit price bid per linear foot. Price bid includes all labor, materials, equipment, and incidental items necessary to install the pipe.

ITEM 618-1 - 24" DIP

ITEM 618-2 - 30" DIP

ITEM 618-3 - 12" RGRCP

ITEM 618-4 - 24" RGRCP

ITEM 618-5 - 30" RGRCP

ITEM 618-6 - 36" RGRCP

ITEM 618-7 - 60" RGRCP

SECTION 625 - MANHOLE CONSTRUCTION

Manhole construction shall conform to Section 625 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 625.1 - Description

Two sanitary sewer manholes will be raised to grade the Broadway Road alignment dip crossing per MAG STD. DET. 422. A new 16" DIP sewer line shall be constructed between the adjusted manholes and connected to the existing manholes as shown on the plans. The work also includes construction of irrigation siphon manholes at locations shown in the plans and per Detail 12 on Sheet 60 of the plans.

Subsection 625.5 - Payment

Payment for adjusting the existing sanitary sewer manholes and constructing new irrigation siphon manholes will be made on the basis of the price bid per each. Price bid shall include all earthwork, labor, materials, equipment, trash racks, ladder rungs, and other incidental items necessary to adjust the existing manhole, frame and cover, and to construct the siphon manholes complete in place in accordance with the plans.

ITEM 625-1 – ADJUST SANITARY SEWER MANHOLE

ITEM 625-2 – IRRIGATION SIPHON MANHOLE (DETAIL 12)

SECTION 632 – PIPE SLEEVES

Add this section to the MAG Uniform Standard Specifications.

Subsection 632.1 – Description

Work in this section consists of furnishing and installing PVC and steel pipe sleeves at the locations shown in the plans, and includes all excavation, backfill, and compaction necessary to complete the work. These sleeves will be used in the future by others for installing irrigation lines to the 48" RCP tree wells in the grouted riprap section north of the UPRR railroad tracks. The work also includes the installation of two 18-inch steel sleeves for future utility crossings of the channel.

Subsection 632.2 – Materials

All PVC sleeves and fittings shall be 2" diameter as indicated on the plans and be rigid polyvinyl chloride (PVC). PVC conduit and fittings shall be Schedule 40 heavy wall.

The ends of all PVC and steel sleeves shall be wrapped with tracer tape so that they can be located in the future. Tracer tape shall be four (4) mil inert plastic film specifically formulated for prolonged use underground and shall be a minimum of three (3) inches wide. All tape shall be highly resistant to alkalis, acids, and other destructive agents found in the soil. Large diameter rebar shall also be placed at the ends of the sleeves to mark the locations.

The 18-inch steel sleeve shall have a minimum wall thickness of 0.312 inches and a minimum yield strength of 35,000 psi. Trenching and backfill shall be as specified in Section 601 of the MAG Standard Specifications.

Subsection 632.3 - Payment

Payment for pipe sleeves shall be made on the basis of the price bid per linear foot complete in place including all excavation and backfill.

ITEM 632-1 – PVC PIPE SLEEVE

ITEM 632-2 – STEEL PIPE SLEEVE

SECTION 635 - CONCRETE LINED DITCH

Add this section to the MAG Uniform Standard Specifications

Subsection 635.1 – Description

This item shall consist of furnishing all material, labor and equipment necessary to construct cast-in-place concrete lined ditches to the cross-section, lines, grades and locations as shown on the plans and details. This will include the concrete lined ditches per Section F3 and Section F5, and the shallow concrete lined ditch per Section F6.

Subsection 635.2 - Construction

In preparation of the area for the location of the concrete lined ditch and prior to the excavation for the ditch, all earth fills, embankments and natural earth shall be constructed to the cross-section and grade shown on the plans or as directed by the Engineer.

Areas over which fills are to be placed for the construction of the ditch shall be cleared, and scarified to a depth of 6 inches. A layer of approximately 3 inches of approved fill material shall be spread and compacted with the subgrade material to provide a bond between the existing ground and the material to be deposited thereon. The original ground area upon which fills are to be constructed plus the initial 3-inch lift shall be compacted to a uniform density of not less than 90 percent. The earth material for the construction of the ditch site, if approved by the Engineer, shall be placed in layers not to exceed eight (8) inches in depth before being compacted to the greatest dimension shall be broken up before compacting the material in the embankment. Broken concrete or asphalt shall not be used

as fill material and rock pieces shall not exceed 2 ½ inches. The natural earth found in place or any imported embankment material shall be compacted at optimum moisture content by mechanical methods that will insure the required density of 90 percent of the maximum density for the material. The maximum density for the material shall be determined on the basis of laboratory compaction tests made in accordance with AASHTO Designation T-99, Method A and T-191 or ASTM D-2992 and D-3017 with the percent of density adjusted in accordance with the rock correction procedure for maximum density determination, standard detail, to compensate for the rock content larger than that which will pass a No. 4 sieve.

The depth of the compaction required will be to twelve (12) inches below the flow line grade of the completed ditch lining.

Transverse grooves five-sixteenths of an inch (5/16") in width and five-eighths of an inch (5/8") in depth shall be made in the concrete lining at intervals of ten feet (10') and maintained to the required dimensions until the concrete has hardened.

After construction and compaction of all the necessary embankments, the irrigation ditch section shall be excavated to the subgrade elevation and cross-section as shown on the plans to allow for placing of the concrete ditch lining. The surface against which the lining is to be placed shall be compacted and accurately finished to the grades and dimensions shown on the plans. Excess material removed in excavation of the ditch shall be used to construct the berm shown in the plans and used to strengthen the embankment on either side of the ditch or for backfill of existing ditches identified to be filled and compacted.

Subsection 635.3 - Materials

The irrigation ditch lining shall consist of unreinforced concrete placed to the thickness as specified on the plans. The finished surface of the concrete shall be free from rock pockets or surface voids and shall be comparable to the finish obtained by use of a long handled steel trowel.

Concrete shall be mixed in such proportions that the 28-day strength has a minimum of 2000 psi with cement content of not less than 4.5 sacks per cubic yard of concrete. Cement for concrete shall be Type II, low alkali, in accordance with ASTM C-150. The slump of the concrete shall not exceed 4 inches. The Contractor shall use an air entraining agent in the concrete, which shall be one of those permitted under ASTM Designation C-260 or AASHTO M-154. The amount of air entraining agent used shall be such as will effect the entrainment to produce from 4% to 6% air, by volume, of the concrete at the jobsite.

The coarse aggregate shall comply with ASTM C-33, and graded according to size 7 in Table 2.

The fine aggregates shall comply with ASTM C-33.

As soon as the concrete lining has hardened sufficiently, it shall be cured by the application of a white pigmented sealing compound conforming to the requirements of AASHTO Designation M-148 for Type 2. The sealing compound shall be applied in one coat to provide a continuous uniform white membrane over the entire concrete area. The sealing compound shall be applied at the rate of at least one gallon per 150 square feet and the rate shall be increased, if necessary, to obtain the required continuous membrane.

Subsection 635.4 - Payment

Payment for the concrete lined ditches and the shallow concrete lined ditch shall be made on the basis of the price bid per linear foot including excavation and embankment necessary to construct these ditches and all materials, labor, and equipment necessary to construct complete in place as shown in the plans.

ITEM 635-1 - CONCRETE LINED DITCH

ITEM 635-2 - SHALLOW CONCRETE LINED DITCH

SECTION 703 - RIPRAP

Riprap shall conform to Section 703 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 703.1 - Stone

In addition to the requirements of Section 703.1, stone for riprap shall have a minimum apparent specific gravity of 2.4 per ASTM C-127. Waste concrete shall not be used for riprap.

The rock used for the grouted and for the dumped riprap and shall be rounded stone or angular, hard, durable, resistant to weathering and to water action, free from overburden, spoil, shale, and organic material, and shall meet the gradation requirements for the type specified.

Subsection 703.2 - Size of Stone

Section 703.2 of the MAG Standard Specifications is replaced with the following for riprap:

D_{mi} (in)	D_{max} (in)	D_{50} (in)
8	22	15

Grouted riprap shall be used at all locations as shown on the plans including the outlet for the BID overchute and north of the Union Pacific railroad.

SECTION 725 - PORTLAND CEMENT CONCRETE

Portland cement concrete shall conform to Section 725 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 725.2 - Portland Cement

Add the following:

Cement shall be Portland cement, conforming to the requirements of ASTM C-150, Type II, unless noted otherwise on the plans or in the specifications.

**MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
ESTRELLA PARKWAY
BUCKEYE IRRIGATION CANAL TO ELWOOD STREET
AND
ELWOOD STREET TO NORTH OF YUMA ROAD
MCDOT WORK ORDER NUMBERS 68877 & 68947**

SPECIAL PROVISIONS

SECTION 205 - ROADWAY EXCAVATION:

Roadway excavation shall consist of removing soil material, excluding concrete and asphalt concrete pavement, necessary to construct the new roadway pavement structure to the lines and grades shown in the plans. Roadway excavation also includes grading for the drainage ditches and linear retention basins and combined irrigation and drainage ditches. Roadway excavation does not include structural excavation, excavation for the concrete lined irrigation ditches, excavation for the dirt tailwater ditches, or Bullard Wash channel excavation.

Roadway excavation shall be paid for per cubic yard of material removed at the unit price bid for **ITEM 205.08000, ROADWAY EXCAVATION** which price shall include all labor and equipment necessary to excavate, haul and place as fill material for the roadway or at waste sites approved by the **ENGINEER**.

SECTION 210 - BORROW EXCAVATION:

The construction of Estrella Parkway, MC 85, Elwood Street, Lower Buckeye Road, Lower Buckeye Parkway, and Yuma Road will require fill material in excess of material available in the roadway right-of-way. Material excavated from the retention basin locations along Estrella Parkway and from the Bullard Wash Channel may be used as fill material for the roadway construction provided that the material meets the requirements of Section 211 of the MAG Uniform Standard Specifications and Section 211 of these Special Provisions.

Borrow excavation is a non-pay item. The cost of excavating and hauling of borrow material shall be included in **ITEM 215.08010 - Earthwork for Retention Basins and ITEM 215-1 - Earthwork for Drainage Channels**.

SECTION 211 - FILL CONSTRUCTION:

Fill construction consists of placing and compacting fill material for use in constructing the subgrade to the lines and grades shown on the plans for the roadway pavement structure, roadway shoulder areas, and fill slopes including fill and compaction of existing dirt drainage and irrigation ditches. The top 9 or 12 inches of subgrade fill material will be stabilized using a lime slurry/fly ash mixture as required in Section 309 of these Special Provisions. The **CONTRACTOR** shall develop a mix design using a composite of soils available in the channel and retention basin areas. The unconfined compressive strength of the mix at 5 days shall be no less than 160 psi when tested in accordance with ASTM D 1633, Method A. A geotechnical investigation was conducted along Estrella Parkway and the Bullard Wash Channel. The results are summarized in the Geotechnical Report available at MCDOT. The **CONTRACTOR** is strongly encouraged to review and study the geotechnical report prior to submitting a proposal for this project.

Removed AC pavement from project may be used as fill material, provided it meets the material and placement requirements of Section 211 of the MAG Uniform Standard Specifications, and that the maximum dimension of any piece is less than 4 inches, and is not placed within 2 feet of the subgrade surface.

Fill construction is a non-pay item and the cost of this work shall be included in ITEM 301.07000, Subgrade Preparation.

SECTION 215 - CHANNEL EXCAVATION:

The work under this section consists of excavating and shaping the retention basins, and dirt irrigation ditches in accordance with the plans and Section 215 of the Uniform Standard Specifications, and removal, hauling, and disposal of excavated material from the retention basins. Excess material from the retention basins and dirt ditches may be used for roadway fill or disposed of at designated other sites as follows. The City of Goodyear and Sunchase have expressed interest in obtaining excess fill material once all project needs have been satisfied. The City of Goodyear has identified a stockpile site located on the City's property on the northwest corner of Yuma Road and Estrella Parkway. The **CONTRACTOR** shall coordinate stockpiling of material on this site with Andrew Cooper, Interim Public Works Director, at 932-1637. Contact Todd Tupper of Sunchase at 468-1090 for coordination of the disposal of any excess material on properties owned by Sunchase located north of Lower Buckeye Road and south of MC 85.

The excavation for roadside drainage ditches and concrete lined ditches are not included in this section. Excavation for roadside concrete lined drainage ditches and roadside dirt drainage ditches shall be included in ITEM 205.0800 - Roadway Excavation. Excavation for concrete lined Irrigation ditches shall be included in ITEM 635.04100 - Concrete Slipform Irrigation Ditch (1' Bottom).

Areas over which fills are to be placed for the construction of the dirt irrigation ditches or retention basin berms shall be cleared, and scarified to a depth of 6 inches. A layer of approximately 3 inches of approved fill material shall be spread and compacted with the

subgrade material to provide a bond between the existing ground and the material to be deposited thereon. The original ground area upon which fills are to be constructed plus the initial 3-inch lift shall be compacted to a uniform density of not less than 90 percent. The earth material for the construction of the ditch or retention basin berms shall be placed in layers not to exceed eight (8) inches in depth before being compacted to the required density. The embankment shall be constructed to the top of ditch elevation shown on the plans and at least 1' beyond the top width on each side of the dirt ditch. Clods or hard lumps of greater than 6 inches in greatest dimension shall be broken up before compacting the material in the embankment. The in place material or imported embankment material shall be compacted at optimum moisture content by mechanical methods that will insure the required density of 90 percent of the maximum density for the material. The maximum density for the material shall be determined on the basis of laboratory compaction tests made in accordance with AASHTO Designation T-99, Method A, and T-191 and ASTM D-2922 and ASTM D-3017 with the percent of density adjusted in accordance with the rock correction procedure for maximum density determination, standard detail, to compensate for rock content larger than that which will pass a No. 4 sieve.

After construction and compaction of all the necessary embankments, the irrigation ditch section shall be excavated, compacted and finished to the grades and dimensions shown on the plans. The berm adjacent to the lined ditches shown on the plans shall be constructed from the material excavated from the ditch.

Payment for excavation of retention basins and dirt irrigation ditches will be made according to the quantity of material excavated from the natural ground to the finished ditch flowline or basin bottom.

Payment for this item will be made at the unit price bid per cubic yard of excavated material, excluding fill construction for **ITEM 215.08010 EARTHWORK FOR RETENTION BASINS**, and **ITEM 215.08100 - EARTHWORK FOR DIRT IRRIGATION DITCHES**.

SECTION 216 – TEMPORARY BYPASS FOR IRRIGATION DITCHES

Add this section to the MAG Uniform Standard Specifications.

Subsection 216.1 - Description

The existing irrigation delivery and tailwater ditches located all along the project will need to be relocated as part of this roadway project. The new ditches and pipes will be constructed prior to removal of any existing ditches. It may be necessary to construct temporary ditches or pipes to divert irrigation flows around construction areas such as connections of the new ditch with the existing ditch and areas where new headwalls are being constructed in existing ditches. The CONTRACTOR shall maintain irrigation flows and coordinate work with BID, RID or private farmers as directed in Subsection 105.6.4 of the Supplementary General Conditions. Pumping tailwater into the BID Canal may be required to maintain tailwater flow while constructing improvements to the headwall and ditch north of the BID Canal.

The earthwork required for the temporary ditch construction shall consist of excavation, fill, grading, and temporary stockpiling of excavated material. The temporary bypass

ditches are generally an excavated earthen "V" ditch. No temporary ditch section or location is given in the plans. The **CONTRACTOR** shall confer with the ditch owners and users and determine an appropriate section and location for the temporary ditches.

After the completion of all construction that requires temporary bypass ditches, the **CONTRACTOR** shall remove, fill, compact, level and restore all works, and dispose of all material. All fill material used to restore the temporary bypass ditches shall be compacted to a minimum compaction of 85%.

Subsection 216.2 - Contractors Responsibility

Temporary Bypass Ditch - The **CONTRACTOR** shall at all times during construction of the Project, insure the operation of all irrigation delivery and tailwater ditches impacted by the channel project as required for farming operations. This will include as required the construction of temporary bypass ditches. A continuous irrigation delivery of minimum of 7 cubic feet per second will be maintained in the irrigation ditches, except for RID Lateral 5 ½ where the minimum capacity of 12.5 cubic feet per second shall be maintained.

The construction sequencing and schedule for the use of temporary ditches shall be coordinated with RID and the farm users.

The **CONTRACTOR** shall be fully responsible for the conveyance, construction, maintenance, operation, and removal of all temporary features. In the event of any interruption in the flow of irrigation tailwater due to any construction activities or failure of any features of the bypass system, the **CONTRACTOR** shall immediately take necessary action to repair all damage to the temporary ditch system and restore the irrigation flow. All repairs shall be done to the satisfaction of the RID or farmer as approved by the **ENGINEER**, at no cost to the project. Any costs associated with any crop losses associated with any failure on the part of the **CONTRACTOR** to maintain the flows of irrigation water, will be the responsibility of the **CONTRACTOR** at no cost to the project. The **CONTRACTOR** shall coordinate and schedule with the Engineer and the RID or farm user all activities, which in any way impact the irrigation delivery and flow of tailwater ditches.

Subsection 216.3 - Measurement

Measurement for payment for temporary ditches will be made on a lump sum basis, and will include all work necessary to construct and maintain the temporary systems, including but not limited to material excavated from natural ground, temporary lining that may be installed, temporary pipes that may be installed, pumping, fill or berm construction, stockpiling and disposal of excess material, the restoration of the existing and temporary bypass ditch alignments to original or better condition.

Subsection 216.4 - Payment

Payment for diversion of irrigation flows and construction of the temporary bypass system, and other items necessary to care for the temporary bypass of irrigation water during construction, shall be made on the basis of the lump sum price bid, and which shall include the cost of furnishing all labor, equipment, and materials for constructing and maintaining the ditches, and restoring the alignments, after the bypass ditches are no longer required.

ITEM 216.01120 - TEMPORARY BYPASS DITCHES

SECTION 220 - RIPRAP CONSTRUCTION:

The work under this section consists of placing dumped riprap check dams in the linear retention basins and dumped riprap at the locations shown on the plans. Check dam riprap shall have a D50 of 2" with a minimum rock size of 1" and a maximum rock size of 3". Other dumped riprap shall have a D50 of 6" and a minimum rock size of 4".

Payment for all work under this section will be made at the unit price bid per cubic yard for **ITEM 220.08400 - PLAIN RIPRAP, Complete In Place, including excavation.**

SECTION 225 - WATERING:

Watering consists of providing and distributing water, as necessary, to compact the subgrade, fill material, and aggregate base course, and provide dust control as requested by the **ENGINEER.**

Watering is a non-pay item and the cost of this item shall be included in ITEM 301.07000 - Subgrade Preparation.

SECTION 301 - SUBGRADE PREPARATION:

Subgrade Preparation shall include the placing, shaping, grading, and compaction of the subgrade under the base course and surface courses of new roadway and driveway pavement to the required line and grades as shown on the plans. The work also includes shaping and compacting fill material required to construct the subgrade, shoulders, fill slopes, graded dirt farm roads, and unpaved portions of driveway turnouts, in accordance with the plans. Placement, shaping, grading, and compaction of unpaved shoulder areas, and embankment slopes is considered incidental to subgrade preparation. Excavation and hauling the roadway fill material from sources outside the roadway right-of-way is not included in this item and the cost of this work shall be included in ITEM 215.08010 - Earthwork for Retention Basins or ITEM 215-1 - Earthwork for Drainage Channels.

Shoulders and graded dirt farm roads shall be rolled and compacted to a minimum of 90 percent (90%) of the maximum density per Paragraph 301.3 of the MAG Uniform Standard Specifications. Subgrade under pavement shall be compacted to 95%.

Existing asphalt and other existing bituminous roadway surfacing materials may be used as fill in accordance with Section 211 of the MAG Uniform Standard Specifications, except that the maximum dimension of any piece shall not exceed four inches (4") and shall not be placed within 2 feet of the subgrade surface.

The earthwork quantities shown on the plans are approximate. They are listed for the sole purpose of aiding the bidder in formulating its bid.

Payment for this item shall be made at the unit price bid per square yard for areas under new roadway and driveway pavement for **ITEM 301.07000 - SUBGRADE PREPARATION** while the work on the dirt farm roads and miscellaneous grading and

compaction of unpaved portions of the driveways shall be paid for at the unit price bid per square yard for **ITEM 301.07110 - GRADE DIRT FARM ROAD.**

SECTION 309 - LIME SLURRY with FLY ASH STABILIZATION:

Subgrade stabilization shall be done to the depth specified on the plans.

SUBSECTION 309.1 - DESCRIPTION:

This section shall consist of constructing a mixture of soil, lime slurry, fly ash and water for the stabilization of soils or base materials. The work shall be performed in conformity with the lines, grades, thickness, and typical cross sections shown on the plans. The excavation and hauling of fill material shall be included in ITEM 215.008010 – Earthwork for Retention Basins, and ITEM 215-1 – Earthwork for Drainage Channels, and the placing, shaping, grading and compaction of fill material required to form the subgrade section is included ITEM 301.07000 – Subgrade Preparation.

SUBSECTION 309.2 - MATERIALS:

SUBSECTION 309.2.1 - Soil or Subgrade: The soil or subgrade material used for this work shall consist of materials on the site or imported and shall be free of roots, sod, weeds, and stones larger than 3 inches.

SUBSECTION 309.2.2 - Quicklime And Hydrated Lime: Lime used to manufacture the Commercial lime slurry specified herein, shall be either Quicklime or Hydrated lime and shall conform to the requirements of ASTM C 977. Lime may only be used in the production of a lime slurry. The direct use of dry hydrated lime or quicklime to the soil material is strictly prohibited. All lime shall come from a single source. If a source change is requested, a new mix design shall be submitted using lime from the proposed new source. The new design must be approved by the **ENGINEER** prior to its use.

SUBSECTION 309.2.3 - Commercial Lime Slurry: Commercial lime slurry shall be a pumpable suspension of solids in water. The water or liquid portion of the slurry shall not contain dissolved material in sufficient quantity naturally injurious or objectionable for the purpose intended. The solids portion of the mixture, when considered on the basis of solids content, shall consist principally of hydrated lime of a quality and fineness sufficient to meet the following requirements as to chemical composition and residue.

(A) **Chemical Composition:** The solids content of the lime slurry shall consist of a minimum of 90% by weight, of calcium and magnesium oxides (CaO and MgO), as determined by ASTM C-25.

(B) **Residue:** The percent by weight of residue retained in the solids content of lime slurry shall conform to the following requirements:

Residue retained on a No. 6 sieve	Max. 0.2%
Residue retained on a No. 30 sieve	Max. 4.0%

(C) Grade: Commercial lime slurry shall conform to a dry solids content as approved by the **ENGINEER**.

A certificate of compliance and a field summary of lime slurry produced shall be provided to the **ENGINEER** for each load of slurry.

SUBSECTION 309.2.4 - Water: Water used for mixing or curing shall be reasonably clean and free of oil, salt, acid, alkali, sugar, vegetable, or other substances injurious to the finished product. Water shall be tested in accordance with and shall meet the requirements of AASHTO T-26. Water known to be of potable quality may be used without test.

SUBSECTION 309.2.5 - Fly ash: Fly ash shall be Class C and meet the requirements of AASHTO M-295, Class C.

SUBSECTION 309.3 - COMPOSITION:

SUBSECTION 309.3.1 - Fly Ash: Fly ash shall be applied at the mix design rate for the depth of subgrade stabilization shown on the plans or as requested by the **ENGINEER**, prior to the placement of lime slurry.

SUBSECTION 309.3.2 - Lime Slurry: Lime slurry shall be applied over the top of the fly ash, at the mix design rate for the depth of subgrade stabilization shown on the plans or requested by the **ENGINEER**.

SUBSECTION 309.3.3 - Mix Design: Before commencing lime/fly ash treatment work, the **CONTRACTOR** shall submit a proposed mix design for approval to the **ENGINEER**. The proposed mix design shall be prepared by a testing laboratory under the direction and control of a registered Professional Engineer. The mix design shall be established by using the soils or subgrade material to be stabilized and lime and fly ash from the proposed suppliers and shall determine the following:

- (a) Percent of fly ash and rate of application.
- (b) Percent of lime and rate of application of lime slurry in the treated soil or subgrade material.
- (c) Optimum water content during mixing, curing and compaction.
- (d) Gradation of in-situ mixture after treatment.
- (e) Additional mixing or equipment requirements.
- (f) Mellowing time requirements, if needed.

The mix design shall comply with the following requirements:

- (a) pH: Minimum 12.4 after compaction of initial mixing with lime/fly ash at ambient temperature, in accordance with Eades-Grimm pH test method (ASTM C-977 APPENDIX).
- (b) Plasticity Index: Less than 3, per AASHTO T-89 & 90.
- (c) Swell Potential: One (1) percent or less vertical expansion of an air dried soil when inundated with water and allowed to swell at a confined pressure of 60 psi.
- (d) Unconfined Compressive Strength: Minimum 160 psi in five days curing at 110 degrees Fahrenheit when tested in accordance with ASTM D-1633 Method A.

SUBSECTION 309.3.4 - Tolerances: At final compaction, the lime, fly ash and water content for each course of subgrade treatment shall conform to the approved mix design with the following tolerances.

<u>Material</u>	<u>Tolerance</u>	
Lime	+0.5%	of design, (ASTM C-114)
Fly ash	±1.0%	of design, (ASTM C-114)
Water	+4%, -0%	of optimum, (ASTM D-698)

SUBSECTION 309.4 - CONSTRUCTION:

SUBSECTION 309.4.1 - General: The desired end result of this section of the specifications is to produce a completed subgrade containing a uniform lime/fly ash mixture, free from loose segregated areas, of uniform density and moisture content, well bound for its full depth. A smooth surface suitable for placing subsequent courses is required if pavement is to be placed directly on treated subgrade.

Prior to beginning stabilization, the subgrade shall be constructed and brought to grade and shall be shaped to conform to the typical sections, lines, and grades as shown on the plans and as required in Section 301 of these Special Provisions.

SUBSECTION 309.4.2 - Weather Limitation: Lime slurry/fly ash treated subgrade shall not be constructed if the atmospheric temperature is below 40 degrees F or when conditions indicate that temperatures may fall below 40 degrees F within 24 hours.

SUBSECTION 309.4.3 - Equipment: **CONTRACTOR** shall provide all equipment necessary to complete the work, including grading and scarifying equipment, lime slurry spreader (gravity feed spreaders will not be permitted), fly ash spreader, mixing and pulverizing equipment, sheepsfoot and pneumatic rollers, sprinkling equipment, and trucks. When using dry hydrate to make slurry, agitators are mandatory in spreader trucks. All equipment used for this work is subject to approval by the **ENGINEER**.

SUBSECTION 309.4.4 - Application: Lime slurry and fly ash shall be spread only on that area where the mixing operations can be completed during the same working day. The application and mixing of lime and fly ash with the soil shall be accomplished by the methods hereinafter described as Slurry Placing.

Slurry Placing: Fly ash shall be spread with trucks equipped with an approved distribution system on the prepared subgrade at the rate specified by the job mix design in a single pass, just prior to the application of the lime slurry. Lime slurry shall be mixed in a portable mixing unit and spread with trucks equipped with an approved distribution system as a slurry. Commercial lime slurry shall be applied with a lime percentage not less than specified in the approved mix design. The distribution of lime slurry shall be attained by as many successive passes as necessary, over a measured

section of subgrade until the proper amount of lime has been spread, as determined in the job mix design. The rate of application shall be verified using the methods specified in ASTM D-3155.

Thickness: The thickness of the treated subgrade shall be determined by visual inspection and/or by depth tests taken at intervals so that each test shall represent no more than 1000 square yards. The method used to remove material to determine depth of treatment may be by shovel and/or pick, coring or other method approved by the **ENGINEER**. Phenolphthalein solution shall be used to detect the presence of lime. When the grade deficiency is more than 1 inch, the **CONTRACTOR** shall correct such areas in a manner satisfactory to the **ENGINEER**. **CONTRACTOR** shall replace, at no cost to the County, the material removed during depth tests.

No traffic other than the mixing equipment will be allowed to pass over the spread of treated material until after the mixing is completed.

The **ENGINEER** reserves the right to vary the rate of application of lime and fly ash from the specified application rates during the progress of construction as necessary to maintain a pH of the lime/fly ash soil mixture above 12.4 and the desired characteristics of the treated subgrade.

SUBSECTION 309.4.5 - Mixing: The full depth of the treated subgrade shall be mixed with an approved mixing machine. The use of disc plows or blades are strictly prohibited except in areas specified by the **ENGINEER**. To insure a complete chemical reaction of the lime, fly ash and soil or subgrade, water shall be used as required to maintain a minimum moisture content of 4% above the optimum prior to beginning compaction and held at 0-4% above optimum during compaction. During the interval of time between application and mixing, lime that has been applied, unmixed and exposed to the open air for 10 hours or more will not be accepted.

After mixing and prior to compaction, clay lumps shall meet the following criteria:

	<u>Percent</u>
Minimum of clay lumps passing 1-1/2 inch sieve	100
Minimum of clay lumps passing No. 4 sieve	60

SUBSECTION 309.4.6 - Compaction: Compaction of the mixture shall begin after final mixing. Sheepsfoot or segmented wheel rollers shall be used during initial compaction. Steel wheel or pneumatic tired rollers shall be used only during final compaction, if pavement is to be placed directly on the treated subgrade. Areas inaccessible to rollers shall be compacted to the required density by methods approved by the **ENGINEER**.

The material shall be aerated or watered as necessary to provide and maintain required moisture content. The field density of the compacted mixture shall be at least 95 percent of the maximum density at 0-4% above optimum moisture. A composite of treated soil or subgrade materials from a minimum of five (5) random locations, per soil type, within the area to be stabilized shall be used to determine the maximum density and optimum moisture content in accordance with ASTM D-558. The in-place field

density shall be determined in accordance with ASTM D-1556, ASTM D-2167 or ASTM D-2922.

After each section is completed, tests will be made by the **ENGINEER**. If the material fails to meet the density requirements, it shall be recompact until the requirements are met.

If pumping subgrade should become evident at any time prior to paving, the **ENGINEER** may require proof rolling with a pneumatic-tire roller or other approved equipment in order to identify the limits of the unacceptable area. The proof rolling will be performed at no additional cost to the County.

All irregularities, depressions, or weak spots which develop shall be corrected immediately by scarifying the areas effected, adding or removing material as required, and reshaping and recompacting. The surface of the course shall be maintained in a smooth condition, free from undulations and ruts, until other work is placed thereupon or the work is accepted. Compaction and finishing shall be done in such a manner as to produce a smooth dense surface, free of compaction planes, cracks, ridges, or loose materials.

Throughout this entire operation, the shape of the course shall be maintained by blading, and the surface upon completion, shall be smooth and shall conform with the typical section shown on the plans and to the established lines and grades. Should the material lose the required stability, density, and finish before the next course is placed or the work is accepted, it shall be recompact and refinished at no cost to the County.

SUBSECTION 309.4.7 - Finishing And Curing: After the final layer or course of lime slurry/fly ash treated subgrade has been compacted, it shall be brought to the required lines and grades in accordance with the plans. The completed section shall then be finished by rolling with a pneumatic or other suitable roller.

The final layer of lime slurry/fly ash treated subgrade shall be maintained in a moist condition until the next layer of pavement structure is placed. All traffic, except necessary construction equipment shall be kept off the lime slurry/fly ash stabilized subgrade until the final pavement structure layer(s) are placed.

A curing seal may be required by the **ENGINEER** to maintain moisture for curing. The seal shall be applied per Section 333 in these Special Provisions and in the MAG Standard Specifications. The curing seal may be avoided by placing the aggregate base course immediately on the approved subgrade.

SUBSECTION 309.4.8 - Maintenance: The **CONTRACTOR** shall maintain, at his/her own expense, the entire treated subgrade in good condition from the start of work until all the work has been completed and is accepted by the **ENGINEER**.

SUBSECTION 309.5 MEASUREMENT:

The quantity of lime slurry/fly ash treated soils shall be measured by the cubic yard, measured in place, treated, compacted, to the proper depth, and accepted.

SUBSECTION 309.6 - PAYMENT:

The lime slurry/ fly ash treated soils measured as provided above, will be paid for at the unit price bid per cubic yard for **ITEM 309.08000 – LIME SLURRY WITH FLY ASH STABILIZATION**, which price shall be full compensation for the item Complete In Place.

SECTION 310 - UNTREATED BASE:

Work in this section shall include the placement, shaping, grading and compaction of aggregate base course in the locations shown on the plans and to the thicknesses shown in the pavement structure sections.

Aggregate Base shall conform to the requirements of Section 702 of the Uniform Standard Specifications. Aggregate Base shall be crushed in accordance with Section 702.2 of the MAG Uniform Standard Specifications.

CONTRACTOR shall furnish the **ENGINEER** certified weight tickets covering all of the Aggregate Base placed on the project. Final pay quantities will be based upon the scale tickets accepted by the **ENGINEER**.

Payment for this item shall be made per ton at the unit price bid for **ITEM 310.03161 – AGGREGATE BASE COURSE**.

SECTION 315 - BITUMINOUS PRIME COAT (CONTINGENT ITEM):

The work included in this section shall consist of furnishing and applying a bituminuous material to the prepared aggregate base course when requested by the **ENGINEER**. The bituminuous material shall be Grade MC-70 or MC-250 liquid asphalt, as determined by the **ENGINEER**. Prime coat shall be applied to the total width of the aggregate base material at the rate of 0.40 gallon per square yard, unless otherwise specified by the **ENGINEER**. Prime Coat shall be allowed to penetrate for not less than 48 hours prior to the commencement of the asphalt concrete paving. Application of the bituminuous prime coat is a contingent item and shall not be applied unless requested by the **ENGINEER**. If the **ENGINEER** determines that the prime coat application is necessary and requests the **CONTRACTOR** to apply the prime coat, it shall be paid for at the unit price bid per ton for **ITEM 315.03000 – BITUMINOUS PRIME COAT (CONTINGENT ITEM)**.

SECTION 321 - ASPHALTIC CONCRETE:

Work in this section includes all asphalt paving on the project, including roadways, driveways, and temporary detour and diversion road pavements. The pavement thicknesses are shown in the pavement structure sections and typical sections in the plans.

Pavement Structure Section No. 2 ends at the south curb returns at the intersection of MC 85 and Estrella Parkway.

The asphaltic concrete shall conform to the 19.0 mm Surface Course for Heavy Traffic requirements of Section 710 of the MAG Uniform Standard Specification (1998).

The bituminous material to be used shall be PG 70-10, and comply with requirements of Section 711 of the MAG Uniform Standard Specifications.

In addition to pugmill type mixing plants, drum dryer mixers may be used in accordance with Standard Specification 710.9. The moisture content of the bituminous mixture immediately behind the paver shall not exceed three percent (3%). The proper proportioning of the material at the cold feed shall be determined by the **CONTRACTOR** and approved by the **ENGINEER** prior to the production of asphaltic concrete. Production shall not commence until calibration tests indicate that an acceptable product can be obtained.

The correct proportions of each aggregate size introduced into the mixer shall be drawn from the storage bins by a continuous feeder, approved by the **ENGINEER**, which shall supply the correct amount of aggregate in proportion to the bituminous material and shall be so arranged that the proportion of each aggregate size can be separately adjusted. The continuous feeder for the aggregate may be mechanically or electrically activated.

The plant shall be equipped with a sampling device to take representative composite samples of the cold feed. If tests indicate non-compliance with specifications, operation shall cease until proper corrections have been made.

The production of the plant shall be governed by the rate required to obtain a thorough and uniform mixture of the materials. Mixing shall continue until the uniformity of coating, when tested in accordance with the requirements of AASHTO T-195, is at least ninety-five percent (95%).

CONTRACTOR shall furnish the **ENGINEER** with certified weight tickets for all the asphalt concrete placed on the project.

Where the compacted thickness of asphalt pavement course is designated as three inches (3") or less, the asphalt concrete may be placed in one lift.

Payment for this item shall be made at the unit price bid per ton for **ITEM 321.03940 – ASPHALT CONCRETE (19 mm)**.

SECTION 329 - BITUMINOUS TACK COAT:

The tack coat shall be grade SS-1h (diluted). Tack coat shall be applied at the rate of 0.05 gallons per square yard.

Payment for Bituminous Tack Coat shall be made at the contract unit price bid per ton of diluted mixture for **ITEM 329.03000 – BITUMINOUS TACK COAT**.

SECTION 333 – FOG SEAL COAT (CONTINGENT ITEM):

Work included in this section consists of applying a seal coat for curing purposes as specified in Section 309 and when requested by the **ENGINEER** to do so.

The application rate shall be 0.40 gallons per square yard of diluted emulsified asphalt grade SS-1h, as specified in Section 713 of the MAG Uniform Standard Specifications.

Payment for fog seal coat shall be made at the unit price bid per ton of diluted mixture for **ITEM 333.03100 – FOG SEAL COAT (CONTINGENT ITEM)**.

SECTION 340 – CONCRETE CURB, GUTTER, SIDEWALK, DRIVEWAYS AND ALLEY ENTRANCES:

Work includes construction of concrete curb, gutter, sidewalk, sidewalk ramps, driveways, and median nose transitions in accordance with MAG Standard Details, MCDOT Standard Details and City of Goodyear Standard Details at the locations shown in plans and related subgrade preparation in accordance with Section 301 of the Uniform Standard Specifications.

Work also includes repair and replacement of decomposed granite landscaping material adjacent to sidewalk and curb and gutter work along Lower Buckeye Parkway west of Estrella Parkway. The **CONTRACTOR** shall minimize disturbance to the existing landscaping improvements and only remove landscaping items necessary to construct the new sidewalk and curb and gutter. Landscaping items removed by the **CONTRACTOR** shall be replaced by the **CONTRACTOR** with the material removed or new material provided that the new material matches the existing material in size and color. The **CONTRACTOR** shall exercise care to protect in place the existing landscaping items such as trees and shrubs and irrigation facilities. Existing landscape items damaged by the **CONTRACTOR** shall be replaced by the **CONTRACTOR**. Coordinate these activities with the City of Goodyear. Protection, repair, and replacement of landscape items is considered incidental to the construction of concrete curb and gutter and sidewalk.

Measurements for the items listed below shall be rounded to the nearest linear foot, or square foot.

Payment for median nose transitions, excluding adjacent median curb or curb and gutter, shall be made at the unit price bid per each transition for **ITEM 340.00904 – MEDIAN NOSE TRANSITION (MAG STD DET 223)**.

Payment for MAG standard curb and gutter, including transition sections, sections adjacent to concrete driveways, and variable width gutters adjacent to guardrail GET-2, shall be made at the unit price bid per lineal foot for **ITEM 340.04205 – CURB AND GUTTER (MAG STD DET 220, TYPE A)**.

Payment for MAG standard single curb shall be made at the unit price bid per lineal foot for **ITEM 340.04225 – SINGLE CURB (MAG STD DET 222, TYPE A)**.

Payment for concrete driveways, excluding adjacent curb and gutter, shall be made at the unit price bid per square foot for **ITEM 340.05012 – CONCRETE DRIVEWAY (MAG STD DET 250)**.

Payment for concrete alley entrances shall be made at the unit price bid per square foot for **ITEM 340.05400 – ALLEY ENTRANCE (MAG STD DET 260)**.

Payment for concrete sidewalk shall be made at the unit price bid per square foot for **ITEM 340.05700 – SIDEWALK (MAG STD DET 230)**.

Payment for concrete sidewalk ramps shall be made at the unit price bid per each ramp for **ITEM 340.40305 – SIDEWALK RAMP (MCDOT STD DET 2031, TYPE A)**.

Payment for MCDOT standard curb and gutter including transition sections, sections adjacent to concrete driveways, and variable width gutters adjacent to guardrail GET-2, shall be made at the unit price bid per lineal foot for **ITEM 340.44200 – CURB AND GUTTER (MCDOT STD DET 2030)**.

Payment for MCDOT standard single curb shall be made at the unit price bid per lineal foot for **ITEM 340.44220 – SINGLE CURB (MCDOT STD DET 2030)**.

Payment for City of Goodyear standard concrete driveway shall be made at the unit price bid per square foot for **ITEM 340.45013 – CONCRETE DRIVEWAY (COG STD DET 3250)**.

SECTION 345 - ADJUSTING FRAMES, COVERS, VALVE BOXES AND WATER METER BOXES:

Work in this section consists of adjusting valve box frames and covers and sewer manhole frames and covers to grade per MAG Standard Detail 391-1 at the locations indicated in the plans.

Any valve operator nut that is more than 5 feet below the finished grade shall have a valve stem extension installed per MAG Standard Detail 391-2.

All existing utility manholes, except sewer, will be adjusted by the utility company that owns the manhole. The **CONTRACTOR** shall notify the utility company at least 48 hours in advance of the desired commencement of work by the utility and allow at least 72 hours for the utility to complete the manhole frame and cover adjustment. The **CONTRACTOR** shall provide the utility the finish elevation for the manhole frame and cover to be adjusted to.

Sewer manholes rims and walls shall be adjusted to grade per MAG Standard Detail 422. The adjustment shall include all material and labor necessary to raise manhole covers 1 to 4 feet from their existing top of rim elevation as shown on the plans (Average adjustment height =2 feet).

Payment for adjusting valve frame boxes and covers shall be made at the unit price bid per each for **ITEM 345.00112 – ADJUST VALVE BOX FRAME & COVER (MAG STD DET 391-1, TYPE A)** and **ITEM 345.00113 – ADJUST VALVE BOX FRAME & COVER (MAG STD DET 391-1, TYPE B)**.

Payment for adjusting sewer manhole frames and covers shall be made at the unit price bid per each for **ITEM 345.00340 – ADJUST MANHOLE FRAME & COVER (MAG STD DET 422)**.

SECTION 350 - REMOVAL OF EXISTING IMPROVEMENTS:

The work under this section shall consist of the removal and disposal of any obstacle to construction, including but not limited to, existing asphalt pavement, temporary diversion roadway pavement, curb and gutter, sidewalk, pipe culverts and headwalls, miscellaneous drainage and irrigation structures, box culverts, concrete lined irrigation ditches, and vegetation, unless specifically noted on the plans for removal and relocation by other entities.

The existing asphalt concrete pavement to be removed varies in thickness from 1"-5", according to cores taken in October of 1997 as part of the geotechnical investigation conducted for this project. This geotechnical data is available from the County. The average AC thickness on Yuma Road west of Estrella Parkway is 4.5", while east of Estrella Parkway only one core was taken which indicated 1" of AC. A core taken on the Yuma Road centerline found 8" of PCC pavement below the AC and ABC layers. The PCC pavement will be removed as required to place new pavement sections or pipe work as shown in the plans. The 5 cores along MC 85 indicate an average AC thickness of 5". Most of the Cores on Estrella Parkway were taken north of Yuma Road and south MC 85. These cores show an average AC thickness of 3.5 inches on Estrella Parkway. The only core taken north of the railroad tracks and south of Yuma Road had a 1 inch AC thickness.

Arrangements for disposal of all waste material shall be the responsibility of the **CONTRACTOR**, except that all usable pipe culvert, as determined by the **ENGINEER**, shall be stockpiled within the right-of-way for salvage by the County.

Removed asphalt concrete paving may be used as fill material, providing the requirements of MAG Uniform Standard Specification, Section 211, are met, and that the maximum dimension of any piece is less than 4 inches and is not placed within 2 feet of the subgrade surface.

If a Maricopa County Landfill is selected for disposal of road construction waste and/or debris a Maricopa County Landfill Use Permit will be required. Application for the permit can be made at the Maricopa County Landfill Office, located at 2801 West Durango Street, Phoenix, Arizona 85009 (Telephone Number 506-7060). Charges will be levied on a weight basis for each load delivered to the landfill in accordance with the current Landfill fee schedules which are available at the above address.

An above ground diesel refueling tank was located near the southwest corner of Lower Buckeye Road and Estrella Parkway. This privately owned facility was used to re-fuel farm equipment and is located partially within the new right-of-way. There is evidence of fuel spillage at the site. The soil has been tested and the material excavated from this site shall not be used as fill material for the project or stockpiled with other excess fill material for future use. If the contaminated soil has not been removed by others before construction begins in this area, the **CONTRACTOR** shall properly dispose of

the material following applicable federal and state regulations. The work for this item shall not be performed unless directed by the **ENGINEER**. Payment for the removal of the contaminated material shall be made on an allowance basis for **ITEM 350.00000 – REMOVAL OF CONTAMINATED SOIL.**

Payment for removal of existing concrete lined ditches shall be made at the unit price bid per lineal foot for **ITEM 350.04210 – REMOVAL OF EXISTING CONCRETE LINED DITCHES.**

Payment for removal of existing pipe culverts, including adjacent headwalls, shall be made at the unit price bid per lineal foot for **ITEM 350.04710 – REMOVAL OF EXISTING PIPE CULVERTS.**

Payment for removal of existing pavement; including driveways, adjacent curb and gutter removal, valley gutter removal, and any pavement sawcutting required on plans; shall be made at the unit price bid per square yard for **ITEM 350.07500 – REMOVAL OF EXISTING PAVEMENT.**

Payment for all other removals necessary for the construction of the improvements shown on the plans that are not included in the above items or called out to be relocated by other agencies, companies, or individuals, shall be paid for at the lump sum price bid for **ITEM 350.01100 – REMOVAL OF EXISTING MISCELLANEOUS IMPROVEMENTS.** This item includes but is not limited to the following removals:

- Box culverts including wingwalls and headwalls
- Mailbox relocation or removal
- Guardrail
- Concrete half barrier
- Landscaping and associated irrigation facilities in the median south of MC 85
- Concrete cutoff wall
- Miscellaneous irrigation structures
- Well fence, shade roof and electric service panel
- Concrete sidewalk
- Approximately 80 landscape irrigation emitters and landscaping in the median on Lower Buckeye Parkway
- Abandoned utility poles (2 Ea) on Yuma Road

SECTION 401 - TRAFFIC CONTROL

SUBSECTION 401.1 - GENERAL REQUIREMENTS: Road closures for Estrella Parkway, MC 85, Lower Buckeye Road, Lower Buckeye Parkway, Elwood Street, or Yuma Road are not authorized, except for a maximum of 3-day closure for the construction of the at-grade crossing on Estrella Parkway. Two paved lanes shall be maintained at all times. However, the **CONTRACTOR** may use a temporary two-way traffic control set-up with the use of flaggers during working hours only.

Traffic shall be maintained on paved surfaces at all times.

CONTRACTOR shall complete all scheduled work that is outside of the existing roadway prior to restrictions on any existing paved surface.

Access for all residences, businesses, school buses, and emergency services shall be maintained at all times during construction.

The **CONTRACTOR** shall designate an on-site employee, other than the project supervisor, during work hours that is properly trained in the application of traffic control measures, and who shall be responsible for monitoring and responding immediately to correct traffic control measures, as necessary. This individual shall be authorized to receive and carry out requests from the **ENGINEER**.

SUBSECTION 401.2 - SPECIAL SIGNING REQUIREMENTS: Advance Project Notification signing shall be installed on Estrella Parkway, Yuma Road, and MC 85 at each end of the project limits. These signs shall be installed at least 14 days prior to the start of construction activities.

SUBSECTION 401.3 - SPECIAL NOTIFICATION REQUIREMENTS: Notification shall be made to the following agencies at least 7 calendar days prior to the commencement of construction : Maricopa County Sheriffs Office, Rural/Metro Fire Department, and the City of Goodyear Police and Fire Departments. These same agencies shall be notified at least 7 days in advance of the closure of Estrella Parkway for the railroad crossing installation.

SUBSECTION 401.4 - TRAFFIC CONTROL DEVICES: All traffic control devices and their application shall conform to the Manual on Uniform Traffic Control Devices Handbook (United States Department of Transportation, Federal Highway Administration) any revisions thereto, and these Special Provisions. All temporary traffic control devices shall be ballast with sandbags or other approved ballast, as requested by the **ENGINEER**.

Traffic cones shall only be used during daylight hours, and shall be a minimum of 28" (711.2 mm) high.

At any time when traffic is moved from their normal travel lane, an arrow board shall be installed, and removed only when traffic has been restored to their proper travel path.

Any existing striping that conflicts with temporary traffic movements for a period of more than 48 hours shall be removed. When traffic is restored, **CONTRACTOR** shall restore all striping to its original design, if applicable.

It shall be **CONTRACTOR's** responsibility to provide, erect, maintain, remove, and/or relocate all temporary and existing traffic control devices necessary to properly mark and control the construction area(s) for the safe and efficient movement of traffic. Temporary traffic control warning signs and devices shall be installed prior to the start of any work, and portable signs shall be used to supplement blocked or removed signs. In the event **CONTRACTOR** removes any permanent signing which will not be reinstalled immediately, **CONTRACTOR** shall store permanent signs in a secure location at the Site and request through the **ENGINEER** that County forces or City of

Goodyear remove stored signage. The County or City of Goodyear will reset all permanent signing removed or relocated during construction. **CONTRACTOR** is responsible for all costs incurred in replacing lost or damaged traffic control devices.

All hazards on the Site (trench's, material storage piles, etc.) shall be barricaded in such a way as to provide maximum safety. Barricade spacing and applicable warning signs (Open Trench, etc.) shall be installed at or around the hazard and the spacing shall not be greater than 25 feet.

All temporary traffic control devices shall be ballast with sandbags.

SUBSECTION 401.5 - TRAFFIC CONTROL MEASURES: CONTRACTOR shall submit a Traffic Control Plan and Phasing Plan, for review at the pre-construction meeting. The traffic control plan adjacent to the Estrella Parkway railroad crossing shall be coordinated with UPRR to ensure safe temporary traffic flow through this area. The Traffic Control Plan(s) shall address all anticipated phases of construction.

Paved diversionary roadways shall be constructed per MAG standards on MC85 to divert traffic away from the bridge construction site as shown in the plans. Paved diversionary roads are required at other locations when traffic cannot be maintained on existing paved roadways, with the exception of temporary two-way traffic control with the use of flaggers during working hours. The posted speed on the diversion roadways shall be a maximum of 25mph. Portable jersey barriers shall be installed when construction hazards warrant, or as shown in the plans or required by the **ENGINEER**. The approach ends of all portable jersey barriers shall be protected from vehicle impact by flaring the ends 14 away from the travel path at a minimum flare rate of 8:1.

Off-duty uniformed law officers are required at all major intersections when restrictions are present.

All persons used as flaggers shall be properly trained by a recognized source prior to their use on the project. Proof of training shall be submitted at the time of the pre-construction conference. Recognized sources are the following: International Municipal Signal Association (IMSA), American Traffic Safety Services Association (ATSSA), and Local Technical Assistance Program (LTAP). Other sources may be used with prior authorization from the **ENGINEER**.

CONTRACTOR shall provide and maintain all necessary traffic control devices until acceptance of the project by the County or until the **ENGINEER** requests removal.

Construction Staging:

In order to keep irrigation disruption to a minimum, the **CONTRACTOR** shall construct all irrigation relocations prior to the other roadway or channel work. The bridge on MC85 shall be constructed prior to constructing any other roadway work on MC85 (Phase I on the plans). The median and eastbound paving shall be constructed in Phase II as shown on the plans. In Phase III, the eastbound lanes shall be striped temporarily to facilitate two traffic lanes while the westbound pavement is constructed.

County forces will install new signal poles and lights after **CONTRACTOR** has properly installed all underground signal facilities.

Union Pacific Railroad forces will construct the railroad crossing at Estrella Parkway prior to Estrella Parkway paving.

The **CONTRACTOR** may submit for approval, a plan for a different staging sequence as long as the criteria of traffic safety and minimum traffic disruption are met.

Stage 1:

CONTRACTOR shall construct new replacement irrigation facilities and then connect them to the existing irrigation facilities where necessary. This work shall be completed within 45 days after the notice to proceed date.

Stage 2:

CONTRACTOR shall construct diversion road on MC85, install temporary striping, install temporary jersey barrier, and construction signing.

Stage 3:

CONTRACTOR shall construct MC85 and the Bullard Wash Bridge and approach slabs.

Stage 4:

CONTRACTOR shall construct temporary roadway on the north side of the new MC85 and Bullard Wash Bridge and restripe MC85. Remove deviation road.

Stage 5:

CONTRACTOR shall construct median and south half (future eastbound pavement) of MC85 including guardrail and curb returns at Estrella Parkway, south half of pipe work and south half of box culverts.

Stage 6:

CONTRACTOR shall stripe south half (future eastbound pavement) of MC85 for temporary two-way traffic and construct north half (future westbound pavement) of MC85 including guardrail, curb and gutter, and north half of box culverts and north half of pipe work.

Stage 7:

CONTRACTOR shall complete all other work on the project along Estrella Parkway, Elwood Street, Lower Buckeye Road, Lower Buckeye Parkway, and Yuma Road, as per the approved schedule.

SUBSECTION 401.7 – PAYMENT:

Payment for traffic control shall be made on a lump sum basis for **ITEM 401.01000 – TRAFFIC CONTROL**, which price shall be full compensation for the work, including labor, materials, traffic control devices, installation and removal of all temporary pavement marking, and miscellaneous incidental items necessary to complete the work. Construction and removal of the temporary diversion roadways shall not be included in

this item, the cost of which shall be included in ITEM 310.003161 – Agreggate Base Course, ITEM 321.03940 – Asphalt Concrete (19 mm), and ITEM 350.07500 – Removal of Existing Pavement.

Payment for **ITEM 401.01100 – UNIFORMED OFF-DUTY LAW ENFORCEMENT OFFICER**, will be based on approved time sheets or invoices in an amount not to exceed \$8,000, as shown on the bidding schedule, for actual hours the **CONTRACTOR** provided and Uniformed Off-Duty Law Enforcement Officer for traffic control purposes at the request and with the approval of the **ENGINEER**. Expenses, eligible for reimbursement, are labor costs, supported by approved time sheets or invoices and documented expenses such as taxes or bond costs charged to the **CONTRACTOR** in connection with the Uniformed Off-Duty Law Enforcement Officer assignment. No additional mark-up for profit and /or fee for the **CONTRACTOR** will be eligible for reimbursement.

SECTION 402 – PVC PIPE SLEEVE:

Work in this section consists of furnishing and installing underground PVC pipe sleeves at the locations shown in the plans or as requested by the **ENGINEER**, including excavation, backfill, compaction, and concrete encasement necessary to complete the work.

All PVC sleeves and fittings shall be of the size indicated on the plans and be rigid polyvinyl chloride (PVC). PVC conduit and fittings shall be Schedule 40 heavy wall and Schedule 80 for the 5" Conduits. 2 ½ inch and 5-inch conduit shall be dark gray in color and comply with NEMA TC-2. The concrete encasement shall consist of Class C concrete per MAG Uniform Specifications Section 725. Concrete aggregate shall consist of 40 percent concrete sand by weight and 60 percent 3/8-inch maximum coarse aggregate. Concrete slump shall be between 2 inches and 4 inches. Calcium chloride and flyash admixtures are not acceptable.

Maintain at least 1' vertical separation between all conduit and any underground conflicts. When passing over or under conflicts, trench shall not be sloped steeper than 12:1 ratio for conduits 4" or less, and 20:1 ratio for 5" conduit, or minimum radius of 150 times the outside diameter of the conduit. Extreme care shall be exercised to ensure that concrete and other foreign matter do not enter the conduit being laid, while encasing or any time thereafter. The usability of all conduit systems must be insured.

The **CONTRACTOR** shall not trench closer than 2' to an APS facility (except 4' to poles) unless an APS representative is present. The trench depths and widths shown in the plans are minimum requirements based on conduit sizes. Where workmen must enter the trench, widths shall be increased. The trench bottom shall be smooth, flat, and without surface irregularities, otherwise a sufficient amount of bedding material shall be installed to provide the required surface. The bedding material shall not contain rocks larger than 1 ½ " in their greatest dimension and contain sufficient fines to fill all voids. Backfill shall comply with MAG Uniform Standard Specifications Section 601. When service trenches intersect or branch off from the mainline trench, the service trench bottom shall gradually taper up to the specified service trench depth or service stub location.

The **CONTRACTOR** shall install 2 ½ inch, 4-inch, or 5-inch conduit at the locations shown on the plans including conduit sweeps, conduit caps, conduit plugs, conduit spacers, rebar J-Boxes, primer, glue, and mandrelling of the conduits.

APS will provide surveying necessary to stake the location of the 2 ½ inch and 5-inch conduit trenches. The **CONTRACTOR** shall provide surveying necessary for vertical control for the conduit placement.

Electrical markers and prelubricated ¾ " polyester, flat strap pull line for each 2 ½ " or 5" conduit run will be provided and installed by APS.

APS will inspect the conduit system including trench work and conduit installation. Notify Mr. John Kramrar at 550-8514, 48 hours prior to commencement of the conduit installation.

Payment for PVC pipe sleeve installation including trenching, conduit placement, bedding, concrete encasement, and backfill shall be made at the unit price bid per lineal foot for **ITEM 402.04100 – 2 ½ " PVC CONDUIT, ITEM 402.04140 – 4" PVC PIPE SLEEVE, and ITEM 402.04150 – 5" PVC CONDUIT.**

SECTION 405 - MONUMENTS:

The work in this section shall consist of installing brass caps and brass caps and frames at the locations shown on the plans or adjusting existing frames to grade for existing survey monuments. The brass caps shall be furnished and installed by the **CONTRACTOR** including surveying necessary to establish the exact locations of the new survey monuments.

The **CONTRACTOR** shall set all monuments called out on the plans and mark their (PC, PT, Township, Range, and Section Corner) on each cap along with the State Registered Land Surveyor license (RLS) number of the individual supervising the survey crew performing the work. In the case of a corner that is part of the Public Land Survey System, the RLS survey supervisor shall file an Arizona Land Survey Corner Record form with the Maricopa County Records office within 30 days of setting the corner as per A.R.S. 33-106.

Elevations should be stamped on brass caps to be installed on headwalls and bridges as shown on the plans, and the proper elevation shall be recorded on the as-built drawings.

Payment for furnishing and installing new survey monuments shall be made at the unit price bid per each for **ITEM 405.00011 – INSTALL BRASS CAP (MAG STD DET 120-2, TYPE E), ITEM 405.00021 – INSTALL BRASS CAP (MAG STD DET 120-1, TYPE A), ITEM 405.00111 – INSTALL SURVEY MONUMENT (MAG STD DET 120-2, TYPE E), and ITEM 405.00121 – INSTALL SURVEY MONUMENT (MAG STD DET 120-1, TYPE A).**

Payment for adjusting existing survey monuments to grade shall be made at the unit price bid per each for **ITEM 405.00122 – ADJUST SURVEY MONUMENT TO GRADE (MAG STD DET 120-1, TYPE A).**

SECTION 415 - FLEXIBLE METAL GUARDRAIL:

SUBSECTION 415.1 – DESCRIPTION: The work in this section shall consist of constructing metal W-beam guardrail, transitions, special anchors, shop curved guardrail, guardrail extruder terminals (GET) barrier markers and terminal sections at the locations shown on the plans and in accordance with MCDOT Standard Details, ADOT Standard Details, and special details included in the plans.

SUBSECTION 415.4 – MEASUREMENT: Guardrail shall be measured by lineal feet including guardrail transition sections and excluding terminal and anchor sections as shown in Maricopa County Department of Transportation Detail 2038. Rubrail shown in the guardrail transition sections is a non-pay item and shall not be measured for payment.

SUBSECTION 415.5 – PAYMENT: Guardrail including transition sections, rubrail, and barrier markers shall be paid for at the unit price bid per linear foot for **ITEM 415.44200 – GUARDRAIL (MCDOT STD DET 2039)**.

Guardrail Extruder Terminal shall be paid for at the unit price bid per each for **ITEM 415.10001 – GUARDRAIL GET-1 (ADOT STD DET C-10.40)** or **ITEM 415.10002 – GUARDRAIL GET-2 (ADOT STD DET C-10.41)**.

Guardrail anchor sections shall be paid for at the unit price bid per each for **ITEM 415.40003 – GUARDRAIL ANCHOR (MCDOT STD DET 2042)**.

The shop curved guardrail and special anchors including barrier markers shown in Detail A shall be paid for at the unit price bid per each for **ITEM 415.40004 – SHOP CURVED GUARDRAIL (SPECIAL DETAILS A & B)**.

SECTION 420 - CHAIN LINK FENCE:

The work under this section consists of constructing chain link fencing on the MC 85 Bullard Wash Bridge.

The bridge chain link fencing shall be paid for at the contract unit price bid per linear foot for **ITEM 420.44400 – 4' CHAIN LINK FENCE ON BRIDGE**.

SECTION 451 - THERMOPLASTIC PAVEMENT MARKINGS:

SUBSECTION 451-1 -Description:

The work under this section shall consist of cleaning and preparing pavement surfaces and furnishing and applying either white or yellow hot sprayed thermoplastic reflectorized pavement markings to the prepared pavement surface at the locations and in accordance with the details shown on the project plans, the manufacturer's specifications, and the requirements of these specifications.

Screed or extrusion application of thermoplastic may be allowed, if approved by the Engineer, for short application work such as intersections.

The **CONTRACTOR** shall furnish all materials, supervision, labor, equipment, tools, transportation and supplies required to complete the work according to the striping plans, standard specifications and these construction specifications.

SUBSECTION 451-2 - Materials:

SUBSECTION 451-2.01 - General Requirements:

The thermoplastic reflectorized material shall consist of a solid mixture of heat-stable resins, white or yellow pigment, inter-mixed glass beads, filler, and other materials in granular or block form specifically compounded for reflectorized pavement markings to be applied to the pavement in a molten state. The characteristics of the liquefied material shall be such that complete and even coverage of specified areas to the required thicknesses is provided by the required application method and rate. Upon cooling to normal pavement temperature, this material shall produce an adherent reflectorized marking capable of resisting deformation and wear in the roadway.

Certificates of Compliance conforming to the requirements of Arizona State Department of Transportation standard specifications for road and bridge construction 1990 edition, subsection 106-05 shall be submitted for each lot or batch of thermoplastic reflectorized material prior to its use.

Only thermoplastic materials currently shown on the Arizona Department of Transportation's Approved Products List shall be used. The current Approved Products List is available from the Engineering Records Office, 1655 West Jackson, Phoenix, AZ 85007, Phone (602) 255-8216.

SUBSECTION 451-2.02 - Composition:

The thermoplastic composition shall conform to the following requirements:

	Percent by Weight	
	White	Yellow
Binder (hydrocarbon or alkyd)	18 - 26	18 - 26
Titanium dioxide	10 - 15	-----
Basic lead chromate	-----	2 - 10
Reflective glass inter-mix beads	30 - 40	30 - 40
Calcium carbonate or equivalent filler	20 - 40	25 - 45

The ingredients of the thermoplastic composition shall be thoroughly mixed and in a solid or sectionalized block, or free-flowing granular form. When heated in a melting apparatus, the material shall readily liquefy into a uniform solution. This solution shall be free from all skins, dirt, foreign objects or any other ingredient which would cause

bleeding, staining, blotting, or discoloration when applied to the bituminous or concrete pavement surfaces.

The thermoplastic shall be one of the following two types based on the binder composition:

Hydrocarbon: Shall consist mainly of synthetic petroleum hydrocarbon resins with appropriate fillers and pigments.

Alkyd: Shall consist of a mixture of synthetic resins, at least one of which is solid at room temperature, and of high-boiling-point plasticizers. At least one third of the binder composition and no less than eight percent by weight of the entire material formulation shall be solid maleic-modified glycerol ester resin. The alkyd binder shall not contain any petroleum-based hydrocarbon resins.

An alkyd thermoplastic formulation shall be used for all symbols, legends, and transverse lines, including stop bars and crosswalks. Either an alkyd or hydrocarbon thermoplastic formulation may be used for longitudinal lines, including lane lines and edge lines, unless otherwise shown on the project plans or specified herein. Extrusion or spray formulations shall be used in accordance with requirements of the application equipment used to install the markings.

(A) Reflective Glass Beads:

In addition to incorporating glass beads in the thermoplastic mix, glass beads shall be evenly applied to the surface of the molten material, immediately after application, at a minimum rate of 10 pounds of glass beads per 100 square feet of line (300 linear feet of four-inch stripe).

(B) Filler:

The filler shall be a white calcium carbonate or equivalent filler with a compressive strength of at least 5,000 pounds per square inch.

(C) Titanium Dioxide:

Titanium Dioxide shall conform to the requirements of ASTM D 476 for Type II (92 percent).

(D) Lead Chromate Pigment:

The lead chromate pigment shall be silica double encapsulated heat resistant lead chromate pigment.

SUBSECTION 451-2.03 - Physical Characteristics of the Composition:

(A) General Requirements:

The thermoplastic material shall not exude fumes which are toxic, injurious, or require specialized breathing apparatus when heated to the temperature range specified by the manufacturer for application. The material shall remain stable when held for four hours at this temperature, or when subjected to four reheatings, not exceeding a total of four hours, after cooling to ambient temperature. The temperature viscosity characteristics of the plastic material shall remain constant throughout the reheatings and shall show like characteristics from batch to batch. There shall be no obvious change in color of the thermoplastic material as a result of reheating, and the color of the material shall not vary from batch to batch.

(B) Color:

The thermoplastic material, after heating for four hours \pm five minutes at $425 \pm$ three degrees F and cooled to $77 \pm$ three degrees F, shall meet the following:

White: Daylight reflectance at 45 degrees - 0 degrees shall be 70 percent minimum.

The color shall match Federal Test Standard Number 595, color chip no. 17925.

Yellow: Daylight reflectance at 45 degrees - 0 degrees shall be 43 percent minimum.

The color shall match Federal Test Standard Number 595, color chip no. 13538.

(C) Retroreflectance:

The white and yellow thermoplastic materials shall have the following minimum retroreflectance values at 86.5 degrees illumination angle and 1.5 degrees observation angle as measured by a MiroLux 12 portable retroreflectometer or similar approved device within 30 days after application to the roadway surface:

Product	Retroreflectance (Millicandelas)
White	200
Yellow	125

(D) Softening Point:

After heating the thermoplastic material for four hours \pm five minutes at $425 \pm$ three degrees F and testing in accordance with ASTM D 36, the thermoplastic materials shall have a softening point of 215 ± 15 degrees F.

(E) Water Absorption and Specific Gravity:

The thermoplastic material shall not exceed 0.5 percent by weight of retained water when tested in accordance with the requirements of ASTM D 570.

The specific gravity of the material, as determined by Section 11 of AASHTO T 250, shall be between 1.85 and 2.3.

(F) Impact Resistance:

After heating the thermoplastic material for four hours \pm five minutes at $425 \pm$ three degrees F and forming test specimens, the impact resistance shall be not less than 10 inch-pounds when tested in accordance with Section 9 of AASHTO T 250.

(G) Bond Strength:

After heating the thermoplastic material for four hours \pm five minutes at $425 \pm$ three degrees F, the bond strength to portland cement concrete shall be not less than 180 pounds per square inch. The bond strength shall be determined in accordance with the procedures specified in Section 7 of AASHTO T 250.

(H) Abrasion Resistance:

The abrasion resistance of the thermoplastic material shall be determined by forming a representative lot of the material at a thickness of 0.125 inches on a four-inch square monel panel (thickness 0.050 ± 0.001 inches), on which a suitable primer has been previously applied, and subjecting it to 200 revolutions on a Taber Abraser at 25°C , using H-22 calibrated wheels weighted to 250 grams. The wearing surface shall be kept wet with distilled water throughout the test.

The maximum loss of thermoplastic material shall be 0.5 grams.

(I) Cracking Resistance at Low Temperature:

After heating the thermoplastic material for four hours \pm five minutes at $425 \pm$ three degrees F, applying to concrete blocks, and cooling to $15 \pm$ three degrees F, the material shall show no cracks when observed from a distance exceeding 12 inches. Testing for low temperature crack resistance shall be in accordance with the procedures specified in Section 8 of AASHTO T 250.

(J) Flowability:

After heating the thermoplastic material for four hours \pm five minutes at $425 \pm$ three degrees F, and testing for flowability in accordance with Section 6 of AASHTO T 250, the white thermoplastic shall have a maximum percent residue of 18, and the yellow thermoplastic shall have maximum percent residue of 21.

(K) **Yellowness Index:**

The white thermoplastic material shall not exceed a yellowness index of 0.12 when tested in accordance with Section 4 of AASHTO T 250.

(L) **Flowability (Extended Heating):**

After heating the thermoplastic material for eight \pm 1/2 hours at 425 \pm three degrees F, with stirring the last six hours, and testing for flowability in accordance with Section 12 of AASHTO T 250, the thermoplastic shall have a maximum percent residue of 28.

(M) **Flash Point:**

The thermoplastic material shall have a flash point not less than 475 degrees F when tested in accordance with the requirements of ASTM D 92.

(N) **Storage Life:**

The materials shall meet the requirements of this specification for a period of one year from the date of manufacture. The month and year of manufacture shall be clearly marked on all packages of thermoplastic material. The thermoplastic material must also melt uniformly with no evidence of skins or unmelted particles for this one year period. Any material which does not meet the above requirements, or which is no longer within this one year period at the time of application, shall not be used. The **CONTRACTOR** shall replace any outdated material with material meeting the above performance and time requirements at no additional cost to the Department.

(O) **Primer-Sealer:**

Primer-sealers shall be used on portland cement concrete, or existing hot mix asphaltic concrete surfaces prior to application of the thermoplastic material, and shall be applied as recommended by the thermoplastic material manufacturer. The primer-sealer shall be compounded specifically for use with the specified thermoplastic material.

Application of primer-sealer will not be required on newly placed hot-mix asphaltic concrete surfaces prior to application of the thermoplastic material.

SUBSECTION 451-2.04 - Physical Requirements for Glass Beads:

Inter-mix and drop-on reflective glass beads shall conform to the requirements of Subsection 455-2.02, except as noted herein.

The inter-mix beads shall conform to AASHTO M 247-81 (1986), type I, and may be coated or uncoated as recommended by the manufacturer. If uncoated beads are used, the thermoplastic formulation shall be configured to minimize settling of the intermix beads when the material is heated and applied.

SUBSECTION 451-3 - Construction Requirements:

SUBSECTION 451-3.01 - Equipment:

The equipment used to install hot applied thermoplastic material shall be constructed to provide continuous uniform heating to temperatures exceeding 400 degrees F while mixing and agitating the material. The heating mechanism of the kettle shall be equipped with a heat transfer medium consisting of oil or air. The burner flame shall not directly contact the material vessel surface. The mixing and agitating mechanism shall be capable of thoroughly mixing the material at a rate which ensures constant uniform temperature distribution. The kettle shall be equipped with two temperature gauges: one to indicate the temperature of the oil or air heat transfer medium, and the other to indicate the temperature of the thermoplastic material. The kettle shall also be equipped with an automatic thermostatic control device that allows for positive temperature control to prevent overheating or underheating of the material.

The conveying portion of the equipment, between the kettle and the line dispensing device shall be configured to prevent accumulation and clogging, and shall maintain the material at the specified application temperature. The dispensing device shall be capable of applying the required shapes and thicknesses. All parts of the equipment which will come in contact with the material shall be constructed for easy accessibility for cleaning and maintenance.

All melting and application equipment shall have functioning and calibrated temperature sensing devices to verify that temperature requirements are being met. The **CONTRACTOR** shall provide proof that the temperature sensing devices and verification thermometers are fully functional.

The application equipment to be used on roadway long line installations shall consist of either truck-mounted units or motorized ride-on equipment. The truck-mounted or motorized ride-on units used for center lines, lane lines, gore lines, and edge lines shall consist of a mobile self-contained unit carrying its own material capable of operating at a minimum speed of five miles per hour while applying striping, and shall be sufficiently maneuverable to install curved and straight lines, both longitudinally and transversely.

The truck shall be equipped with high pressure air spray jets in front of the pavement marking material applicators to remove loose matter from the pavement surface where the marking material is to be applied.

Hand applicator equipment, to be used for all other roadway installations, shall be either self-contained melter application units or reservoir application units that are filled from a separate melter unit. Both types of units shall be equipped to maintain and measure the required application temperatures. The hand applicator equipment shall be sufficiently maneuverable to install symbols and legends, and curved and straight lines, both longitudinally and transversely.

The application equipment shall be so constructed as to assure continuous uniformity in the dimensions of the pavement marking. The applicator shall provide a means for cleanly cutting off square pavement markings edges and provide a method of applying

"skip" and solid lane lines. The equipment shall be constructed to provide varying widths and thicknesses of pavement markings. The application equipment shall be mobile and maneuverable to the extent that straight lines can be followed and normal curves can be made in a true arc. The equipment operator shall be located in such a position as to enable full visibility of the striping apparatus.

A glass bead top dressing shall be applied to the completed thermoplastic stripe by an automatic glass bead dispenser attached to the striping machine in such a manner that the beads are applied to the molten thermoplastic material immediately after it has been applied to the pavement. The bead dispenser shall use pressure-type spray guns for truck-mounted or motorized ride-on units, and a drop-on bead dispenser for hand applicators. The bead dispenser shall be capable of evenly distributing glass beads at the required application rate immediately after the application of the thermoplastic. The bead dispenser shall dispense the beads in such a manner that they shall be embedded in the surface of the molten thermoplastic to an anchoring depth of from 55 to 60 percent of the bead diameter. The bead dispenser shall be equipped with an automatic cut-off which is synchronized with the cut-off of the thermoplastic material.

The heating kettle and application equipment shall meet the requirements of the National Fire Underwriters, the National Fire Protection Association, and other applicable federal, state and local authorities. Thermoplastic melting units, trucks or trailers, shall be equipped with foam-type fire extinguishers suitable for application to thermoplastic material that is at the flash point.

SUBSECTION 451-3.02 - Application:

(A) Placement Locations:

Pavement markings shall be positioned as defined on the plans and in the specifications. When it becomes necessary for proper installation, the Engineer may revise individual marking locations as necessary.

The **CONTRACTOR** shall spot mark the entire project at ten (10) foot intervals in conformance with the striping plans. Upon completion of the spot marking, the **CONTRACTOR** shall notify the Engineer that the project is ready for inspection. **ENGINEER** will conduct an inspection after the spot marking is completed, within three (3) working days from notification of contractor.

Approval of the spot marking shall not relieve the **CONTRACTOR** from obtaining a final inspection. Upon final inspection, if the Engineer decides that more than one coat is required, it will be done at the **CONTRACTOR'S** expense.

The final striping inspection will be made by the Engineer within three (3) working days after all pavement markings and markers have been installed.

The Striping in the field may exceed the construction project limits in order to match and tie into the existing striping. Contractor shall perform a field inspection and determine if the striping exceeds the construction project limits.

If a conflict exists between actual field conditions and the pavement marking plans, the **CONTRACTOR** shall cease work and notify the Engineer immediately.

(B) Obliteration of Existing Pavement Markings:

Pavement marking obliteration shall be accomplished by the **CONTRACTOR** as indicated on the plans or as directed by the Engineer. Obliteration of all existing pavement markings shall be considered incidental work and shall be included in unit bid price for installation of new pavement markings.

Pavement markings shall be removed to the fullest extent possible from the pavement by any method that does not materially damage the surface or texture of the useable pavement. Sandblasting, using air or water, is an acceptable method for removing pavement markings, however, other methods may be approved by the Engineer. Overpainting of markings with paint or asphalt will not be permitted.

Sand or other material deposited on the pavement as a result of removing pavement markings shall be removed as the work progresses. Accumulations of sand or other material, which might interfere with drainage or might constitute adverse safety conditions to traffic, will not be permitted.

Where blast cleaning is used for the removal of pavement markings or for removal of objectionable material, the residue including dust shall be removed immediately after contact between the sand and the surface being treated. Such removal shall be by a vacuum attachment operating concurrently with the blast cleaning operation, or by other methods approved by the Engineer. Blasting shall not be used within 12 feet of a lane occupied by public traffic.

Any damage to the pavement caused by pavement marking removal shall be repaired by methods acceptable to the Engineer. When asphalt slurry is used to repair damage to the pavement caused by pavement marking removal or the obliteration of the marks remaining after the markings have been removed, the asphalt slurry shall be placed parallel to the new direction of travel and shall be not less than two feet in width.

(C) Materials Selection and Compatibility:

All thermoplastic material, drop-on glass beads, and primer-sealer will be inspected and approved by the Engineer prior to their application. The **CONTRACTOR** shall also provide samples of said materials if requested by the Engineer.

All materials shall be properly packaged and stored. Each container to be used on the project shall be clearly labeled to indicate the following information:

- Nature, type, and formulation of the material, including whether it is an alkyd or hydrocarbon;
- Manufacturer, batch number, and date of manufacture;
- Application requirements and constraints; and

- Compatibility requirements and constraints, particularly those pertaining to equipment, storage, and other materials to be used.

Preparation and application equipment shall be in accordance with the plans and specifications, and shall conform to the recommendations of the materials manufacturer.

Incompatible materials shall not be used together. The **CONTRACTOR** shall not combine alkyd and hydrocarbon materials in preparation or application equipment. The **CONTRACTOR** shall completely clean preparation and application equipment when materials are changed.

The **CONTRACTOR** shall dispose of excess materials, cleaning fluids, and all empty material containers at a site in conformance with the state and federal requirements.

(D) Equipment Inspections and Deficiencies

The **CONTRACTOR** shall make daily maintenance and operation inspections of all application equipment to ensure that it is operable within the requirements of the specifications. The **CONTRACTOR** shall inform the Engineer of any equipment breakdowns, intermittent malfunctions, or other conditions that may impact the proper application of specified markings. Any equipment judged to be unsuitable by the Engineer shall be repaired or replaced.

(E) Pavement Surface

The **CONTRACTOR** shall remove all dirt, grease, oil or other detrimental material from the road surface prior to application of the thermoplastic stripes, arrows, legends or symbols. Any area that cannot be satisfactorily cleaned shall be scrubbed with a biodegradable chemical called Citrus Solv Plus or approved equal.

The method of cleaning the surface is subject to approval by the Engineer and shall include sweeping and the use of high-pressure air spray. The method of surface preparation shall also be in accordance with the recommendations of the thermoplastic material manufacturer. Loose material including all grindings and obliterated markings shall be removed from the pavement surface and disposed of properly.

When thermoplastic markings are to be applied to new portland cement concrete pavement, any curing compound present shall be removed by means of a high-pressure water jet or sandblasting, followed by sweeping and high-pressure air spray. The curing compound shall be removed at least two inches beyond the entire perimeter of each marking to be installed.

At the time of application of primer-sealer and thermoplastics, the road surface shall be absolutely dry with no detectable or measurable surface or near-surface dampness. If precipitation or other surface wetting is imminent, all marking operations shall be stopped. If any surface dampness is detected during marking activities, marking operations shall be stopped until the pavement dries. If the hot-applied thermoplastic

marking blisters upon application, marking operations shall be stopped until the cause, potentially including subsurface moisture, is determined and corrected.

(F) Primer Application

On both old and new portland cement concrete pavement, a primer-sealer shall be used if recommended by the thermoplastic manufacturer. The primer-sealer shall be applied at the manufacturer's recommended application rates prior to placing the thermoplastic material. The primer-sealer shall be allowed to set up for the manufacturer's specified cure or evaporation time, and shall be free of solvent and water when the thermoplastic is applied.

The thermoplastic material shall be applied to primed pavement surfaces within the working time specified by the primer-sealer and thermoplastic materials manufacturers.

If the primed surfaces are not marked within these time limits, the **CONTRACTOR** shall re-prime the surfaces as required by the manufacturer at no additional cost to the Department. If an epoxy primer is used, the thermoplastic application shall be completed before the epoxy has cured.

Improper primer-sealer application may result in bond failure between the thermoplastic and the pavement surface and may cause the thermoplastic surface to pinhole or blister. Should these conditions occur, all application operations shall stop until the cause is determined and corrected. All such defective markings shall be removed and replaced at no additional cost to the Department.

(G) Pavement Temperatures

Screed or extrusion application procedures shall not be used if the wind chill factor is below 65 degrees F.

For other application procedures, the road surface temperature at the time of application shall be a minimum of 55 degrees F and rising.

If at any time during marking operations the air or pavement temperature falls below these requirements, all marking operations shall stop.

The **CONTRACTOR** shall measure pavement surface temperatures one half hour prior to the start of the striping installation activities and as deemed necessary by the Engineer until the end of the application period. For elevation changes greater than 1,000 feet, temperature readings at the highest elevation shall govern unless otherwise directed by the Engineer. The lowest temperature so measured shall govern, unless otherwise directed by the Engineer. The temperature measurements shall be recorded in a log book and provided to the Engineer when required. The pavement surface temperature shall be measured with a standard surface temperature thermometer or a non-contact infrared thermometer.

After installing the asphaltic concrete roadway surface, a cooling down period of at least 12 hours shall be allowed prior to the installation of the pavement markings.

(H) Thermoplastic Application

The thermoplastic pavement marking material shall be extruded or sprayed on to the pavement surface at a material temperature between 400 and 440 degrees F, depending on manufacturer's recommendations, ambient air and pavement temperatures, and the nature of the pavement surface. The **CONTRACTOR** shall verify temperature requirements with a non-contact infrared thermometer as directed by the Engineer.

The alkyd and hydrocarbon thermoplastic material temperatures shall not exceed 450 degrees F. Material temperatures exceeding 440 degrees F shall be allowed for short periods of time; however, in no case shall the material be held for more than four hours at temperatures above 440 degrees F. Total heating time for any batch of material shall not exceed six hours. The **CONTRACTOR** shall note in the temperature log the time when each batch of thermoplastic material is first heated. The start of heating time shall also be marked on the side of the kettle to which it applies.

Specified temperature requirements shall be maintained at all times during application. The **CONTRACTOR** shall monitor material temperature at thirty minute intervals, unless otherwise directed by the Engineer, and maintain a log of temperature readings taken. Readings shall be taken at the melting kettle or the application outlet point, as determined by the Engineer.

The **CONTRACTOR** shall minimize the thermoplastic material remaining in the kettle at the end of the work day and shall blend a minimum of 80 percent fresh material the start of each day. During project delays, the **CONTRACTOR** may transfer heated thermoplastic material into approved containers for later re-use, subject to specified limits on total acceptable heating time for each batch.

Drop-on glass beads shall be mechanically deposited, at the specified rate, into the thermoplastic material immediately after the thermoplastic marking is applied. The bead dispenser shall evenly distribute the beads such that they embed in the surface of the thermoplastic to a depth of between 50 and 60 percent of the bead diameter. If the glass beads do not adhere to the thermoplastic marking, operations shall be stopped until the problem has been corrected. All markings which do not meet the requirements of Subsection 451-2.03(C), as determined by the Engineer, shall be removed by the **CONTRACTOR** and replaced at no additional cost to the Department.

Unless otherwise specified, thermoplastic pavement markings crosswalks, stopbars, holding bars, railroad markings, chevrons, painted hatching, legends, symbols and arrows shall be installed at a thickness of ninety (90) mils. Longitudinal markings, such as lane lines, edge lines, centerlines, taper lines, and bike lane legends, symbols and arrows shall be installed at a thickness of sixty (60) mils. The thermoplastic thickness shall be uniform and consistent throughout the total length of the marking project.

The **CONTRACTOR** shall perform periodic spot checks of thermoplastic material to verify that the required thickness has been attained. Random spot checks of the thermoplastic thickness will be made by the Engineer to ensure conformance with the required criteria. Suggested spot check procedures include the following:

Wet: Thickness can be field tested immediately after the thermoplastic marking is applied by inserting a thin, graduated machinist rule or similar instrument into the molten thermoplastic to the depth of the pavement surface. The thickness is then determined visually by noting on the scale the depth of the penetration or coating of the instrument.

Dried: Thickness can be field tested by placing a small flat sheet of metal with a known thickness immediately ahead of the striping apparatus. After striping, remove the sample and use a suitable measuring device, such as a caliper or micrometer, to determine the thickness of the dried marking.

The finished thermoplastic line shall have well defined edges and be free from waviness. New pavement striping shall not vary more than one half (1/2) inch in fifty (50) feet from the striping plans. Existing pavement markings requiring restripe shall be restriped to completely cover existing markings within one quarter (1/4) inch and be within a longitudinal tolerance of six (6) inches at the beginning and at the end of each stripe.

The longitudinal deviation of a painted segment and gap shall not vary more than six (6) inches in a 40-foot cycle, using a ten (10) foot line with a thirty (30) foot gap between lines. The actual width of the line shall be within the limits specified in the following table, according to the width of line called for on the plans:

Plan Width	Actual Width
4 inches	4 to 4-1/2 inches
8 inches	8 to 9 inches
Over 8 inches	± 1 inch

If a preservative or fog seal is required, sufficient drying time, minimum of forty-eight (48) hours, shall be allowed before applying any pavement markings.

After the forty-eight (48) hour drying time has passed and the seal remains tacky, or excessive oil has risen to the roadway surface, a sand blotter shall be applied to absorb the excess oil. The **CONTRACTOR** shall sweep the roadway surface free of sand prior to pavement marking applications.

If a seal or blotter is applied after the installation of thermoplastic pavement markings, any pavement markings affected by the seal or blotter shall be removed and re-applied at the **CONTRACTOR'S** expense.

After application of sufficient drying time, the thermoplastic marking shall show no apparent deformation or discoloration under local traffic conditions with air and road temperatures ranging from (-)10 to (+) 180 degrees F. The drying time shall be defined as the minimum elapsed time, after application, when the thermoplastic pavement markings shall have and retain the characteristics required herein, and after which the

normal traffic will leave no impression or imprint on the newly applied marking. When applied within the temperature range of 412.5 ± 12.5 degrees F and thickness range of 60 mill to 90 mill, the material shall set to bear traffic in not more than two minutes when the air and pavement surface temperature are 50 ± 3 degrees F, and in not more than 10 minutes when the air and pavement surface temperatures are approximately 90 ± 3 degrees F. The Engineer may conduct field tests in accordance with ASTM D 711 to verify actual drying times.

The thermoplastic shall not be applied over the decorative design in the median.

SUBSECTION 451-4 - Method of Measurement:

Thermoplastic pavement longitudinal and transverse markings, such as edge lines, lane lines, gore lines, cross-walks and stop bars, will be measured by the linear foot along the center line of the pavement marking line and will be based on a four-inch-wide line.

Measurement for striping with a plan width greater or less than the basic four inches as shown on the plans or directed by the Engineer will be made by the same method and then adjusted by the following factor:

$$\frac{\text{Plan Width of Striping (inches) x Linear Feet}}{4 \text{ (inches)}}$$

No measurement will be made of the number of linear feet of gaps in dashed lines.

Double marking lines, consisting of two four-inch-wide stripes, will be measured as two individual marking lines. Crosswalk lines, stop bars, stop lines, gore lines, cross hatch lines, chevron lines and railroad marking transverse lines will be measured for centerline length and adjusted for widths other than four inches, as defined above.

Thermoplastic pavement marking symbols, such as diamonds, or single, double, or triple arrows, will be measured by each unit applied. Each pavement symbol, as shown on the plans, will be considered a unit.

Thermoplastic pavement marking legends, defined as a complete letter grouping such as "SCHOOL," "XING," "STOP," "RR," or "ONLY.", will be measured by each unit applied. Each complete pavement legend, as shown on the plans, will be considered a unit.

No separate measurement will be made for cleaning and preparing the pavement surface, including abrasive sweeping and high-pressure air spray, and for disposal of excess materials, cleaning fluids, and empty material containers, the cost being considered as included in contract items.

Removal of curing compound from new portland cement concrete pavement and the application of primer-sealer, which is to be applied to both old and new portland cement concrete pavement prior to application of thermoplastic marking, shall be measured by the linear foot for striping lines regardless of width, or unit each for symbols and legends, and in accordance with the items of work established in the bid schedule.

SUBSECTION 451-5 -Basis of Payment:

The accepted quantities of thermoplastic pavement markings of the type specified in the bidding schedule, measured as provided above, will be paid for at the contract unit price, complete in place, including pavement surface preparation and glass beads for **ITEM 451.61100 – THERMOPLASTIC, LONG LINE, WHITE, 60 MIL; ITEM 451.61110 – THERMOPLASTIC, LONG LINE, YELLOW, 60 MIL; ITEM 451.61001 – THERMOPLASTIC, SHORT LINE, WHITE, 90 MIL; ITEM 451.60201 – THERMOPLASTIC, ARROWS, WHITE, 90 MIL; and ITEM 451.60401 – THERMOPLASTIC, SYMBOLS, WHITE, 90 MIL.**

The accepted quantities for removal of curing compound from new portland cement concrete pavement and the application of primer-sealer, measured as provided above, will be paid for at the respective contract unit prices for **ITEM 451.60500 – REMOVAL OF CURING COMPOUND/APPLICATION OF PRIMER-SEALER.**

Removal of existing pavement stripes, arrows, legends, symbols and raised pavement markings shall be considered incidental work and shall be included in the unit price for installation of new pavement markings.

Pavement marking stripes will be paid for at the contract unit bid price per linear foot complete in place for the total length of painted lines applied to the nearest foot, including surface preparation. If the Engineer determines that additional striping beyond the project limits are required in order to tie into and meet the existing striping, then this striping will be paid for at the contract unit bid price for the total length of lines applied.

SECTION 453 - RAISED PAVEMENT MARKERS:

SUBSECTION 453-1 - Description:

The work under this section shall consist of cleaning and preparing the pavement surface, furnishing all materials, equipment, tools and labor and placing pavement markers of the type specified at the locations and in accordance with the details shown on the plans and the requirements of these specifications.

SUBSECTION 453-2 - Materials

SUBSECTION 453-2.01 - General:

Certificates of Compliance conforming to the Arizona State Department of Transportation standard specifications for road and bridge construction 1990 edition, subsection 106-05, for raised pavement markers and adhesive, shall be submitted to the Engineer at least 10 days prior to use. A minimum of one sample per lot per type of marker shall be taken by the Engineer. The pavement marker samples shall be tested to determine conformance to the applicable standard drawings and these specifications.

The base of the pavement markers shall be free from glass glaze or from substances which may reduce its bond to the adhesive. The base shall be flat and its deviation from a flat surface shall not exceed 0.05 of an inch.

SUBSECTION 453-2.02 - Reflective Pavement Markers:

Reflective pavement markers shall be of the following type:

Type D	Yellow, two-way
Type G	Clear, one-way
Type H	Yellow, one-way

Reflective pavement markers shall be of the prismatic reflector type consisting of a molded methyl methacrylate or suitably compounded acrylonitrile butadiene styrene (ABS) shell filled with a mixture of an inert thermosetting compound and filler material. The exterior surface of the shell shall be smooth and contain one or two prismatic reflector faces of the color specified.

When illuminated by an automobile headlight, the color of the reflectors shall be an approved clear or yellow as designated. Reflectors not meeting the required color may be rejected.

Permanent reflective pavement markers will be tested for compressive strength, abrasion resistance and specific intensity. Permanent reflective pavement markers shall have thin untempered glass or other abrasion resistant material bonded to the prismatic reflector face to provide an extremely hard and durable, abrasive resistant reflector surface.

The area covered by the glass, or other abrasion resistant surface, shall not be less than 3 sq. in.

The strength by compressive loading shall be at least 2000 pounds for both permanent and temporary reflective pavement markers.

The original specific intensity of each reflecting surface for both temporary and permanent reflective markers shall not be less than the following:

<u>Reflectance</u>	<u>Specific Intensity</u>		
	<u>Clear</u>	<u>Yellow</u>	<u>Red</u>
0 Degrees	3.0	1.8	0.75
20 Degrees	1.2	0.72	0.30

Permanent reflective pavement markers shall be subject to an abrasion resistance test as follows:

Steel Wool Abrasion Procedure - Form a one-inch diameter flat pad using No. 3 coarse steel wool per Federal Specification FF-W1825. Place the steel wool pad on the reflector lens face. Apply a load of 50 pounds and rub the entire lens surface 100

times. After the lens surface has been abraded, the specific intensity of each clear and yellow reflective surface shall be not less than that required above for the original specific intensity.

All reflective pavement markers used shall be Stimsonite 911 or approved equal and shall be non-adhesive with an adhesive surface.

SUBSECTION 453-2.03 - Non-Reflective Pavement Markers

Non-reflective pavement markers shall be, Type A - white

Reflectorized dagmars shall be of the following types:

- Type J white
- Type JY yellow

Non-reflective pavement markers and reflectorized dagmars shall consist of a heat-fired, vitreous ceramic base and a heat-fired, opaque glazed surface which will produce the required properties. Markers shall be produced from any suitable combination of intimately mixed clays, shales, flints, feldspars, or other inorganic material which will meet the properties herein required. Markers shall be thoroughly and evenly matured and free from defects which will affect appearance or serviceability.

The top surface of the marker shall be in reasonably close conformity with the configuration shown on the plans. Markers shall be convex and the radius of curvature shall be between 3-1/2 and six inches, except that the radius of the half inch nearest the edge may be less. All edges shall be rounded and any change in curvature shall be gradual. The top and sides shall be smooth and free of mold marks, pits, indentations, air bubbles, or other objectionable marks or discolorations.

Non-reflective pavement markers and dagmars shall meet the following requirements:

Glaze Thickness, minimum	0.005 inches
Moh Hardness, minimum	6
Directional Reflectance (White Only) minimum Glazed Surface Body of Marker	75 70
Yellowness Index (White Only), maximum: Glazed Surface Body of Marker	0.07 0.12
Color (Yellow Only) Purity, percent, range Dominant Wave Length, mu, range Total Lummosus Reflectance (Y valve), min.	75-96 579-585 0.41
Compressive Strength, pounds, minimum	1,500
Water Absorption, percent, maximum	2.0

Autoclave	Glaze shall not spall, craze or peel
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Reflectorized dagmars shall have encapsulated lens reflectors conforming to standard manufacturing practices.

SUBSECTION 453-2.05 - Bituminous Adhesive:

The bituminous adhesive for pavement markers shall be a hot-melt adhesive manufactured by one of the following approved manufacturers:

Stimsonite Corporation
7542 N. Natchez Avenue
Niles, Illinois 60648

or

Crafco, Incorporated
6975 West Crafco Way
Chandler, Arizona 85226

Materials by manufacturers other than those listed above may be used but must be approved by the Department prior to use.

SUBSECTION 453-3 - Construction Requirements:

The portion of the highway to which the markers are to be attached shall be free of dirt, existing painted lines, curing compound, grease, oil, moisture, loose or unsound layers and any other material which could adversely affect the bond of the adhesive. The method of cleaning the pavement surface and removal of detrimental material is subject to approval by the Engineer and shall include sweeping and the use of high-pressure air spray. On portland cement concrete pavement and old asphaltic concrete pavements, cleaning shall be accomplished by sandblasting, followed by sweeping and/or air blowing. Newly placed asphaltic concrete pavement need not be sandblasted unless, in the opinion of the Engineer, the surface is contaminated with materials that would adversely affect the bond of the adhesive.

The adhesive shall be placed uniformly on the cleaned pavement surface in an amount sufficient to result in complete coverage of the area of contact of the markers, with no voids present and with a slight excess after the markers have been placed. The markers shall be placed in position and pressure applied until firm contact is made with the pavement. The markers shall be protected against impact until the adhesive has set to the degree acceptable to the Engineer.

Excess adhesive on the pavement and on the exposed surfaces of the markers shall be immediately removed. Thinners or solvents which may be detrimental to either the markers or the bond provided by the adhesive shall not be used in removing excess adhesive.

Markers shall not be installed when the temperature of the pavement surface or the atmosphere is less than 40 degrees F, when the relative humidity is 80 percent or higher or when the pavement surface is not dry.

All markers shall be installed to the line approved by the Engineer and in such manner that the reflective face of the markers is perpendicular to a line parallel to the roadway centerline. No pavement markers shall be installed over longitudinal or transverse joints of the pavement surface.

SUBSECTION 453-4 - Method of Measurement:

Pavement markers will be measured as a unit for each marker furnished and placed.

SUBSECTION 453-5 - Basis of Payment:

The accepted quantities of pavement markers, measured as provided above, will be paid for at the contract unit price for the type designated in the bidding schedule, complete in place, including adhesive and surface preparation for **ITEM 453.60000 – TYPE 'D' RPM, ITEM 453.60100 – TYPE 'G' RPM, ITEM 453.60200 – TYPE 'H' RPM, and 453.60800 – 911 - BLUE MARKERS.**

SECTION 455 - PAINT PAVEMENT MARKINGS:

SUBSECTION 455-1 - Description:

The work under this section shall consist of cleaning and preparing the pavement surface, furnishing all materials and applying white or yellow, water-borne, lead-free, rapid-dry traffic paint and reflective glass beads at the locations and in accordance with the details shown on the plans, MUTCD, the requirements of these specifications, or as directed by the Engineer.

The **CONTRACTOR** shall furnish all materials, experienced supervision, labor, equipment, tools, transportation and supplies required to complete the work according to the striping plans, standard specifications and these construction specifications.

SUBSECTION 455-2 - Materials:

SUBSECTION 455-2.01 - Pavement Marking Paint:

(A) General:

All material used in the formulation of the pavement marking paint shall meet the requirements herein specified. Any materials not specifically covered shall meet the approval of the Engineer.

Certificates of Compliance conforming to the requirements of Arizona State Department of Transportation standard specifications for road and bridge construction 1990 edition, subsection 106-05 shall be submitted for each lot or batch of paint prior to its use.

(B) Composition Requirements:

The pavement marking paint shall be a ready-mixed, one component, water-borne, lead-free, rapid-dry traffic line paint, of the correct color, to be applied to either asphaltic or portland cement concrete pavement. The composition of the paint shall be determined by the manufacturer. It will be the manufacturer's responsibility to produce a pigmented water-borne paint containing all the necessary co-solvents, dispersant, wetting agents, preservatives and all other additives, so that the paint shall retain its viscosity, stability and all of the properties as specified herein. The manufacturer shall certify that the product does not contain mercury, lead, hexavalent chromium, toluene, chlorinated solvents, hydrolyzable chlorine derivatives, ethylene-based glycol ethers and their acetates, and not any carcinogen, as defined in 29 CFR 1910.1200. Lead content shall not exceed 0.06 percent of weight of the dry film, and the test for chromium content shall be negative.

No glass beads will be allowed in the pavement marking paint. Glass beads will be applied immediately after the paint has been applied.

(C) Manufacturing Formulations:

The manufacturer shall formulate the pavement marking paint in a consistent manner and notify the Engineer of any change of formulation. The formulation of the paint shall be determined by the manufacturer. It will be the manufacturer's responsibility to formulate paint which will meet the quantitative and qualitative requirements of this specification. Any change in the formulation of the paint must be approved by the Engineer.

(D) Quantitative Requirements of Mixed Paints:

	White	Yellow
Pigment:		
percent by weight, ASTM D3723, allowable variation from qualifying sample	± 2.0	± 2.0
Non-volatile Content:		
percent by weight, ASTM D2369, allowable variation from qualifying sample	± 2.0	± 2.0
Viscosity:		
Kreb Units at 77 ° F. ± 1 ° F., ASTM D562	70 - 85	70 - 85
Weight per Gallon:		
pounds at 77° F. ± 1° F., ASTM D1475, allowable variation from qualifying sample	± 0.3	± 0.3

Vehicle Composition: Vehicle Infrared Spectra, ASTM D2621, allowable variation from qualifying sample	None	None
pH: ASTM E70, allowable variation from qualifying sample	± 1.0	± 1.0
Fineness of Dispersion: HEGMAN, minimum, ASTM D1210	3.0	3.0
Volatile Organic Compounds: pounds per gallon of paint, maximum, ASTM D3960 according to 7.1.2.	2.1	2.1
Flash Point: Degrees F., minimum, ASTM D93, Method A	100	100
Dry time to No Pick Up: with no beads, minutes, maximum ASTM D711	10	10
Dry Through Time: Minutes, ASTM D1640 except no thumb pressure is used when thumb is rotated 90 degrees on paint film	20	20
Flexibility: TT-P-1952B	Pass	Pass

(E) Qualitative Requirements:

(1) Color of Yellow Paint:

The color of the yellow paint shall closely match Federal Standard 595b, Color No. 33538. The color shall be checked visually, and will be checked against Tristimulus Values for the color according to Federal Test Method Standard No. 141.

(2) Dry Opacity:

Dry opacity for the paint will be determined using a black-white Leneta Chart, Form 2C Opacity and a Photovolt 577 Reflectance Meter or equal. Using a 10 mil (0.25 mm) gap doctor blade, a film of paint is drawn down, covering both black and white portions

of the chart. The film shall be allowed to dry 24 hours. After calibrating the Reflectance Meter according to the manufacturer's instructions, measure the reflectance over the white and black portions with the green Tristimulus filter. Dry opacity is calculated as follows:

Reflectance over black/reflectance over white = Dry Opacity

Dry Opacity for both white and yellow paint shall be a minimum 0.90.

(3) Yellowness Index:

Yellowness Index for white paint will be determined as described for dry opacity, only use a 15 mil (0.4 mm) gap doctor blade to draw down the paint. After 24 hours for drying, measure the reflectance of the paint film, using the green, blue and amber Tristimulus filters. Calculate the Yellowness Index as follows:

$$\text{Yellowness Index} = \frac{\text{Amber - Blue}}{\text{Green}} \times 100$$

Yellowness Index for the white paint shall be a maximum of 10.

(4) Reflectance:

Reflectance for both white and yellow paint will be determined using the same 15 mil draw down film as for the Yellowness Index. For white paint the same sample may be utilized for both the Yellowness Index and Reflectance. Measure the reflectance of the paint film, using the green Tristimulus filter. Reflectance for the white paint shall be a minimum of 85. Reflectance for the yellow paint shall range from 42 to 59, inclusive.

(5) UV Color Durability:

UV Color Durability shall be determined using a QUV Weatherometer, with Ultra Violet Light and Condensate Exposure according to ASTM G53, for 300 hours total. The repeating cycle shall be 4 hours UV exposure at 60° C. followed by 4 hours condensate exposure at 40° C. After 300 hours of exposure, the Yellowness Index for white paint shall not exceed 12, and yellow paint must closely approximate Federal Standard 595b, Color No. 33538.

(6) Static Heat Stability:

To determine static heat stability for the paint, place 1 pint (1/2 liter) of paint in a sealed can and heat in an air circulation oven at 120° F. ± 1° F. for a period of one week. Remove the paint from the oven and check the viscosity in Krieb Units at 77° F. ± 1° F. according to ASTM D562. The viscosity measured must be in the range from 68 to 90, inclusive. Also, check for any signs of instability.

(7) Heat-Shear Stability:

To determine heat-shear stability for the paint, one pint (1/2 liter) of the paint is sheared in a Waring Blender at high speed to 150° F. The blender should have a tight fitting lid taped onto it to minimize volatile loss. When the paint reaches 150° F., stop the blender and immediately pour the paint into a sample can and apply a cover to seal the can. Let the paint cool overnight and examine for jelling or other signs of instability. Measure viscosity in Kreb Units at 77° F. \pm 1° F. according to ASTM D562.

The viscosity measured must be in the range from 68 to 95 inclusive. If not within the upper limit, run total solids on the sheared paint and adjust solids, if necessary, by adding water to reach the original solids content. If the solids content required adjustment, again check the viscosity of the paint. The viscosity must be in the range from 68 to 95 inclusive.

(8) Scrub Resistance:

Scrub Resistance will be determined according to ASTM D2486. Use an appropriate doctor blade to provide a dry film thickness of 3 to 4 mils. Allow the paint to cure for 24 hours. Perform the scrub resistance test at 77° F. \pm 1° F. and 50 \pm 5% humidity. Record the number of cycles to remove the paint film. The number of cycles recorded must be a minimum of 800.

(9) Spraying Properties:

The paint shall be applied at a 15 mils wet film thickness in the field. The paint shall show the following properties at ambient temperatures of 50° F. to 100° F. with a paint spray temperature of 150° F., maximum, and 6 to 8 lbs. of post-applied glass beads per gallon of paint. Beads shall conform to Subsection 708-2.02 of the Standard Specifications.

- (a) Dry to a no track condition in 5 minutes or less when the line is crossed over in a passing maneuver with a standard sized automobile.
- (b) Produce a clean-cut, smooth line with no overspray or puddling.
- (c) Paint shall accept glass beads so that the spheres shall be embedded into the paint film to a depth of 50% of their diameter.
- (d) Paint when heated to the temperature necessary to obtain the specified dry time, shall show no evidence of instability such as viscosity increase, jelling or poor spray application.

(10) Freeze-Thaw Properties:

The paint viscosity or consistency shall not change significantly when the paint is tested for resistance to five cycles of freeze-thaw according to ASTM D2243.

(11) Road Service Rating:

Test stripes of the paint shall be applied transversely across the road, 4 inches in width and approximately 12 ft. long at a location approved by the Engineer.

Wet film thickness of the test stripes shall be approximately 15 mils as determined according to ASTM D4414 and ASTM D713 prior to test stripe application. To aid in obtaining the correct film thickness, a length of roofing paper placed by the side of the road can be used. Place a rigid metal test panel on the roofing paper in the path of a test line. Immediately after the test line is applied by the striper, measure the wet film thickness. If not satisfactory, adjust the spray pressure and repeat until the target wet film thickness is attained. It is important that no glass beads be present that would give a false wet film thickness. When the wet film thickness is correct, apply a test line across a tarred metal test panel. After this, apply another test line across a different torn metal test panel, this time also adding the beads. These samples are necessary to determine the initial bead retention.

Glass beads conforming to the requirements of Subsection 708-2.02 of these specifications (moisture proof type) will be applied after the paint has been applied, but during the same striping operation at a rate such that the initial bead retention on the test line is a minimum of 0.72 kilograms of beads per liter of wet paint. The initial bead retention will be determined analytically by the ADOT Materials Group concurrently with the determination of the dry paint thickness utilizing tarred metal test panels. The paint shall accept the glass beads so that the spheres are embedded into the paint film to a depth of 50 percent of their diameter. Test stripes will be observed for a period of 180 days from date of application. Paints will be evaluated for wear according to ASTM D 913.

After 180 days of service, on a scale of 0 to 10, paints must have a rating of No. 7 or better to be acceptable. All ratings will be taken in the wheel track area. Glass beads shall show no more than a 30% loss after 180 days of test. This will be determined by taking close-up photographs of the paint film and by count, determining the average bead loss.

The road service test may be waived at the option of the Engineer or evaluated for a period of time less than 180 days.

(12) Workmanship:

Paint shall be free from foreign materials, such as dirt, sand, fibers from bags, or other material capable of clogging screens, valves, pumps, and other equipment used in a paint striping apparatus.

The paint pigment shall be well ground and properly dispersed in the vehicle. The pigment shall not cake or thicken in the container, and shall not become granular or curdled. Any settlement of pigment in the paint shall result in a thoroughly wetted, soft mass permitting the complete and easy vertical penetration of a paddle. Settled pigment shall be easily redispersed, with minimum resistance to the sidewise manual motion of a paddle across the bottom of the container, to form a smooth uniform

product of the proper consistency. If the paint cannot be easily redispersed, due to excessive pigment settlement as described above, or due to any other cause, the paint shall be considered unfit for use.

The paint shall retain all specified properties under normal storage conditions for 8 months after acceptance and delivery. The **CONTRACTOR** shall be responsible for all costs and transportation charges incurred in replacing paint that is unfit for use. The properties of any replacement paint, as specified herein, shall remain satisfactory for 8 months from the date of acceptance and delivery.

(F) Manufacturing Requirements:

(1) Inspection:

The manufacturer of the paint shall advise the Engineer when paint is to be manufactured and shall furnish the Engineer free access to all parts of the plant involved in the paint manufacture and shall furnish every reasonable facility for sampling both the paint and the raw materials during the process of manufacturing.

All materials used in formulation shall meet the requirements herein specified. Any materials not specifically covered shall meet the approval of the Engineer.

All manufactured paint shall be prepared at the factory ready for application.

When paint is shipped to a distributor or paint applicator who will store the paint prior to its use, the distributor or paint applicator shall furnish the Engineer free access to all parts of the facility where paint is stored and shall furnish every reasonable facility for sampling the paint.

Paint shall normally be sampled at the place of storage either at a warehouse or on the site prior to application of the paint. Application of the paint will not be permitted until the paint has been approved by the Engineer. It is the **CONTRACTOR'S** responsibility to notify the Engineer a minimum of 14 working days prior to any traffic painting operation and to allow access at that time for paint sampling at the storage location.

A minimum of one paint sample shall be obtained from each lot of paint.

Samples of finished paint, while being applied, will be taken at intervals as determined by the Engineer.

(2) Testing:

All tests will be conducted in accordance with the latest test methods of the American Society for Testing and Materials, Federal Test Method Standard No. 141, and methods in use by Materials Group, Highways Division, Arizona Department of Transportation as specified herein.

Evidence of adulteration or improper formulation shall be cause for rejection.

(3) **Packaging:**

All shipping containers for paint must comply with the Department of Transportation Code of Federal Regulations, Hazardous Materials and Regulation Board, Reference 49 CFR. The container and lids must be lined with a suitable coating so as to prevent attack by the paint or by agents in the air space above the paint. The lining must not come off the container or lid as skins.

Containers shall be colored white, including lids, and containers shall have an identifying band of the appropriate color around and within the top one third of the container.

All containers shall be properly sealed with suitable gaskets and shall show no evidence of leakage and shall remain in satisfactory condition for a period of 12 months after delivery to a distributor or paint applicator. The **CONTRACTOR** shall be held responsible for all costs and transportation charges incurred in replacing paint and containers.

(4) **Marking:**

All containers of paint shall be labeled showing the manufacturer's name, date of manufacture, paint color, product code, manufacturer's batch number, and quantity or weight of paint on both the side of the container and also the lid. Containers shall be clearly marked or labeled Rapid or Fast Dry lead-free Water-Borne Traffic Paints.

All containers of paint shall be labeled to indicate that the contents fully comply with all rules and regulations concerning air pollution control in the State of Arizona, Maricopa County.

The manufacturer of the paint shall be responsible for proper shipping labels with reference to whether the contents are toxic, corrosive, flammable, etc., as outlined in the Code of Federal Regulations, Hazardous Materials and Regulations Board, Reference 49CFR.

(5) **Unused Paint:**

Disposal of unused quantities of traffic paint shall be the responsibility of the **CONTRACTOR** and must meet all applicable state and Federal regulations for waste disposal. Paint which is saved to be used later shall be packaged as specified previously and shipped to a storage location. Unused paint must be identified on the container. Unused paint may be utilized on a future project provided the paint still conforms to all specifications contained herein.

SUBSECTION 455-2.02 - Reflective Glass Beads (Spheres):

(A) General:

The term "glass bead" shall be synonymous with the term "glass sphere" as used herein.

The beads shall be manufactured from glass of a composition designated to be highly resistant to traffic wear and to the effects of weathering.

The glass beads shall be moisture-proof, contain less than 1/4 of one percent moisture by weight, and be free of trash, dirt, or other deleterious materials.

Beads shall be essentially free of sharp angular particles showing milkiness or surface scoring or scratching. Beads shall be water white in color.

(B) Physical Requirements:

(1) Gradation:

When tested by the method provided in ASTM D 1214 (by use of US Standard Sieves) the grade sizes of the beads shall be as follows:

Size of Sieve	Percent Passing
No. 30	100
No. 50	15 - 35
No. 70	0 - 15
No. 100	0 - 5

(2) Roundness:

When tested by the method provided in ASTM D-1155 (Procedure B except paragraphs (F) and (G) are deleted) beads retained on any screen specified in the gradation requirements shall contain a minimum of 75% true spheres.

(3) Index of Refraction:

When tested by a liquid immersion method at a temperature of 25 °C, the beads shall have an index of refraction of 1.50 to 1.57.

(4) Specific Gravity:

The specific gravity of the beads shall be in the range 2.40 to 2.60 when tested in accordance with the following procedures:

Place 100 grams in an oven at 110 °C for one hour.

Remove beads and place in a desiccator until the sample is cool.

Remove approximately 60 grams of beads from the desiccator and weigh the sample accurately.

Pour the beads slowly in a clean 100-milliliter graduated cylinder containing 50 milliliters of isopropyl alcohol. Make certain that air is not entrapped among the beads.

The total volume, minus 50, will give the volume of the beads.

Calculate the specific gravity as follows:

$$\text{Specific Gravity} = \frac{\text{Weight of sample}}{\text{Volume of the sample}}$$

(5) Chemical Stability:

Beads which show any tendency toward decomposition, including surface etching, when exposed to atmospheric conditions, moisture, dilute acids, or alkalis or paint film constituents, may be required to demonstrate satisfactory reflectance behavior, prior to acceptance, under such tests as may be prescribed.

(C) Moisture Proofing:

All glass beads shall have a moisture-proof overlay consisting of water repellent material applied during the process of bead manufacture. The beads so treated shall not absorb moisture in storage and shall remain free of clusters and lumps and shall flow freely from dispensing and testing equipment.

The beads shall pass the test for water repellency and free flow using the following equipment:

(1) Test bag:

The bag used is approximately 10-1/2 inches by 17-1/2 inches after sewing. The material used in the construction of the bag is unbleached cotton sheeting with a thread count of 48 by 48. The material before sewing is approximately 18 inches by 22 inches. The cloth is folded in half lengthwise and stitched in the shape of an "L" with the short side left open at the top. The material can be obtained from selected manufacturers of cloth and paper packaging. The finished bag may also be obtained from the manufacturer of the glass beads.

Newly fabricated bags must be thoroughly washed with hot water and detergent and rinsed before use to remove the sizing which may be present in the cloth. Subsequent to the initial washing, the bags need only be rinsed clean of beads from previous tests and dried thoroughly before use.

(2) Funnel:

The funnel used is a standard laboratory funnel with a top opening diameter of 125- and 150-millimeter stem length. The inside diameter of the stem is between nine and 10 milliliters. This funnel is available from most laboratory glassware supply houses. Coming No. 6100 or equal.

(3) Ring Stand and Clamp.

(4) Balance accurate to 0.1 grams.

(5) Distilled water.

MOISTURE TESTING PROCEDURE:

Glass beads shall be tested for compliance to specification requirements. Testing shall be conducted at standard conditions of temperature ($25 \pm \text{one } ^\circ\text{C}$) and humidity (50 ± 5 percent R.H.) and shall consist of the following procedure or an approved alternate:

Weigh 900.0 grams of glass beads into a clean, dry, flat-bottomed pan.

Dry beads at $150 ^\circ\text{C}$ for two hours.

Cool beads to room temperature ($25 \pm \text{one } ^\circ\text{C}$) in a desiccator.

Using the clean, pre-washed bag described under apparatus section, turn the bag inside-out so that the sewn seam and seam-allowance are on the outside.

Quantitatively transfer the beads into the inverted cotton bag.

Grasp the gathered top of the bag with one hand and lower the bag into a container of distilled water until the beads are approximately one inch below the water level. The container shall be of such dimensions that the bag does not contact the bottom or sides during immersion. Each bag shall be immersed individually. Do not allow one bag to contact another if multiple tests are run.

Remove the bag after 30 seconds of immersion time.

Cradle the bottom of the bag uniformly in the palm of one hand and twist the top neck of the bag until the twisted bag is compressed firmly against the beads. Twist until excess water no longer drips from the bag.

After the excess water has been squeezed from the bag, allow the bag to unwind.

Gather the top of the bag and clamp. Suspend the bag on a ring stand or other support such that the bottom or sides of bag do not contact the support.

After a standing time of two hours at room temperature (25 ± 1 °C), remove bag from support. Mix sample thoroughly by holding the bottom seam allowance in one hand and gathered neck of the bag in the other, invert bag and shake up and down five times.

Transfer the Sample into a clean, dry funnel of the type described under apparatus. if consecutive tests are run, be sure the funnel is clean, dry and free of beads from prior tests.

The entire sample shall flow through the funnel without stoppage.

At the start of the test only, it is permissible to lightly tap the stem of the funnel to initiate flow.

Small quantities of beads which have adhered to the side of the funnel or stem shall not be cause for failure.

SUBSECTION 455-3 - Construction Requirements:

SUBSECTION 455-3.01 - Equipment:

The traffic paint and beads shall be placed on the pavement by a spray-type, self-propelled pavement marking machine except that temporary striping during construction may be placed with other equipment designed for application of paint and beads with the approval of the Engineer

The application equipment to be used on roadway installation shall have, as a minimum, the following characteristic and/or apparatus:

The machine shall be capable of applying a clear-cut four-inch line or lines as per widths specified on the plans.

The machines shall be equipped with a mechanical device capable of placing a broken reflectorized line with a 10-foot painted segment and a 30-foot gap.

The machine shall be equipped with an air-operated glass bead drop-in dispenser controlled by the spray gun mechanism.

A glass bead dispenser which is capable of placing the glass beads into the paint line as the paint is applied to the pavement shall be utilized. This dispenser shall provide satisfactory marking and delineation.

SUBSECTION 455-3.02 - Obliteration of Existing Pavement Markings:

Pavement marking obliteration shall be accomplished by the **CONTRACTOR** as indicated on the plans or as directed by the Engineer. Obliteration of all existing pavement markings shall be considered incidental work and shall be included in unit bid price for installation of new pavement markings.

Pavement markings shall be removed to the fullest extent possible from the pavement by any method that does not materially damage the surface or texture of the useable pavement. Sandblasting, using air or water, is an acceptable method for removing pavement markings, however, other methods may be approved by the Engineer. Overpainting of markings with paint or asphalt will not be permitted.

Sand or other material deposited on the pavement as a result of removing pavement markings shall be removed as the work progresses. Accumulations of sand or other material, which might interfere with drainage or might constitute adverse safety conditions to traffic, will not be permitted.

Where blast cleaning is used for the removal of pavement markings or for removal of objectionable material, the residue including dust shall be removed immediately after contact between the sand and the surface being treated. Such removal shall be by a vacuum attachment operating concurrently with the blast cleaning operation, or by other methods approved by the Engineer. Blasting shall not be used within 12 feet of a lane occupied by public traffic.

Any damage to the pavement caused by pavement marking removal shall be repaired by methods acceptable to the Engineer. When asphalt slurry is used to repair damage to the pavement caused by pavement marking removal or the obliteration of the marks remaining after the markings have been removed, the asphalt slurry shall be placed parallel to the new direction of travel and shall be not less than two feet in width.

SUBSECTION 455-3.03 - Application:

(A) Pavement Surface

Pavement marking shall be applied when the pavement surface is dry and the weather is not foggy, rainy, or otherwise adverse to the application of markings. The **CONTRACTOR** shall remove all dirt, grease, oil or other detrimental material from the road surface prior to the application of the paint. Any area that cannot otherwise be satisfactorily cleaned shall be scrubbed with a biodegradable chemical. The method of cleaning the surface is subject to approval by the Engineer and shall include sweeping and the use of high-pressure air spray.

(B) Placement Locations:

Pavement markings shall be positioned as defined on the plans and in the specifications. When it becomes necessary for proper installation, the Engineer may revise individual marking locations as necessary.

The **CONTRACTOR** shall spot mark the entire project at ten (10) foot intervals in conformance with the striping plans. Removal of existing pavement markings shall be completed prior to the spot marking. Upon completion of the spot marking, the **CONTRACTOR** shall notify the Engineer that the project is ready for inspection. **ENGINEER** will conduct an inspection after the spot marking is completed, within three (3) working days from notification of contractor.

Approval of the spot marking shall not relieve the **CONTRACTOR** from obtaining a final inspection. Upon final inspection, if the Engineer decides that more than one coat is required, it will be done at the **CONTRACTOR'S** expense.

The final striping inspection will be made by the Engineer within three (3) working days after all pavement markings and markers have been installed.

The Striping in the field may exceed the construction project limits in order to match and tie into the existing striping. Contractor shall perform a field inspection and determine if the striping exceeds the construction project limits.

If a conflict exists between actual field conditions and the pavement marking plans, the **CONTRACTOR** shall cease work and notify the Engineer immediately.

(C) Pavement Temperature

Painting shall not be performed when the atmospheric temperature is below 50° F. when using water-borne paint, nor when it can be anticipated that the atmospheric temperature will drop below said 50° F. temperatures during the drying period. Water-borne paints shall not be applied if rain is expected within one hour of its application, unless otherwise approved by the Engineer. Water-borne paint shall not be heated to a temperature greater than 150° F. to accelerate drying.

After installing the asphaltic concrete roadway surface, a cooling down period of at least 12 to 24 hours shall be allowed prior to the installation of the pavement markings

(D) Paint Application

The **CONTRACTOR** shall provide the necessary personnel and equipment to divert traffic from the installation area where the work is in progress and during drying time when, in the opinion of the Engineer, such diversion of traffic is necessary.

The volume of paint in place shall be determined by measuring the paint tank with a calibrated rod. At the option of the Engineer, if the striping machine is equipped with air-atomized spray units (not airless) and paint gauges, the volume of paint may be determined by utilizing said gauges.

The quantity of glass reflectorizing beads in place shall be determined by measuring the glass reflectorizing bead tank with a calibrated rod.

The paint shall not bleed, curl, or discolor when being applied to the roadway surface. If bleeding, curling or discoloration occurs, the unsatisfactory areas shall be given additional coats of paint to correct the problem. In the event that the additional coats are not sufficient, the Engineer will determine what method of correction may be used. Such corrections will be at the **CONTRACTOR'S** expense.

The paint shall not be applied over the decorative design in the median.

If a seal is required, sufficient drying time, minimum forty-eight (48) hours, shall be allowed before applying any pavement markings.

After the forty-eight (48) hour drying time has passed and the seal remains tacky, or excessive oil has risen to the roadway surface, a sand blotter shall be applied to absorb the excess oil. If the seal remains tacky, no pavement markings shall be applied.

If a seal blotter is applied after the installation of pavement markings, then all markings affected shall be removed and re-applied at the **CONTRACTOR'S** expense.

(E) Tolerances for Placing Paint, Beads, and Primer:

The length of painted segment and gap shall not vary more than six inches in a 40-foot cycle.

The finished line shall be smooth, aesthetically acceptable and free from undue waviness.

Painted lines shall be four, eight, or 12 inches wide as shown on the plans with a tolerance of plus or minus 1/8-inch and shall be placed at a minimum rate of 16 gallons per mile for a solid four-inch line and four gallons per mile for a broken four-inch line, based on a 10-foot stripe and a 30-foot gap (40-foot cycle aggregate).

New pavement striping shall not vary more than one half (1/2) inch in fifty (50) feet from the striping plans. Existing pavement markings requiring re-stripe shall be restriped to completely cover existing markings within one quarter (1/4) inch and be within a longitudinal tolerance of six (6) inches at the beginning and at the end of each stripe.

Glass reflectorizing beads shall be applied on the wet paint at a minimum rate of six pounds to each gallon of paint.

Wet mil thickness shall not be less than 15 mils.

SUBSECTION 455-4 - Method of Measurement:

Pavement marking paint will be measured by the linear foot along the centerline of the pavement stripe. Skips in dashed lines will not be included in the measurement. Length of pavement markings will be based on four inch wide stripe. Measurement for striping with a plan width greater or less than the basic four inches as shown on the plans or directed by the Engineer will be made by the following method:

$$\frac{\text{Plan Width of Striping (inches) x Linear Feet}}{4 \text{ (inches)}}$$

Symbols, legends, painted medians, painted curbing, and painted islands will be measured by each unit applied. Each legend, regardless of the number of letters, will be considered as a single unit.

SUBSECTION 455-5 -Basis of Payment:

Pavement striping of the type specified, measured as provided above, will be paid for at the contract price per linear foot for the total length of painted line applied to the nearest foot, which price shall be full compensation for the work complete, including glass beads, as described and specified herein and on the project plans.

Pavement symbols, legends, painted medians, painted curbing, and painted islands measured as provided above, will be paid for at the contract price for each item painted, which price shall be full compensation for the work complete, including glass beads, as described and specified herein and on the project plans.

ITEM 455.60610 – PAINT, ISLAND, YELLOW

SECTION 466 - DELINEATORS AND MARKERS:

SUBSECTION 466-1 -Description:

The work under this section shall consist of furnishing and installing delineators, reference markers, and object markers in conformance with the details shown on the plans and in accordance with the requirements of these specifications.

The types of delineators and markers to be installed and the locations will be shown on the project plans.

SUBSECTION 466-2 -Materials:

SUBSECTION 466-2.01 - General:

Certificates of Compliance conforming to the requirements of Arizona State Department of Transportation standard specifications for road and bridge construction 1990 edition, subsection 106-05 shall be submitted.

SUBSECTION 466-2.02 - Metal Posts:

Posts for delineators and for all markers shall conform to the details shown in the project plans.

SUBSECTION 466-2.04 - Metal Plates:

Metal plates for the various types of object markers shall conform to the details shown on the plans and shall be fabricated in one piece from 0.063-inch thick aluminum-alloy sheet 3003-H 14, 5052-H 38 or 6061-T 6, all conforming to the requirements of ASTM B 209.

SUBSECTION 466-2.06 - Retroreflective Sheeting:

Retroreflective sheeting for delineators and markers shall be at least of Engineering grade or as specified on the plans.

SUBSECTION 466-2.07 - Prismatic Reflectors:

The type of prismatic reflectors to be used shall be as specified on the plans.

SUBSECTION 466-2.08 - Hardware:

Steel bolts and nuts of the types shown on the plans shall be galvanized in accordance with the requirements of ASTM A 153 or shall be cadmium plated in accordance with the requirements of ASTM A 165.

SUBSECTION 466-3 - Construction Requirements:

Metal posts shall be cut and perforated to the sizes and shape shown on the plans. The finished posts shall be straight with a permissible tolerance in straightness of 1/16 inch per three feet of post length.

Posts on which galvanizing has been damaged in transporting, handling or erecting shall be repaired by the **CONTRACTOR** at his expense.

Metal plates shall be cut to size and shape and the holes punched for mounting all in accordance with the details shown on the plans. The surfaces and edges of the plates shall be free of buckles, warps, dents, cockles, burrs and defects resulting from fabrication.

Posts shall be set vertically to line at the locations designated on the plans. Posts shall be set firmly in the ground by a method that will not bend the post or deface the top of the post. If ground conditions are such that the posts cannot be driven without damaging the posts, pilot holes shall be required. Metal plates shall be installed after the posts have been set in place.

Posts shall be placed in the ground to the depth shown on the plans.

Existing markers and delineators that are to remain in place and which have been damaged by the **CONTRACTOR** shall be replaced with new ones at his expense.

SUBSECTION 466-4 - Method of Measurement:

Delineators and markers will be measured by the unit for each type of delineator and marker furnished and installed.

SUBSECTION 466-5 - Basis of Payment:

Placement of barrier and guardrail markers as noted in the plans shall be considered incidental to the cost of guardrail and concrete barrier transitions and the cost shall be included in items in Section 415.

SECTION 470 - TRAFFIC SIGNAL AND INTERSECTION LIGHTING GENERAL REQUIREMENTS:

SUBSECTION 470.1 - DESCRIPTION: It is the purpose of this section to provide general information necessary for completion of the installation of traffic signals and intersection lighting in accordance with the details shown on the Traffic Signal Plan, Traffic Signal Standard Drawings, Maricopa Association of Governments (MAG) Uniform Standard Specification for Public Works Construction, and the requirements of these specifications.

All electrical systems and appurtenances shall be complete, functional and in operating condition at the time of acceptance.

SUBSECTION 470.2 - MATERIALS AND EQUIPMENT REQUIREMENTS: These specifications outline the material and equipment requirements, method of measurement, and basis of payment for the work performed.

SUBSECTION 470.3 - SCOPE OF WORK:

SUBSECTION 470.3.01 - General: With reference to MAG Subsection 104.1.1, the **CONTRACTOR** shall furnish labor and supervision with experience in the construction of the traffic signals and all materials, equipment, tools, transportation and supplies required to complete the work in an acceptable manner; and in full compliance to these specifications, terms of the contract, the Traffic Signal Plan and special provisions.

CONTRACTOR shall have on the work site at all times a competent supervisor capable of reading and thoroughly understanding the plans and specifications and thoroughly experienced in the construction of traffic signals. Unless waived by the special provisions, the **CONTRACTOR's** supervisor shall possess an International Municipal Signal Association (IMSA) Level II Traffic Signal Electrician Certification.

SUBSECTION 470.4 - CONTROL OF WORK:

SUBSECTION 470.4.01 - Traffic Signal Plan: The Traffic Signal Plan will graphically describe the location of signal component parts, the equipment and materials to be used, and the way the traffic signal is to be constructed. The plans shall be supplemented by the Traffic Signal Standard Drawings or any other drawing(s) deemed necessary for the completion and control of the work.

Where dimensions on the plans are given or can be computed from other given dimension they shall govern over scaled dimension.

After completion of the project, the **CONTRACTOR** shall provide the **ENGINEER** with a set of as-built drawings on clean prints of the original drawings. The as-built drawing shall indicate in a neat and accurate manner all changes and revisions in the original design. As-built drawings shall be submitted before final payment for completed work will be made.

SUBSECTION 470.4.02 – Cooperation With Utility Companies: The following requirements shall apply in addition to the requirements of MAG subsection 105.6. An attempt has been made by the **ENGINEER** to identify the location of all underground utilities located within the perimeter of the site and to design the location of all traffic signal facilities to avoid interference with existing utilities. Relocation or adjustment of utilities or other facilities shall be made as deemed necessary prior to start of contract.

CONTRACTOR is solely responsible for any damage to existing utilities resulting from the **CONTRACTOR's** operation at the site.

In addition to the requirements of MAG Section 107 the use of hand tools (pothole) to expose a marked facility is required when proposed excavation is within the two (2) foot tolerance zone of a marked facility, or if uncertainty exists as to the exact location of a facility.

CONTRACTOR shall call The Blue Stake Center for a "blue stake" prior to any construction on the site. The "blue stake" shall be continuously updated during the construction of the traffic signal until all underground facilities have been completed.

With reference to MAG Subsection 107.5, the **CONTRACTOR's** construction equipment and personnel are required to maintain a minimum of ten (10) feet working clearance from energized aerial electrical power lines (See OSHA std. 1926.550 (a)15 and Arizona Revised Statutes 40.360.41 through 45.). When it is necessary to work less than ten (10) feet from energized power lines the **CONTRACTOR** must notify the appropriate utility company and make necessary arrangements which will insure adequate protection of personnel, equipment and the utility company power lines. The cost of such temporary arrangement will be borne by the **CONTRACTOR**.

SUBSECTION 470.4.03 – Maintenance During Construction: In addition to the requirement of MAG Subsection 105.12 all excavations required for the installation of foundations and other items shall be performed in such a manner as to avoid any unnecessary damage to streets, sidewalks, landscaping, and other improvements. All surplus excavated material shall be removed and properly disposed of within 48 hours by the **CONTRACTOR**, as required by the **ENGINEER**. At the end of each working period, all excavations shall be barricaded, or covered, or both, to provide safe passage for pedestrian and vehicular traffic.

Sidewalks, curbs, gutters, pavement, lawns, plants, and any other improvements removed, broken, or damaged by the **CONTRACTOR's** operation shall be replaced or reconstructed as requested by the **ENGINEER** and at the expense of the **CONTRACTOR**.

SUBSECTION 470.5 - CONTROL OF MATERIAL AND EQUIPMENT:

SUBSECTION 470.5.01 – Source of Supply: **CONTRACTOR** shall furnish all traffic signal material and equipment required to complete the work, except materials and equipment designated in the special provisions to be furnished by Maricopa County Department of Transportation and the City of Goodyear.

SUBSECTION 470.5.02 – Quality Requirements: Only materials and equipment conforming to the requirements of these specifications shall be incorporated into the work. Material and equipment shall be new except as may be provided in the special provisions.

Maricopa County Department of Transportation reserves the right to reject proposed traffic signal material or equipment if, in the judgment of the **ENGINEER** any or all the following may apply:

- 1) The equipment does not meet the requirements of these specifications.
- 2) The material or equipment is not in the best interest of Maricopa County Department of Transportation and the public.
- 3) The material or equipment past field performance has been unsatisfactory.
- 4) The material or equipment is not compatible with the material or equipment presently in use which may cause the need to purchase additional spare parts, provide additional training, and/or long term maintenance problems.

In addition, Maricopa County Department of Transportation reserves the right to pre-approve traffic signal material and equipment by brand name model or part number which in the judgment of the **ENGINEER** meets the intended purpose of these specifications. Pre-approved items will be listed in the special provisions or bid package. Bidders seeking to provide equipment and materials which have not previously been approved shall submit an approval request to the **ENGINEER** prior to the date of bid opening. Rejection or pre-approval of traffic signal material and equipment by the **ENGINEER** shall be final.

SUBSECTION 470.5.03 – Approval of Material and Equipment: All traffic signal materials and equipment shall be approved by **ENGINEER** prior to incorporation in the work. Any work in which materials or equipment not previously approved are used shall be performed at the **CONTRACTOR's** risk and may be considered as unauthorized and unacceptable and not subject to the payment provisions of the contract. Such materials or equipment may be subject to removal at the discretion of the **ENGINEER**.

Before ordering or installing any material or equipment, the **CONTRACTOR** shall submit six (6) copies of each proposed material and/or equipment list, including shop drawings to MCDOT at the pre-construction conference for approval by the **ENGINEER**.

To be acceptable, the list shall be complete and contain all items supplied on the project by the **CONTRACTOR**. All items on the list shall be identified by manufacturer's part number, model, specification or other pertinent catalogue information. Three (3) copies will be returned to the **CONTRACTOR** for further action.

Any equipment or material specified by these specifications, on signal plans, or other drawings, by brand name, part number, or model number are intended to be descriptive of the type and quality of material or equipment desired. Another equal brand name,

part number, or model number may be substituted so long as it is in accordance with these specifications and is equal in form, fit, function, performance, reliability, and is approved by the **ENGINEER**.

SUBSECTION 470.5.04 - Warranties and Guaranties: In addition to the requirement of MAG Subsection 108.8 manufacturers warranties and guaranties furnished for material and equipment used in the work, shall be delivered to the **ENGINEER** prior to acceptance of the project.

SUBSECTION 470.5.05 - Regulations and Codes: All electrical equipment shall conform to the standards of the National Electrical Manufacturers Association (NEMA), National Electric Safety Code (NESC), Underwriters' Laboratory Inc. (UL), when applicable. All material and workmanship shall conform to the requirements of the National Electric Code (NEC), Illumination Engineers Society (IES), Standards of the American Society for Testing and Materials (ASTM), Maricopa Association of Governments (MAG), requirements of the Traffic Signal Plan, these specifications, the special provisions, and to any other codes, standards, or ordinances which may apply. Whenever references are made to any of the standards mentioned, the reference shall be intended to mean the code, ordinance, or standard that is in effect at the time of the bid advertisement.

SUBSECTION 470.6 - REMOVAL AND SALVAGE OF EXISTING FACILITIES: All removals shall be done in accordance with MAG specifications, Section 350, and as shown in the plans. The two wooden traffic signal pole and equipment located at the intersection of MC 85 and Estrella Parkway shall be salvaged and delivered to the MCDOT warehouse. The **CONTRACTOR** shall notify the **ENGINEER** forty-eight (48) hours in advance of the intended date of delivery. All salvaged material shall be delivered to the following address:

Maricopa County Department of Transportation Warehouse
2222 South 27th Avenue
Phoenix, Arizona 85009-6357

SUBSECTION 470.6.01 - Method of Measurement: The cost of the removal, salvaging and delivery of existing facilities will be measured on a lump sum basis.

SUBSECTION 470.6.02 - Basis of Payment: Removal and salvaging of existing facilities, measured as provided above, will be paid for at the contract lump sum price, which price shall be full compensation for **ITEM 470.00000 - REMOVE AND SALVAGE TRAFFIC SIGNAL**

SUBSECTION 470.7 - PROSECUTION AND PROGRESS OF WORK:

SUBSECTION 470.7.01 - Pre-Construction Conference: **CONTRACTOR** shall meet with the **ENGINEER** for a pre-construction conference prior to commencing work. At this time the **CONTRACTOR** shall submit a progress schedule showing the order in which he proposes to carry out the work, the dates on which he will start the work including procurement of materials and equipment, and other dates required for the review and approval of the **ENGINEER**.

SECTION 471 ELECTRICAL UNDERGROUND INSTALLATION:

SUBSECTION 471.1 - DESCRIPTION OF WORK: The work under this section shall consist of furnishing and installing electrical conduit, and pull boxes for traffic signals and intersection lighting including jacking, drilling, excavating placing and compacting backfill material in accordance with the locations shown on the Traffic Signal Plan, requirements of these specifications, and MAG specifications.

SUBSECTION 471.2 - MATERIALS:

SUBSECTION 471.2.01 - Electrical Conduit: All conduit and conduit fittings shall be listed by UL, and conform to NEC standards. Except as specified below, all conduit to be installed underground shall be rigid polyvinyl chloride (PVC) rigid nonmetallic type conforming to the requirements of UL 651 for Rigid Nonmetallic Conduit. PVC conduit and conduit fittings shall be Schedule 40, Type A.

All conduit and conduit fittings to be installed above ground shall be rigid metallic type manufactured of galvanized steel conforming to requirements of UL 6 for Rigid Metallic Conduit and to NEC standards.

SUBSECTION 471.2.02 - Conduit Warning Tape: Conduit warning tape shall be a four (4) mil inert plastic film specially formulated for prolonged use underground and shall be a minimum of three (3) inches wide. All tape shall be highly resistant to alkalis, acids, and other destructive agents found in the soil.

Tape shall have a continuous printed message warning of the location of underground conduits. The message shall be in permanent ink formulated for prolonged underground use and shall bear the words, 'CAUTION--ELECTRIC LINE BURIED BELOW' in black letters on a red background.

SUBSECTION 471.2.03 - Pull Boxes: Pull boxes, pull box covers and pull box extensions shall be constructed of polymer concrete and reinforced by a heavy-weave fiberglass in accordance with Traffic Signal Standard Drawings S-201-1 and S-201-2. Pull boxes and covers shall be concrete gray color and rated for no less than 8,000 lbs. over a 10" x 10" area and be designed and tested to temperatures of -50 degrees F. Material compressive strength shall be no less than 11,000 psi. Covers shall have a minimum coefficient of friction of .5. Pull boxes shall be stackable for extra depth. Covers shall be secured with two (2) 3/8 inch corrosion resistant metallic hex bolts with corrosion resistant metallic washers. The bolts shall be in accordance with the requirements of Traffic Signal Standard Drawing S-201-1.

The words TRAFFIC SIGNAL shall be cast in the pull box covers in one (1) inch high letters.

At the request of the **ENGINEER**, the **CONTRACTOR** shall furnish pull box drawings and specifications.

Chipped or cracked pull boxes, covers and extensions will not be accepted.

SUBSECTION 471.2.04 – Bond Wire: Conduit bond wire shall be a No. 8 AWG bare copper wire.

SUBSECTION 471.3 - CONSTRUCTION REQUIREMENTS:

SUBSECTION 471.3.01 – Installation of Electrical Conduit:

SUBSECTION 471.3.01(A) – General Requirements: Conduit shall be furnished and installed at the locations and of the sizes shown on the Traffic Signal Plan. Unless changes are necessary to avoid underground obstructions all underground conduit shall be installed in a straight line from pull box to pull box and/or from foundation to pull box and shall be of one continuous size. Any change in conduit routing must be approved by the **ENGINEER** and documented by the **CONTRACTOR** on as-built traffic signal plans.

The PVC conduit shall be cut square and trimmed to remove all rough edges. PVC conduit connections shall be of the solvent weld type. Purple primer conforming to the requirements of ASTM F 656 shall be applied to the joined surfaces prior to use of cement. The joint cement shall be the gray PVC cement conforming to the requirements of ASTM D 2564. Where a connection is made to rigid metallic conduit, the coupling used shall be a PVC female adapter.

Expansion joint fittings shall not be installed in PVC conduit runs between pull boxes unless specified. Expansion joint fittings shall be installed in conduit runs in which both ends of the conduit are fixed in place, such as conduit runs between two foundations. Expansion joint fittings shall be installed in conduit runs that cross a concrete structure expansion joint. Approved expansion fittings shall allow for a linear thermal expansion of up to six (6) inches.

Field PVC conduit bends shall be made without crimping or flattening, using the longest radius practical but not less than specified by the NEC, Article 347-13. Collapsed conduit, no matter how small, is not acceptable. The number of bends between pull boxes or between pull box and foundations shall not contain more than equivalent of two quarter bends (180 degrees, total), including the bends at the pull boxes or foundations, unless authorized by the **ENGINEER**.

PVC conduit entering a pull box or foundation shall be fitted with a factory made 90 degree elbow with a minimum sweep radius per the table below:

<u>PVC Size</u>	<u>Radius</u>
2 in.	9.50 in.
2 ½ in.	10.50 in.
3 in.	13.00 in.

Conduit shall enter pull boxes near the sides and ends and extend no more than four (4) inches above the bottom of the pull box including the length of the conduit bell end.

Conduit for future use shall have a 1/4 inch nylon rope or a No. 8 AWG bare copper bond wire installed which extends two (2) feet beyond each end of the PVC conduit run. This pull rope or wire shall be coiled and inserted into the conduit so as to be easily recovered from either end. Conduit ends shall be capped with conduit end cap fittings after the pull rope is installed. Conduit end cap shall remain in place until wiring is started.

CONTRACTOR shall place warning tape (as specified in Section 201.2.03) in all open trenches in which conduit is placed. All warning tape shall be buried at a depth of six (6) to eight (8) inches below final grade.

Where conduit is to be installed under existing roadway pavement by jacking or drilling methods, the jacking and/or drilling pits shall be kept two (2) feet clear of the edge of the pavement.

Conduit stub-outs under curbs or roadway edges for loop detection lead-in conductors shall conform to the requirements of Traffic Signal Standard Drawings S-207-2 and S-207-3. Loop detection conduit stub-outs shall not be installed until completion of curb and gutter work.

Any existing underground conduit to be incorporated into a new system shall be cleaned and blown out with compressed air.

Installation of conduit for underground electrical service shall be in accordance with the Traffic Signal Standard Drawing S-215-3, as shown on the Traffic Signal Plan and in accordance with the requirements of the utility company providing electrical service. Conduit installed in railroad right-of-way shall be installed in accordance with the requirements of the railroad company.

SUBSECTION 471.3.01(B) – Conduit Depth Requirements: Conduits installed in protected areas such as behind curbs, under side-walks, etc., that are not subject to any vehicular traffic shall be at a minimum depth of 24 inches below final grade. Conduits installed under roadways, driveways, or any open area where there is the possibility of vehicular traffic, shall be installed at a minimum depth of 30 inches below final grade. When conduit cannot be installed at the minimum depth, it shall be completely encased in three (3) inches of class C concrete in accordance with MAG Section 725.

SUBSECTION 471.3.01(C) - Trenching, Backfilling and Compaction: Trenches shall not be excavated wider than necessary for the proper placement of conduit and pull boxes. Trenching, back-filling and compaction shall be done in accordance with MAG Section 601.

All excavations within the roadway shall be back-filled and compacted in accordance with MAG Section 211.

Open trench excavation across any existing paved areas, shall have two (2) parallel cuts made at a distance apart not to exceed 16 inches. All removal and replacement of existing paved areas shall be in accordance with MAG Section 336.

Open trench excavation across an existing portland concrete area shall have two (2) parallel cuts made at a distance apart not to exceed 16 inches. All removal and replacement of existing portland concrete areas shall be done in accordance with MAG Section 336.

After each excavation is complete and materials in place, the **CONTRACTOR** shall notify the **ENGINEER** for inspection, and under no circumstances shall any underground material or equipment be covered with fill without proper approval.

SUBSECTION 471.3.02 – Installation of Pull Boxes: Pull boxes of the type specified on the Traffic Signal Plan shall be furnished and installed at the locations shown on the plan. Pull boxes shall be installed in accordance with the Traffic Signal Standard Drawing S-201-3. Any relocation of pull boxes to avoid driveways and/or other structures shall be approved by the **ENGINEER** and documented by the **CONTRACTOR** on the as-built traffic signal plans.

Pull boxes shall be set and adjusted so that they are level at curb or sidewalk grade. When no grade is established pull boxes shall be set as requested by the **ENGINEER**.

All pull box covers shall be secured with the required bolts and washers before final acceptance of the project.

SUBSECTION 471.4 - METHOD OF MEASUREMENT:

Conduit will be measured by the linear foot for each diameter size.

Pull boxes will be measured as a unit for each pull box size.

SUBSECTION 471.5 - BASIS OF PAYMENT:

SUBSECTION 471.5.01 - Conduit: The accepted quantities of conduit, measured as provided above, will be paid for at the unit price bid per linear foot for **ITEM 471.61111 – 2" SCHEDULE 40 PVC w/ ¼" NYLON PULL CORD, ITEM 471.61311 – 3" SCHEDULE 40 PVC w/ ¼" NYLON PULL CORD, ITEM 471.61312 – 3" SCHEDULE 40 PVC w/ #8 BARE COPPER WIRE**, which prices shall be full compensation for the items, **COMPLETE IN PLACE**, including excavation, backfill, warning tape, pull rope or bond wire and any incidentals necessary to complete the work.

SUBSECTION 471.5.02 – Pull Boxes: The accepted quantities for pull boxes, measured as provided above, will be paid for at the unit price bid for each for **ITEM 471.60043 – NO. 3½ PULL BOX, ITEM 471.60044 – NO. 5 PULL BOX, and ITEM 471.60046 – NO. 7 PULL BOX**, which prices shall be full compensation for the items, **COMPLETE IN PLACE**, including any excavating, backfilling and landscaping necessary to complete the work.

SECTION 472 - TRAFFIC SIGNAL FOUNDATIONS:

SUBSECTION 472.1 - DESCRIPTION OF WORK: The work under this section shall consist of furnishing all materials and constructing all traffic signal foundations,

including signal poles, cabinet and electrical service pedestal foundations for the traffic signal and intersection lighting system in accordance with the locations and details designated on the Traffic Signal Plan, MAG Specifications, and the requirements of these specifications.

Traffic signal foundations shall include all conduit, conduit elbows, anchor bolts, re-bar cages, grounding electrode, and forms required for construction of the foundation.

The pole, cabinet and service pedestal foundations shall conform to the requirements of Traffic Signal Standard Drawings S-202-1, S-202-2, S-202-4 and S-202-5.

SUBSECTION 472.2 - MATERIALS:

SUBSECTION 472.2.01 - Concrete: Concrete used for all foundations shall be class 'A' concrete and shall be in accordance with the requirements of MAG Section 725.

SUBSECTION 472.2.02 – Anchor Bolts: All anchor bolts shall be in accordance with Traffic Signal Standard Drawing No. S-202-2 (modified), S-202-6 and S-202-7.

SUBSECTION 472.2.03 – Re-bar Cage: All re-bar cages shall be in accordance with Traffic Signal Standard Drawing No. S-202-2 (modified).

SUBSECTION 472.2.04 – Electrical Conduit: All electrical conduit and conduit fittings shall be in accordance with these specifications.

SUBSECTION 472.2.05 - Grounding Electrode: The grounding electrode shall be in accordance with these specifications and Traffic Signal Standard Drawing No. S-202-1, S-202-2 (modified), S-202-4 and S-202-5.

SUBSECTION 472.3 - CONSTRUCTION REQUIREMENTS: Foundations of the type specified on the Traffic Signal Plan shall be constructed in accordance with the Traffic Signal Standard Drawings. Where obstructions prevent construction of foundations at the signal plan location, the **CONTRACTOR** shall secure approval of the **ENGINEER** for re-location. Any change in location shall be documented by the **CONTRACTOR** on as-built traffic signal plans.

Holes for pole foundations shall be augured and/or dug against undisturbed earth. All surplus excavated material shall be removed and properly disposed of within 48 hours by the **CONTRACTOR**, as requested by the **ENGINEER**. Excavations shall be barricaded or covered, or both, to provide safe passage for pedestrian and vehicular traffic.

If the soil is not stable, a deeper foundation than specified may be required as requested by the **ENGINEER**. If the foundation hole cannot be augured or dug using hand tools because of soil conditions or underground obstructions, the foundation shall be constructed as determined by the **ENGINEER**.

Foundation forming material shall extend no more than twenty (20) inches below the foundation final grade and shall be removed after placement and curing of concrete.

All foundations shall be set level with existing sidewalk or curb unless otherwise requested or specified. Where no curb or sidewalk exists, the foundations shall be set at the elevation requested by the **ENGINEER**.

After excavations are completed and anchor bolts and conduit installed, the **CONTRACTOR** shall notify the **ENGINEER** for inspection. Under no circumstances shall concrete be placed without the approval of the **ENGINEER**.

Anchor bolts shall be oriented such that the bolt pattern sides are both parallel and perpendicular to the roadway centerlines unless otherwise specified on the Traffic Signal Plan. A 25 foot coil of No. 4 AWG bare copper conductor shall be installed in accordance with Traffic Signal Standard Drawings. Anchor bolts, conduit and rebar cage shall be centered within the foundation, set at the specified height and plumb within + or - 1/2 degree. During placement of concrete, anchor bolts shall be securely held in proper alignment, position, and height with a suitable template.

Before placing concrete the entire foundation hole shall be thoroughly moistened. The concrete pour shall be continuous and consolidated by means of vibrators. All exposed surfaces of the foundation shall receive a finish that is smooth, level, and free of form marks.

Type 'A' pole foundations, type 'P' cabinet foundation, and type 'SP' service pedestal foundation shall set for a minimum of three (3) days prior to installation of poles and/or cabinets. Type 'R' pole foundations shall set for seven (7) days prior to installation of poles.

The template for the 'R' pole anchor bolts will be provided by the City of Goodyear. The **CONTRACTOR** can pick up this template at the City's Public Works Yard at 200 South Calle Del Pueblo, Goodyear. Coordinate with Larry Martinez at 932-1637.

Before the concrete for the cabinet foundation has set, depressions shall be made around the anchor bolts for adjustment of the cabinet leveling nuts in accordance with Traffic Signal Standard Drawing S-202-4.

SUBSECTION 472.4 - METHOD OF MEASUREMENT: Foundations for traffic signals and intersection lighting system will be measured as a unit for each type of foundation constructed.

SUBSECTION 472.5 - BASIS OF PAYMENT: The accepted quantities of foundations for traffic signal and intersection lighting system, measured as provided above, will be paid for at the unit price bid for each, for **ITEM 472.60100 – TYPE 'A' FOUNDATION, ITEM 472.60130 – TYPE 'R' FOUNDATION (MOD), ITEM 472.60260 – TYPE 'SP' (SERVICE PEDESTAL), and ITEM 472.60370 – TYPE 'P' (CABINET), COMPLETE IN PLACE**, which price shall be full compensation for the work described including excavations, backfill and incidentals necessary to complete the work.

No measurement or direct payment will be made for anchor bolts or re-bar cages, the cost being considered as included in the unit price paid for foundations.

SECTION 473 - VEHICULAR DETECTORS:

SUBSECTION 473.1 - DESCRIPTION OF WORK: The work under this section shall consist of furnishing and installing vehicular detectors at the locations shown on the Traffic Signal Plan and in accordance with the requirements of these specifications.

SUBSECTION 473.2 - MATERIALS:

SUBSECTION 473.2.01 – Loop Detector Sensor: Loop detector sensors shall be of the size and type specified on the Traffic Signal Plan and shall conform to the requirements of Traffic Signal Standard Drawing S-207-1. The conductors used for loop detector sensors shall be as specified by Section 201.2.01(C) of these specifications.

Roadway loop detector sensor wire shall conform to IMSA specification 51-5, or be number 14 AWG stranded copper with USE XLPE cross-linked polyethylene insulation and installed in accordance with the requirements of these specifications and Traffic Signal Standard Drawings S-207-1, S-207-2, and S-207-3.

SUBSECTION 473.2.02 – Loop Sensor Saw Cut Sealant: The saw cut loop sealant shall be a hot applied rubberized asphalt formulated specifically for use as a loop sensor saw cut sealant. The sealant shall be non-tracking during application and relatively stiff but flexible after application at low pavement temperatures. At application temperatures the sealant shall be a thin, free flowing fluid which penetrates the saw cut, encapsulating the loop conductors and self-levels permitting uniform and easy application.

The sealant shall be applied using a pressure feed melter/applicator equipped with a heated hose and handgun control.

When heated in accordance with ASTM D3407 the sealant shall meet the following physical properties:

TEST PARAMETER	LIMITS	TEST METHOD
Cone Penetration, TIF 150g, 5 sec; 1/10 mm	35 max	ASTM, D3407, Sec. 5
Flow, 140F, SM; mm	5 max	ASTM, D3407, Sec. 6
Resilience, TIF	30% min	ASTM, D3407, Sec. 8
Softening Point	180°F min	ASTM, D2398
Ductility, TIF 5cm/min	30cm min	ASTM, D113
Mandril Bend,	Pass	SEE NOTE BELOW

Pour Temperature	380°F	
Safe Heating Temperature	210°F	

NOTE: A sample of sealant is poured in a 1/8-inch thick by one(1) inch wide and four (4) inch long configuration on a glycerine coated brass plate using appropriate molds. The specimen is removed from the molds, placed in a freezer maintained at 0° + or - 2°F or one (1) hour. To test, remove the specimen from the freezer and immediately bend over a one(1) inch diameter mandril through a 180 degree arc in five (5) seconds at a uniform rate. To pass the test, the sample shall not show any cracks.

SUBSECTION 473.3 - CONSTRUCTION REQUIREMENTS:

SUBSECTION 473.3.01 - Vehicular Loop Detector Sensors:

SUBSECTION 473.3.01(A) - General: Vehicular loop detector sensors of the size and type specified on the Traffic Signal Plan shall be installed in accordance with the locations shown on the Traffic Signal Plan and the requirements of these specifications.

Any change in loop detector sensor location or deviation in loop detector sensor installation not in accordance with these specification must be approved by the **ENGINEER** and documented by the **CONTRACTOR** on as-built signal plans.

SUBSECTION 473.3.01(B) – Loop Detector Sensor Conductor Installation: The loop detector sensor conductors shall be installed in accordance with Traffic Signal Standard Drawing S-207-1. All saw cuts shall be made with an abrasive type saw.

The sawed slot shall extend to the curbside PVC conduit for each loop sensor. Separate lead-in sawed slots extending from the loop to the stub-out conduit shall be cut for each loop sensor. To insure that all saw cuts are true and straight a loop sensor layout shall first be made on the pavement surface.

All diagonal and corner saw cuts shall overlap such that the sawed slot is at full depth at turn points.

The sawed loop sensor slot shall be flushed clean of all debris with a high pressure stream of water and completely dried by means of an air stream prior to installation of loop sensor conductors.

After the sawed slot is dry and free of debris, wind the specified number of wire turns into the sawed slot in accordance with the details shown on the Traffic Signal Standard Drawing S-207-1. Wind loops which are in close proximity in opposite directions, (i.e. No. 1 clockwise, No. 2 counter clockwise, etc.). This may be accomplished by reversing loop "start-finish" lead-in conductors at the curb-side pull box.

The lead-in conductors from the loop sensor to curb-side pull box shall be continuous and twisted a minimum of six turns per foot in the lead-in saw cut and under curb stub out conduit.

The loop sensor conductors shall be permanently anchored in the sawed slot using the hot applied rubberized asphalt sealant specified. The sealant shall completely surround the loop sensor conductors and fill the sawed slot to within 1/8-inch of the pavement surface. Surplus sealant shall be removed from the road surface without the use of solvents. The sealant shall be applied with an sealant melter/applicator which melts the sealant and pressure applies the sealant at 380 degrees Fahrenheit via a heated hose and applicator handgun control. The handling of the sealant melter/applicator and the filling of the saw slot shall be in accordance with the directions of the melter/applicator manufacturer.

Each pair of loop sensor conductors entering the curb-side pull box shall be identified as to which loop it is connected, i.e. inside lane, outside lane, through lane, or left turn lane. Each conductor pair shall also be marked to signify its winding direction, "S" for start and "F" for finish. Marking identification tags shall be in accordance with Section 201.2.01 of these specifications. For installation of lead-in conductors and connecting conduit refer to Traffic Signal Standard Drawing S-207-2 and S-207-3.

SUBSECTION 473.3.01(C) – Loop Detector Sensor Connection: The loop sensor conductors shall be pulled into the adjacent curb-side pull box.

Unless otherwise specified or requested, the maximum number and size of loop detector sensors connected to a detection channel shall be as follows:

LOOP SIZE	LEAD-IN LENGTH	LOOPS PER CHANNEL	LOOP CONNECTION	LOOP USE
6' x 6'	500 ft. or less	2-3	Series	Advance detection
6' x 6'	500 ft. or greater	1	N/A	Advance detection
6' x 20'	200 ft. or less	2-3	Series	Call detection
6' x 20'	200 ft. or greater	1-2	Series	Call or left turn detection
6' x 40'	As required And greater	1	N/A	Presence detection

SUBSECTION 473.3.01(D) – Loop Detector Sensor Field Test: Before and after sealing the saw cut the **CONTRACTOR** shall perform an insulation resistance to ground test. The insulation resistance to ground shall be at least 50 megohms measure at a voltage between 400 and 500 volts D.C. Any loop detector sensor not meeting the above insulation test or fails to tune when connected to a loop detector amplifier unit shall be replaced by the **CONTRACTOR** at no cost to Maricopa County Department of Transportation.

SUBSECTION 473.4 - METHOD OF MEASUREMENT: Vehicular detectors will be measure as a unit for each type of detector furnished and installed.

SUBSECTION 473.5 - BASIS OF PAYMENT: The accepted quantities of vehicular detectors measured as provided above, will be paid for at the unit price bid for each for **ITEM 473.60100 – 6' x 6' DECTOR LOOP, ITEM 473.60300 – 6' x 30' QUADRUPOLE LOOP, ITEM 473.60400 – 6' x 40' QUADRUPOLE LOOP, and ITEM 473.60500 – 6' x 50' QUADRUPOLE LOOP, COMPLETE IN PLACE,** which price shall be full compensation for the work described and specified described and specified herein and on

SECTION 502 – DRILLED SHAFT FOUNDATIONS:

SUBSECTION 502.1 – DESCRIPTION: The work under this section shall include furnishing all materials and constructing reinforced concrete shafts formed within a drilled excavation. Each drilled shaft foundation shall consist of a shaft section with or without casing left in place, as requested or specified, and shall be constructed in reasonably close conformity with the details and dimensions shown on the project plans and the requirements of these specifications.

SUBSECTION 502.2 – MATERIALS

SUBSECTION 502.2.1 – Concrete: Concrete shall conform to the requirements of Section 725 for the class and strength shown on the project plans. Where concrete is placed in drilled shaft excavations containing bentonite slurry or water, the cement content of the concrete shall be between 658 and 752 pounds per cubic yard and the size of the coarse aggregate shall not exceed one inch.

SUBSECTION 502.2.2 - Reinforcing steel: Reinforcing steel shall conform to the requirements of Section 727.

SUBSECTION 502.2.3 – Metal Casing: Casing may be of unit or sectional construction and shall be of sufficient strength to withstand handling stresses, the pressure of concrete and the surrounding earth and to prevent seepage of water.

SUBSECTION 502.3 – CONSTRUCTION REQUIREMENTS

SUBSECTION 502.3.1 – Excavation: The **CONTRACTOR** shall perform all excavation required for the shafts, through whatever substances encountered, to the dimensions and elevations shown on the project plans or required by the site conditions. Unless otherwise shown on the project plans, the maximum deviation from plumb shall be not more than one percent, and the maximum permissible variation of the center axis at the top shall be three inches from its project plan location.

Any excavation beyond the dimensions shown on the project plans, where shells are not used, shall be filled with concrete at the **CONTRACTOR's** expense.

The project plans are indicative of anticipated subsurface conditions and depths where satisfactory bearing material may be encountered. The project plans may be used as a guide for the **CONTRACTOR** to become familiar with the site subsurface condition but shall not be construed as a warranty of the subsurface condition except at locations actually drilled.

If satisfactory material is not encountered at plan elevation, the bottom of any drilled hole may be lowered, with written approval of the **ENGINEER**. Alteration of the plan depth will be made to satisfactorily comply with design requirements. Reinforcing steel and concrete shall not be placed in the shaft until this final elevation has been established. Raising of the foundation elevation shall be approved by the **ENGINEER**.

When the drilling operation reaches a point where caving conditions are encountered, no further drilling will be allowed until a construction method is employed that will prevent excessive caving and which is acceptable to the **ENGINEER**. If steel casing is proposed, the shell shall be clean and shall extend to the top of the drilled shaft excavation. The inside diameter of the casing shall not be less than the specified size of the shaft.

If the **ENGINEER** determines that the amount of caving is within acceptable limits and the **CONTRACTOR** elects to drill under the same methods and procedures, the excavation shall be filled with concrete at the **CONTRACTOR's** expense, regardless of the extent.

Casing specified on the project plans to be left in place shall be installed in such manner that there will be no voids between the earth and the casing.

If the use of drilling slurry is to be employed, either with or without the use of casing, the **CONTRACTOR** shall use a method of construction, which will allow completion of the drilled shaft in a continuous manner without any mixing of concrete and drilling slurry.

Material excavated from shafts and bells and not incorporated elsewhere on the project shall be disposed of as requested by the **ENGINEER**.

When the project plans indicate drilled shafts are to be constructed within embankments, the embankments shall be constructed prior to drilling, except when requested otherwise by the **ENGINEER**.

After the completion of the drilled shaft excavation and prior to the placement of the reinforcing steel cage and concrete, all slough and other loose material shall be machine cleaned from the shaft. A flight auger or other equipment, approved by the **ENGINEER**, shall be used for cleaning dry excavations where slurry or ground water is not present. Where slurry or ground water is present, the excavation shall be cleaned with a bucket auger or similar type of equipment, as approved by the **ENGINEER**.

Open excavations that are deemed by the **ENGINEER** to be potentially hazardous, shall be covered at the end of each shift in a manner approved by the **ENGINEER**.

SUBSECTION 502.3.2 – Drilling Slurry: When slurry is used by the **CONTRACTOR** to maintain an excavation, the **CONTRACTOR** shall provide for a specialist, experienced in slurry drilling, to design and monitor the slurry. The slurry shall consist of a stable suspension of commercial bentonite in water. The **CONTRACTOR's** specialist shall submit slurry design criteria, including density; viscosity, shear strength, pH, and suspended sand content, for drilling and concrete placement operations to the

ENGINEER for review and approval prior to commencement of any slurry drilling. During the drilling operations, the **CONTRACTOR** shall monitor the properties of the slurry for conformance to the submitted design criteria. The density of the slurry shall be the minimum required to maintain the excavation.

Just prior to placement of the reinforcing steel, the **CONTRACTOR** shall conduct tests on the slurry, including samples obtained from the bottom of the excavation, to establish conformance with the submitted criteria. The consistency of the slurry shall be adjusted as required to maintain the excavation and to provide a suitable environment for the concreting operation.

The slurry shall be mixed in an approved mixer before being placed into the excavation. No dry material will be allowed to be placed in the excavation and mixed with water by the drilling auger.

Slurry shall be fed into the excavation as drilling progresses, keeping the holes filled to the top or maintained within any casing.

The **CONTRACTOR** shall be responsible for the slurry design and control as well as the resulting drilled shaft foundation produced by this method.

SUBSECTION 502.3.3 – Inspection: Drilled shaft excavations will be inspected by the **ENGINEER**. The **CONTRACTOR** shall provide suitable equipment and facilities so that the **ENGINEER** may inspect completed excavations and check the shafts for alignment and dimensions.

Reinforcing steel and concrete shall not be placed in the drilled shaft excavation until the **ENGINEER** has made his inspection and given his approval.

SUBSECTION 502.3.4 – Reinforcing Steel: The reinforcing steel cage for the drilled shaft, consisting of longitudinal bars and spiral hooping or lateral ties shall be completely assembled and placed into the shaft as a unit. The reinforcing steel unit shall not be placed until immediately before concreting operations are to be started and shall be placed in accordance with the details shown on the project plans.

The reinforcing cage shall be adequately supported and anchored to prevent movement from the required location during and for four hours after completion of concrete placement. Spacers shall be at sufficient intervals along the shaft to insure concentric spacing for the entire length of shaft. The type of spacer used shall be approved by the **ENGINEER**.

If the shaft is lengthened and the project plans indicate full depth reinforcement, the bars in the lower portion of the shaft shall be extended accordingly, to the bottom of the hole. These bars may be lap spliced or spliced by other connecting procedures approved by the **ENGINEER** and in accordance with the requirements of Section 505.5.1.

SUBSECTION 502.3.5 – Concrete

SUBSECTION 502.3.5.1 – General: Concrete shall be placed as soon as possible after the completion of the drilled shaft excavation and placement of the reinforcing steel cage. Concrete shall be placed in accordance with the requirements of Section 505.6 and as specified herein. Unless otherwise specified in the project documents, or as otherwise requested by the **ENGINEER**, the slump shall be 8 inches \pm one inch.

Prior to concrete placement, the **CONTRACTOR** shall make all necessary arrangements to assure the uninterrupted delivery of concrete so that all drilled shaft foundations will be constructed without cold joints.

SUBSECTION 502.3.5.2 – Placement in Dry Excavations: For placement in dry excavations, concrete shall be placed through a suitable tube or tremie, or by pumping, to prevent segregation of materials.

Concrete vibration for the full height of the shaft is not necessary to achieve proper consolidation of the concrete. However, all shafts shall be vibrated in a least the top ten feet.

SUBSECTION 502.3.5.3 – Placement under Slurry or Water: Care shall be taken to ensure that all the fluid and suspended solids is expelled from the hole during concrete placement. The concrete shall be placed by pumping. The pumping equipment shall be of suitable type and shall have adequate capacity for the work. The concrete shall not flow either over or through any piping, fittings or equipment which is fabricated of aluminum or aluminum alloys. The operation of the pump shall be such that a continuous stream of concrete without air pockets is produced. Excessive segregation due to high velocity discharge of the concrete will not be permitted. When pumping is completed, the concrete remaining in the pipeline, if it is to be used, shall be ejected in such a manner that there will be no contamination of the concrete or segregation of the ingredients. Standby equipment shall be readily available to replace initial pumping equipment should breakdown occur. In order to prevent contamination of the concrete placed initially, the lower end of the pump pipe shall be provided with a valve or plug. The discharge end of the pump pipe shall always remain between one and three diameters of the drilled shaft below the surface of fluid concrete.

Slurry ejected during concrete placement may be reused provided that it is screened to remove gravel chips or other granular materials, and providing the slurry meets acceptance criteria. Slurry to be discarded shall be disposed of in a manner approved by the **ENGINEER**.

Concrete placed under slurry or water shall not be vibrated, except that the top 5 feet of the shaft shall be vibrated after the slurry or water and contaminated concrete has been totally expelled from the shaft.

SUBSECTION 502.3.6 – Casing Removal: During removal of any casing, a sufficient head of not less than five feet of fluid concrete shall be maintained above the bottom of the casing except at the top of the shaft. All contaminated concrete shall be removed

from the shaft. If any upward movement of the concrete and/or reinforcing steel occurs at any time during the pulling operation, the following criteria shall govern:

- (1) If the upward movement is one inch or less, the casing may continue to be pulled provided no further movement occurs and if the concrete is vibrated or rodded to reconsolidate the concrete. Vibration or rodding shall not be used to attempt to break the casing loose for extraction.
- (2) If the upward movement is greater than one inch, the casing shall be left in place as a permanent sleeve at the **CONTRACTOR's** expense. A load test may be required by the **ENGINEER** to determine the adequacy and acceptability of the drilled shaft.

SUBSECTION 502.4 – MEASUREMENT: Drilled shafts will be measured by the linear foot from the actual bottom of the shaft, to the elevation of the top of the shaft as indicated on the project plans.

SUBSECTION 502.5 – PAYMENT: The accepted quantities of drilled shaft foundations, measured as provided above, will be paid for at the contract unit price per linear foot for **ITEM 502.44126 – 36" DRILLED SHAFT BRIDGE FOUNDATIONS**, complete in place, including excavation, drilling slurry, metal casing, steel reinforcing, Portland cement concrete, and any needed forming, curing and finishing. No additional payment will be made for metal casing that is to remain in place.

When load tests are required by the **ENGINEER** to determine the adequacy and acceptability of drilled shafts, payment for load tests for drilled shafts determined to be adequate and acceptable will be made in accordance with the provisions of Subsection 109.

Load tests for drilled shafts determined to be unacceptable will be at the **CONTRACTOR's** expense.

SECTION 505 - CONCRETE STRUCTURES:

The work under this section consists of constructing in place the concrete portions of the bridge, approach slabs, concrete barrier transitions, concrete box culverts (CBC), CBC headwalls and wingwalls, and catch basins in accordance with the plans and Section 505 of the Uniform Standard Specifications.

The concrete shall conform to Section 725 and the reinforcing steel shall conform to Section 727.

Fly ash may be used in all concrete mixes.

All items embedded in the concrete, such as deck drains, etc, are incidental.

The concrete and reinforcing steel in the concrete barrier transition are incidental to the pay item.

Joints in concrete bridge railing shall be saw-cut within 24 hours of removal of forms.

SUBSECTION 505.8 - CURING: All concrete in bridge decks and approach slabs, shall be water cured, utilizing the wet burlap method, unless otherwise authorized by the **ENGINEER**.

SUBSECTION 505.9 - FINISHING CONCRETE: The use of wood trowels will not be permitted in any finishing operations for concrete slabs.

SUBSECTION 505.10 - PAYMENT: Payment for all work under this section shall be made at the contract unit prices bid for the item. Concrete shall be paid at the theoretical value only.

Payment for catch basins shall be made at the contract unit price bid per each for **ITEM 505.00119 - CATCH BASIN (MAG STD DET 538, TYPE H)**, **ITEM 505.00110 - CATCH BASIN (MAG STD DET 535, TYPE F)**, **ITEM 505.00122 - CATCH BASIN (MAG STD DET 532, TYPE C)**, and **ITEM 505.00112 - CATCH BASIN (MAG STD DET 531, TYPE B)**.

Payment for concrete barrier transitions shall be made at the contract unit price bid per lineal foot for **ITEM 505.48078 - CONCRETE BARRIER TRANSITION (MCDOT STD DET 2044)**.

Payment for scuppers, including adjacent spillways as detailed in the plans, shall be made at the contract unit price bid per each for **ITEM 505.00212 - 4' SCUPPER (MAG STD DET 206)**, **ITEM 505.00222 - 8' SCUPPER (MAG STD DET 206)**, and **ITEM 505.40200 - SCUPPER (DETAIL K)**.

Payment for spillways adjacent to the retention basins shall be made at the contract unit price bid per square yard for **ITEM 505.47050 - CONCRETE SPILLWAY**.

Payment for concrete box culverts and inlet and outlet wing walls shall be made at the contract unit price bid per cubic yard of concrete for **ITEM 505.14020 - CLASS A CONCRETE (BOX CULVERT)** and per pound of reinforcing steel for **ITEM 505.12020 - REINFORCING STEEL (BOX CULVERT)**.

Payment for the Bullard Wash Bridge shall be made at the contract unit price bid per cubic yard for **ITEM 505.04000 - CLASS A PORTLAND CEMENT CONCRETE (BRIDGE)**, **ITEM 505.03000 - CLASS AA PORTLAND CEMENT CONCRETE (BRIDGE)**, and **ITEM 505.02000 - STEEL REINFORCEMENT (BRIDGE)**.

Payment for constructing concrete pipe collars shall be made at the contract unit price bid per each for **ITEM 505.00900 - CONCRETE PIPE COLLAR**.

Payment for constructing special RID irrigation structures shall be made at the contract unit price bid per each for **ITEM 505.40500 - SPECIAL RID STRUCTURE**.

SECTION 510 – CONCRETE BLOCK MASONRY

Work in this section consists of constructing irrigation junction boxes and toggle gates in accordance with MAG Standard Detail 504, at the locations shown in the plans.

The toggle gates shall be equal to toggle gates manufactured by Fullerform of Phoenix.

Payment for the irrigation junction boxes and toggle gates shall be made at the contract unit price bid for **ITEM 510.00000 – IRRIGATION JUNCTION BOX (MAG STD DET 504)**.

SECTION 525 – PNEUMATICALLY PLACED MORTAR

Work in this section consists of placing mortar in locations shown on the plans such as connecting new slipform concrete ditches to irrigation structures and transitions to dirt ditches or the retention ponds.

The pneumatically placed mortar shall be 3 inches thick and be reinforced with 6x6-W1.4xW1.4 welded wire fabric except where connecting slipform concrete ditches with irrigation structures. The wire fabric shall be placed and blocked to an elevation which will embed it in the center of the pneumatically placed mortar. The area upon which the mortar will be placed shall be compacted and maintained in a clean condition, free of loose dirt, grease or other foreign substance before application of the mortar. The wire fabric shall be lapped a minimum of 4 inches.

Payment for all work under this section shall be made at the contract unit price bid per square foot for **ITEM 525.07431, PNEUMATICALLY PLACED MORTAR**, for both reinforced sections and nonreinforced sections.

SECTION 601 – TRENCH EXCAVATION, BACKFILLING, AND COMPACTION

SUBSECTION 601.4-3 - Backfill: Backfill material for pipes, pipe-arches, or arches made of metal shall have a value of resistivity not less than 2000 ohm-cm or the value shown on the project plans. When resistivity is not shown on the plans, the backfill material shall have a value of resistivity not less than that of the existing in-place material or 2000 ohm-cm, whichever is less. Backfill material for all metal pipe installations shall have a pH value between 6.0 and 9.0 inclusive. Backfill material for all concrete or plastic pipe installations shall have a pH value between 6.0 and 12.0. Tests for pH and resistivity shall be in accordance with the requirements of the Arizona Test Method 236.

SECTION 609 - WELL ABANDONMENT:

609.1 – DESCRIPTION: The work in this section consists of the abandonment of an unused irrigation well (#803642) located on the south side of Yuma Road ¼ mile west of Estrella Parkway as identified on the plans. All work shall be done in accordance with ARS R12-15-816, and as a minimum shall consist of the following:

1. Well abandonment shall be performed by a licensed well drilling **CONTRACTOR**.

2. The **CONTRACTOR** will not commence abandoning the well until the appropriate abandonment card is received from the Arizona Department of Water Resources (ADWR). This card will be maintained at the well site.
3. All well casings will be removed prior to abandonment of the well.
4. The well shall be filled with cement grout or clean sand with bentonite of sufficient volume, density, and viscosity to prevent the well from being a channel allowing the vertical movement of water or fluids.
5. Within 30 days after a well is abandoned the **CONTRACTOR** shall file with the ADWR a "Well Abandonment Completion Report" on the form prescribed and furnished by the ADWR which shall include the date the abandonment of the well was completed and such other information as the ADWR may require.

The **CONTRACTOR** shall coordinate the abandonment of the wells with the **ENGINEER**. The **CONTRACTOR** shall provide 45 days advance notice to the **ENGINEER** of when the well will be abandoned. The **CONTRACTOR** will contact the ADWR to initiate the well abandonment process and the issuance of the well abandonment card, which will then be sent directly to the **CONTRACTOR**.

SECTION 609.2 – PAYMENT: Payment for the closure and abandonment of the well shall be made on the basis of the price bid per each, and shall include full compensation for all labor, materials, equipment, and appurtenances necessary to abandon the wells, including all necessary paperwork required by the ADWR, for **ITEM 609.00000 – WELL CLOSURE**.

SECTION 618 – STORM DRAIN CONSTRUCTION:

Work in this section consists of installing rubber gasket reinforced concrete pipe (RGRCP) for drainage and irrigation purposes at the locations shown in the plans.

Payment for installing RGRCP shall be made at the contract unit price bid per lineal foot for **ITEM 618.02310 – 12" RGRCP, CLASS III**, **ITEM 618.02330 – 18" RGRCP, CLASS III**, **ITEM 618.02350 – 24" RGRCP, CLASS III**, **ITEM 618.02360 – 30" RGRCP, CLASS III**, **ITEM 618.02370 – 36" RGRCP, CLASS III**, **ITEM 618.02390 – 48" RGRCP, CLASS III**, **ITEM 618.02450 – 24" RGRCP, CLASS IV**.

SECTION 621 – CORRUGATED METAL PIPE:

The work in this section consists of providing and installing 36" CMP under the deviation road to the lines and grades shown in the plans and removal and salvaging the pipe after MC 85 is constructed. The salvaged pipe shall be delivered to the MCDOT Maintenance Yard located at 2901 West Durango Street in Phoenix.

Payment for this item shall be made at the contract unit price bid per lineal foot for **ITEM 621.01170 – 36" CORRUGATED METAL PIPE**.

SECTION 622 - PIPE CULVERT:

The work under this section shall consist of furnishing and placing ductile iron pipe culvert of the size and at the location specified on the plans, including, bedding, backfill and compaction per Section 601, and thrust blocks. Ductile iron pipe shall conform to Section 750 of the Uniform Standard Specifications.

Ductile iron pipe (DIP) and fittings shall utilize push-on joints and be designed in accordance with AWWA C-150. The DIP shall be externally protected using an 8-mil thick polyethylene encasement in accordance with AWWA C-105.

Payment for all work under this section including polyethylene encasement and thrust block construction as required, shall be made at the contract unit price bid for **ITEM 622.04010 - 12" DIP CULVERT**, and **ITEM 622.04030 - 18" DIP CULVERT**.

SECTION 623 - HEADWALL:

The work under this section shall consist of constructing headwalls of the types and at the locations shown on the plans in accordance with MAG standard details and special details contained within the plans. Concrete box culvert headwalls and wingwalls are included in Section 505.

The work under this section shall also consist of plaster ditch connections between headwalls and ditches, if specified on the plans. Locations and dimensions shall be as shown on the plans. Plaster ditch connection is not a pay item; the cost thereof shall be included in the unit bid price for related items.

Concrete block, mortar, grout and plaster shall fully conform to Sections 775 and 776 of the Uniform Standard Specifications.

Steel reinforcement shall conform to Section 727 of the Uniform Standard Specifications.

Portland Cement Concrete shall conform to Section 725 of the Uniform Standard Specifications.

Headwalls will be measured by the unit for each type of headwall constructed.

Payment for this item will be made at the unit bid price per each for **ITEM 623.06550 - "U" HEADWALL W/ TRASH RACK FOR 24" PIPE (MAG STD DET 502-1)**, **ITEM 623.06560 - "U" HEADWALL W/ TRASH RACK FOR 30" PIPE (MAG STD DET 502-1)**, **ITEM 623.06570 - "U" HEADWALL W/ TRASH RACK FOR 36" PIPE (MAG STD DET 502-1)**, **ITEM 623.06579 - "U" HEADWALL W/ TRASH RACK FOR 2-36" PIPES (MAG STD DET 502-1)**, **ITEM 623.06220 - "U" HEADWALL FOR 12" PIPE (MAG STD DET 501-1,2)**, **ITEM 623.06230 - "U" HEADWALL FOR 18" PIPE (MAG STD DET 501-1,2)**, **ITEM 623.06250 - "U" HEADWALL FOR 24" PIPE (MAG STD DET 501-1,2)**, **ITEM 623.06259 - "U" HEADWALL FOR 3-24" PIPES (MAG STD DET 501-1,2)**, **ITEM 623.06270 - "U" HEADWALL FOR 36" PIPE (MAG STD DET 501-1,2)**, **ITEM 623.06330 - "L" HEADWALL FOR 18" PIPE (MAG STD DET 501-1,2)**, **ITEM 623.06350**

- "L" HEADWALL FOR 24" PIPE (MAG STD DET 501-1,2), ITEM 623.06359 - "L" HEADWALL FOR 3-24" PIPES (MAG STD DET 501-1,2), ITEM 623.06370 - "L" HEADWALL FOR 36" PIPE (MAG STD DET 501-1,2), ITEM 623.06430 - "STRAIGHT" HEADWALL FOR 18" PIPE (MAG STD DET 501-1,2), ITEM 623.06450 - "STRAIGHT" HEADWALL FOR 24" PIPE (MAG STD DET 501-1,2), ITEM 623.06459 - "STRAIGHT" HEADWALL FOR 2-24" PIPES (MAG STD DET 501-1,2), ITEM 623.06460 - "STRAIGHT" HEADWALL FOR 30" PIPE (MAG STD DET 501-1,2), ITEM 623.06470 - "STRAIGHT" HEADWALL FOR 36" PIPE (MAG STD DET 501-1,2), ITEM 623.06479 - "STRAIGHT HEADWALL FOR 2-36" PIPES (MAG STD DET 501-1,2) and ITEM 623.40000 - SPECIAL HEADWALLS.

SECTION 625 - MANHOLE CONSTRUCTION:

Work in this section consists of constructing stormdrain manholes at the locations shown on the plans and in accordance with MAG standard details.

Payment for constructing the manholes shall be made at the contract unit price bid per each for **ITEM 625.00130 - STORM DRAIN MANHOLE SHAFT AND BASE (MAG STANDARD DETAIL 520 & 522).**

SECTION 635 - CONCRETE LINED IRRIGATION DITCH:

This item shall consist of furnishing all material, labor and equipment necessary to construct cast-in-place concrete lined irrigation ditch to the cross-section, lines, grades and locations as shown on the plans and details.

In preparation of the area for the location of the concrete lined ditch and prior to the excavation for the ditch, all earth fills, embankments and natural earth shall be constructed to the cross-section and grade shown on the plans or as requested by the **ENGINEER.**

Areas over which fills are to be placed for the construction of the ditch shall be cleared, and scarified to a depth of 6 inches. A layer of approximately 3 inches of approved fill material shall be spread and compacted with the subgrade material to provide a bond between the existing ground and the material to be deposited thereon. The original ground area upon which fills are to be constructed plus the initial 3-inch lift shall be compacted to a uniform density of not less than 90 percent. The earth material for the construction of the ditch site, if approved by the **ENGINEER**, shall be placed in layers not to exceed eight (8) inches in depth before being compacted to the required density. Clods or hard lumps of greater than 6 inches in the greatest dimension shall be broken up before compacting the material in the embankment. Broken concrete or asphalt shall not be used as fill material and rock pieces shall not exceed 2 ½ inches. The natural earth found in place or any imported embankment material shall be compacted at optimum moisture content by mechanical methods that will insure the required density of 90 percent of the maximum density for the material. The maximum density for the material shall be determined on the basis of laboratory compaction tests made in accordance with AASHTO Designation T-99, Method A and T-191 or ASTM D-2992 and D-3017 with the percent of density adjusted in accordance with the rock correction

procedure for maximum density determination, standard detail, to compensate for the rock content larger than that which will pass a No. 4 sieve

The depth of the compaction required is twelve (12) inches below the flow line grade of the completed ditch lining.

After construction and compaction of all the necessary embankments, the irrigation ditch section shall be excavated to the subgrade elevation and cross-section as shown on the plans to allow for placing of the concrete ditch lining. The surface against which the lining is to be placed shall be compacted and accurately finished to the grades and dimensions shown on the plans. Excess material removed in excavation of the ditch shall be used to construct the berm shown in the details in the plans and used to strengthen the embankment on either side of the ditch or for backfill of existing ditches as requested by the **ENGINEER**.

The irrigation ditch lining shall consist of unreinforced concrete placed to the thickness as specified on the plans. The finished surface of the concrete shall be free from rock pockets or surface voids and shall be comparable to the finish obtained by use of a long handled steel trowel. The concrete placement may be accomplished by either slipform machine or placed and finished by hand. Hand placement will be necessary at least in locations inaccessible to the slipform machine.

Concrete shall be mixed in such proportions that the 28-day strength has a minimum of 2000 psi with cement content of not less than 4.5 sacks per cubic yard of concrete. Cement for concrete shall be Type II, low alkali, in accordance with ASTM C-150. The slump of the concrete shall not exceed 4 inches. The **CONTRACTOR** shall use an air entraining agent in the concrete, which shall be one of those permitted under ASTM Designation C-260 or AASHTO M-154. The amount of air entraining agent used shall be such as will effect the entrainment to produce from 4% to 6% air, by volume, of the concrete at the jobsite.

The coarse aggregate shall comply with ASTM C-33, and graded according to size 7 in Table 2.

The fine aggregates shall comply with ASTM C-33.

Transverse grooves five-sixteenths of an inch (5/16") in width and five-eighths of an inch (5/8") in depth shall be made in the concrete lining at intervals of ten feet (10') and maintained to the required dimensions until the concrete has hardened.

As soon as the concrete lining has hardened sufficiently, it shall be cured by the application of a white pigmented sealing compound conforming to the requirements of AASHTO Designation M-148 for Type 2. The sealing compound shall be applied in one coat to provide a continuous uniform white membrane over the entire concrete area. The sealing compound shall be applied at the rate of at least one gallon per 150 square feet and the rate shall be increased, if necessary, to obtain the required continuous membrane.

Payment for this item shall be made at the contract unit price bid per lineal foot for **ITEM 635.04100 – CONCRETE SLIPFORM IRRIGATION DITCH (1' BOTTOM)**, **ITEM 635.04300 – CONCRETE SLIPFORM IRRIGATION DITCH (2' BOTTOM)** and **ITEM 635.04400 – CONCRETE SLIPFORM IRRIGATION DITCH (3' BOTTOM)**.

GENERAL COMMENTS:

The **ENGINEER** reserves the right to adjust design grades or the location of the drainage structures prior to construction, if determined necessary the **ENGINEER**, without additional cost to Maricopa County.

The cost of work required under this contract, as shown on the plans, for which there are no specific items on the Bidding Schedule, shall be included in the bid price for related items.

It shall be the **CONTRACTOR's** responsibility to protect the structures and construction site from any excessive or detrimental flooding, within the wash right-of-way, which may occur during the construction period, until final acceptance of the completed structures by the **ENGINEER**.

Upon completion of the construction, the **CONTRACTOR** shall clear the wash bed and work area of all debris to the satisfaction of the **ENGINEER**.

No vehicular loads shall be permitted on the bridge prior to the lapse of twenty-one (21) days from the date of the last pour of concrete for the bridge deck or approach slābs, unless specific approval is obtained in writing from the **ENGINEER**.

The **CONTRACTOR** shall take special precautions to keep the area around the structure properly barricaded and marked with flares to prevent automotive traffic from running into the wash or crossing the new structure prior to acceptance of the completed project by the **ENGINEER**.

ENERGIZED POWER LINE WARNING

Arizona Public Service (APS) maintains energized aerial electrical power lines in the immediate vicinity of this project. **CONTRACTOR** shall not consider these lines to be insulated. Construction personnel working in proximity to these lines are exposed to an extreme hazard from electrical shock. **CONTRACTORS**, their employees, and all other construction personnel working on this project must be warned of the danger and instructed to take adequate protective measures, including maintaining a minimum ten (10) foot clearance between the lines and all construction equipment and personnel (see OSHA Std. 1926.55 (a) 15). As an additional safety precaution, **CONTRACTORS**, shall call APS to make arrangements to have these lines de-energized or relocated when the work reaches their immediate vicinity. The cost of such temporary arrangements shall be borne by **CONTRACTOR**. APS can often respond to such requests if two (2) days advance notice is given, but may require up to sixty (60) days notification.

APPENDIX "A"

**UNION PACIFIC RAILROAD
"RIGHT-OF-ENTRY"**

UNION PACIFIC RAILROAD COMPANY

Real Estate Department

R. D. Uhnch
Assistant Vice President
J. A. Anthony
Director-Contracts
D. D. Brown
Director-Real Estate
M. W. Casey
General Director-Special Properties
J. P. Gade
Director-Facility Management



1800 Farnam Street
Omaha, Nebraska 68102
Fax (402) 997-3601

J. L. Hawkins
Director-Operations Support
M. E. Heenan
Director-Administration & Budget
D. H. Lightwine
Director-Real Estate
T. K. Love
Director-Real Estate

Folder No.: 446-75

To the Contractor:

Before the Railroad Company can permit you to perform work on its right of way for the installation of an underground 42.50" irrigation water pipeline crossing/encroachment, for Roosevelt Irrigation District, it will be necessary to complete the enclosed Contractor's Right of Entry Agreement as follows:

1. Fill in the complete legal name of the contractor in the space provided on Page 1 of the Contractor's Right of Entry Agreement. If a corporation, give the state of incorporation. If a partnership, give the names of all partners.
2. Fill in the date construction will begin and be completed in Article 5, Paragraph A.
3. Fill in the name of the contractor in the space provided in the signature block at the end of the Contractor's Right of Entry Agreement. If the contractor is a corporation, the person signing on its behalf must be an elected corporate officer.
4. Return all copies of the Contractor's Right of Entry Agreement together with your Certificate of Insurance as required in Exhibit B-1, in the attached, self-addressed envelope.
5. Check made payable to the Union Pacific Railroad Company in the amount of **\$500.00**. If you require formal billing, you may consider this letter as a formal bill. In compliance with the Internal Revenue Services' new policy regarding their Form 1099, I certify that 94-6001323 is the Railroad Company's correct Federal Taxpayer Identification Number and that Union Pacific Railroad Company is doing business as a corporation.

After approval of the Contractor's Right of Entry Agreement and the Insurance Certificate, your fully-executed document will be returned to you, with instructions to proceed. In no event should you begin work until you have received a copy of the signed Contractor's Right of Entry Agreement.

Under Exhibit B-1 of the enclosed Contractor's Right of Entry, you are required to procure Railroad Protective Liability Insurance (RPLI) for the duration of this project. As a service to you, Union Pacific is making this coverage available to you at the rate specified on the attached Insurance Application Form. You are not required to purchase this coverage from the Railroad and are encouraged to shop the market for the best available rate. If you decide; however, that acquiring this coverage from the Railroad is of benefit to you, simply complete the form and follow the instructions at the bottom.

Yours truly,

A handwritten signature in cursive script that reads "Mary C. Gross".

Mary C. Gross
Contract Representative
#402/997-3623

“SAMPLE ONLY”

**CONTRACTOR'S
RIGHT OF ENTRY AGREEMENT**

THIS AGREEMENT is made and entered into as of the _____ day of _____, 199____
by and between **UNION PACIFIC RAILROAD COMPANY**, a Delaware corporation (hereinafter referred to as the
"Railroad"); and _____
a _____ corporation (hereinafter the referred to as the "Contractor").

RECITALS:

The Contractor has been hired by Roosevelt Irrigation District for the purpose of constructing
(hereinafter "work") an underground 42.50" irrigation water pipeline crossing/encroachment on property
of the Railroad at Mile Post 887.33 on the Gila Subdivision, at or near Goodyear, Maricopa County, AZ.

The Contractor has requested the Railroad to permit it to perform the work and Railroad is
agreeable thereto, subject to the following terms and conditions.

AGREEMENT:

NOW, THEREFORE, it is mutually agreed by and between the Railroad and Contractor, as follows:

ARTICLE 1 - DEFINITION OF CONTRACTOR

For purposes of this agreement, all references in this agreement to the Contractor shall include the Contractor's
contractors, subcontractors, officers, agents and employees, and others acting under its or their authority.

ARTICLE 2 - RIGHT GRANTED; PURPOSE

The Railroad hereby grants to the Contractor the right, during the term hereinafter stated and upon and subject to
each and all of the terms, provisions and conditions herein contained, to enter upon and have ingress to and egress from the
property described in the Recitals hereof and as shown on the attached print dated June 11, 1998, marked Exhibit A for the
purpose of performing the work described in the Recitals above. The right herein granted to Contractor is limited to those
portions of the Railroad's property specifically described herein, or designated by the Railroad representative named in
Article 5.

ARTICLE 3 - TERMS AND CONDITIONS CONTAINED IN EXHIBITS B AND B-1

The terms and conditions contained in Exhibits B and B-1, heretoattached, are hereby made a part of this
agreement.

ARTICLE 4 - ADMINISTRATIVE FEE

Applicant shall pay to the Railroad **FIVE HUNDRED DOLLARS (\$500.00)** as reimbursement for clerical,
administrative and handling expense in connection with the processing of this Agreement.

ARTICLE 5 - ALL EXPENSES TO BE BORNE BY CONTRACTOR; RAILROAD REPRESENTATIVE

The Contractor shall bear any and all costs and expenses associated with any work performed by the Contractor,
or any costs or expenses incurred by the Railroad relating to this agreement. All work performed by Contractor on Railroad's
property shall be performed in a manner satisfactory to the respective local Superintendent of Transportation Services of
the Railroad or his authorized representative (hereinafter the Railroad Representative).

ARTICLE 6 - **TERM: TERMINATION**

- a). The grant of right herein made to Contractor shall commence on _____, and continue until _____, unless sooner terminated as herein provided, or at such time as Contractor has completed its work on Railroad's property, whichever is earlier. Contractor agrees to notify the Railroad Representative in writing when it has completed its work on Railroad property.
- b). This agreement may be terminated by either party on ten (10) days written notice to the other party.

ARTICLE 7 - **CERTIFICATE OF INSURANCE**

- a). Before commencing any work, the Contractor will provide the Railroad with a Certificate issued by its insurance carrier providing the insurance coverage required pursuant to Exhibit B-1 of this agreement in a policy which contains the following type of endorsement:

Union Pacific Railroad Company, is named as additional insured with respect to all liabilities arising out of Insured's, as Contractor, performance of any work on the property of the Railroad.

- b). Contractor warrants that this agreement has been thoroughly reviewed by its insurance agent(s)/broker(s) and that said agent(s)/broker(s) has been instructed to procure insurance coverage and an endorsement as required herein.
- c). All insurance correspondence shall be directed to:

File No. 446-75
Union Pacific Railroad Company
1416 Dodge Street, WP001
Omaha, Nebraska 68179

ARTICLE 8 - **CHOICE OF FORUM**

Litigation arising out of or connected with this agreement may be instituted and maintained in the courts of the states of Nebraska and California only, and the parties consent to jurisdiction over their person and over the subject matter of any such litigation, in those courts, and consent to service of process issued by such courts.

ARTICLE 9 - **SPECIAL PROVISIONS**

None.

IN WITNESS WHEREOF, the parties hereto have executed this agreement in duplicate as the date first herein written.

UNION PACIFIC RAILROAD COMPANY

By _____
CONTRACT REPRESENTATIVE

WITNESS:

(Name of Contractor)

X _____

Address: _____

Title: _____

EXHIBIT B TO CONTRACTOR'S RIGHT OF ENTRY AGREEMENT

Section 1. NOTICE OF COMMENCEMENT OF WORK - FLAGGING.

The Contractor agrees to notify the Railroad Representative at least 48 hours in advance of Contractor commencing its work and 24 hours in advance of proposed performance of any work by the Contractor in which any person or equipment will be within 25 feet of an or will be near enough to any track that any equipment extension (such as, but not limited to, a crane boom) will reach to within 25 feet of any track. Upon receipt of such notice, the Railroad Representative will determine and inform the Contractor whether a flagman need be present whether the Contractor need implement any special protective or safety measures. If any flagmen or other special protective or safety measures are performed by the Railroad, such services will be provided at Contractor's expense with the understanding that if the Railroad provides flagging or other services the Contractor shall not be relieved of any of its responsibilities or liabilities set forth herein.

Section 2. NO INTERFERENCE WITH RAILROAD'S OPERATION.

No work performed by Contractor shall cause any interference with the constant, continuous and uninterrupted use of the tracks, and facilities of the Railroad its lessees, licensees or others, unless specifically permitted under this agreement, or specifically authorized in advance by the Railroad Representative. Nothing shall be done or suffered to be done by the Contractor at any time that would in any way impair the safety thereof. When not in use, Contractor's machinery and materials shall be kept at least 50 feet from the centerline of Railroad's nearest track, and there shall be no vehicular crossings of Railroad's tracks except at existing open public crossings.

Section 3. MECHANIC'S LIENS.

The Contractor shall pay in full all persons who perform labor or provide materials for the work to be performed by Contractor. Contractor shall not create, permit or suffer any mechanic's or materialmen's liens of any kind or nature to be created or enforced against the property of the Railroad for any such work performed. The Contractor shall indemnify and hold harmless the Railroad from and against all liens, claims, demands, costs or expenses of whatsoever nature in any way connected with or growing out of such work done, labor performed or materials furnished.

Section 4. PROTECTION OF FIBER OPTIC CABLE SYSTEMS.

a). Fiber optic cable systems may be buried on the Railroad's property. Protection of the fiber optic cable systems is of extreme importance since any break could disrupt service to users resulting in business interruption and loss of revenue and profits. Contractor shall telephone the Railroad at 1-800-336-9193 (a 24-hour number) to determine if fiber optic cable is buried anywhere on the Railroad's premises to be used by Contractor. If it is, Contractor will telephone the telecommunications company(ies) involved, arrange for a cable locator, make arrangements for relocation or other protection of the fiber optic cable, all at Contractor's expense, and will commence no work on the right of way until such protection or relocation has been accomplished.

b). In addition to other indemnity provisions in this Agreement, the Contractor shall indemnify and hold the Railroad harmless from and against all costs, liability and expense whatsoever (including, without limitation, attorneys' fees, court costs and expenses) arising out of or resulting from the negligence or omission of the Contractor, its contractor, agents and/or employees, that causes or contributes to (1) any damage to or destruction of a telecommunications system on Railroad's property, and/or (2) any injury to or death of any person employed by or on behalf of a telecommunications company, and/or its contractor, agents and/or employees, on Railroad's property. Contractor shall not have or seek recourse against Railroad for any claim or cause of action for alleged loss of profits or revenue or loss of service or other consequential damages to a telecommunications company using Railroad's property or a customer or user of services of the fiber optic cable on Railroad's property.

Section 5. COMPLIANCE WITH LAWS.

In the prosecution of the work covered by this agreement, the Contractor shall secure any and all necessary permits and shall comply with all applicable federal, state and local laws, regulations and enactments affecting the work. The Contractor shall use only such methods and means that are consistent with safety, both as concerns the Contractor, the Contractor's agents and employees, the officers, agents, employees and public of the Railroad and the public in general. The Contractor (without limiting the generality of the foregoing) shall comply with all applicable state and federal occupational safety and health acts and regulations. All Federal Railroad Administration regulations shall be followed when work is performed on the Railroad's property. If any failure by the Contractor to comply with any such laws, regulations, and enactments, shall

in any fine, penalty, cost or charge being assessed, imposed or charged against the Railroad, the Contractor shall reimburse and indemnify the Railroad for any such fine, penalty, cost, or charge, including without limitation attorneys' fees, court costs and expenses. The Contractor agrees in the event of any such action, upon notice thereof being provided by the Railroad, to defend such action free of cost, charge, or expense to the Railroad.

Section 6. SAFETY INSTRUCTIONS.

Safety of personnel, property, rail operations and the public is of paramount importance in the prosecution of the work pursuant to this agreement. As reinforcement and in furtherance of overall safety measures to be observed by the Contractor (and not by way of limitation) the following special safety rules shall be followed:

- a). The Contractor shall keep the job site free from safety and health hazards and ensure that its employees are competent and adequately trained in all safety and health aspects of the job. The Contractor shall have proper first aid supplies available on the job site so that prompt first aid services can be provided to any person that may be injured on the job site. The Contractor shall promptly notify the Railroad of any U.S. Occupational Safety and Health Administration reportable injuries occurring to any person while performing work on the job site. The Contractor shall have a non-delegable duty to control its employees, while on the job site or any other property of the Railroad to be certain they do not use, be under the influence of, or have in their possession any alcoholic beverage, drug, narcotic or other substance that may inhibit the safe performance of work by the employees.
- b). The employees of the Contractor shall be suitably dressed to perform their duties safely and in a manner that will not interfere with their vision, hearing or free use of their hands or feet. Only waist length shirts with sleeves and trousers that cover the entire body are to be worn. If flare-legged trousers are worn, the trouser bottoms must be tied to prevent catching. The employees shall wear sturdy and protective work boots and at least the following protective equipment:
 - (1) Protective head gear that meets American National Standard-Z89.1-latest revision. It is suggested that all hard hats be affixed with Contractor's or subcontractor's company logo or name.
 - (2) Eye protection that meets American National Standard for occupational and educational eye and face protection Z87.1-latest revision. Additional eye protection must be provided to meet specific job situations such as welding, grinding, burning, etc.; and
 - (3) Hearing protection which affords enough attenuation to give protection from noise levels that will be occurring at the job site.
- c). All heavy equipment provided or leased by the Contractor shall be equipped with audible back-up warning devices. If in the opinion of the Railroad Representative any of Contractor's or any of its subcontractor's equipment is unsafe for use on the Railroad right-of-way, the Contractor, at the request of the Railroad Representative, shall remove such equipment from the Railroad right-of-way.

Section 7. INDEMNITY.

- a). As used in this Section, "Railroad" includes other railroad companies using the Railroad's property at or near the location of the Contractor's installation and their officers, agents, and employees; "Loss" includes loss, damage, claims, demands, actions, causes of action, penalties, costs, and expenses of whatsoever nature, including court costs and attorneys' fees, which may result from: (a) injury to or death of persons whomsoever (including the Railroad's officers, agents, and employees, the Contractor's officers, agents, and employees, as well as any other person); and/or (b) damage to or loss or destruction of property whatsoever (including Contractor's property, damage to the roadbed, equipment, or other property of the Railroad, or property in its care or custody).
- b). As a major inducement and in consideration of the license and permission herein granted, the Contractor agrees to indemnify and hold harmless the Railroad from any Loss which is due to or arises from any cause and is associated in whole or in part with the work performed pursuant to this agreement, a breach of the agreement or the failure to observe the health and safety provisions herein, or any activity, omission or neglect arising out of performance or nonperformance of this agreement. However, the Contractor shall not indemnify the Railroad when the Loss is caused by the sole negligence of the Railroad.

c). The Contractor shall maintain whatever insurance coverage is necessary to adequately underwrite its general and contractual liability under the terms of this Agreement.

Section 8. RESTORATION OF PROPERTY.

In the event the Railroad authorizes the Contractor to take down any fence of the Railroad or in any manner move or disturb any other property of the Railroad in connection with the work to be performed by Contractor, then in that event the Contractor shall, as so possible and at Contractor's sole expense, restore such fence and other property to the same condition as the same were in before such fence taken down or such other property was moved or disturbed.

Section 9. WAIVER OF BREACH.

The waiver by the Railroad of the breach of any condition, covenant or agreement herein contained to be kept, observed and performed by the Contractor shall in no way impair the right of the Railroad to avail itself of any remedy for any subsequent breach thereof.

Section 10. ASSIGNMENT - SUBCONTRACTING.

The Contractor shall not assign, sublet or subcontract this agreement, or any interest therein, without the written consent of the Railroad and any attempt to so assign, sublet or subcontract without the written consent of the Railroad shall be void. If the Railroad gives the Contractor permission to subcontract all or any portion of the work herein described, the Contractor is and shall remain responsible for all work of subcontractors and all work of subcontractors shall be governed by the terms of this agreement.

EXHIBIT B-1

Right of Entry Agreements Contract Insurance Requirements Third Party Contractors

Contractor shall, at its sole cost and expense, procure and maintain during the life of this Agreement the following insurance coverage:

- a) General Liability insurance providing bodily injury including death, personal injury and property damage coverage with a combined single limit of at least \$2,000,000 each occurrence or claim and an aggregate limit of at least \$4,000,000. This insurance shall contain broad form contractual liability with a separate general aggregate limit for the project (ISO Form CG 25 03 or equivalent). Exclusions for railroads (except where the Job Site is more than 50 feet (50') from any railroad tracks, bridges, trestles, roadbeds, terminals, underpasses or crossings), and explosion, collapse and underground hazard shall be removed. Coverage purchased on a claims made form shall provide for at least a two (2) year extended reporting or discovery period if (a) the coverage changes from a claims made form to an occurrence form, (b) there is a lapse/cancellation of coverage, or (c) the succeeding claims made policy retroactive date is different for the expiring policy.
- b) Automobile Liability insurance providing bodily injury, property damage and uninsured vehicles coverage with a combined single limit of at least \$2,000,000 each occurrence or claim. This insurance shall cover all motor vehicles including hired and non-owned, and mobile equipment if excluded from coverage under the general public liability insurance.
- c) Workers' Compensation insurance covering Contractor's statutory liability under the workers' compensation laws of the state(s) affected by this Agreement, and Employers' Liability. If such insurance will not cover the liability of Contractor in states that require participation in state workers' compensation fund, Contractor shall comply with the laws of such states. If Contractor is self-insured, evidence of state approval must be provided.

Contractor and their insurers shall endorse the required insurance policy(ies) to waive their right of subrogation against Railroad. Contractor's insurance shall be primary with respect to any insurance carried by Railroad. The policies required under (a) and (b) above shall provide severability of interests and shall name Railroad as an additional insured.

Prior to commencing the Work, Contractor shall furnish to Railroad certificate(s) of insurance evidencing the required coverage and endorsements and upon request, a certified duplicate original of any required policy. The certificate(s) shall contain a provision that obligates the insurance company(ies) issuing such policy(ies) to notify Railroad in writing of any material alteration including any change in the retroactive date in any "claims-made" policies or substantial reduction of aggregate limits, if such limits apply, or any cancellation at least thirty (30) days prior thereto.

The insurance policy(ies) shall be written by a reputable insurance company(ies) acceptable to Railroad or with current Best's Insurance Guide Rating of B and Class VII or better, and authorized to do business in the state(s) in which the Job Site is located.

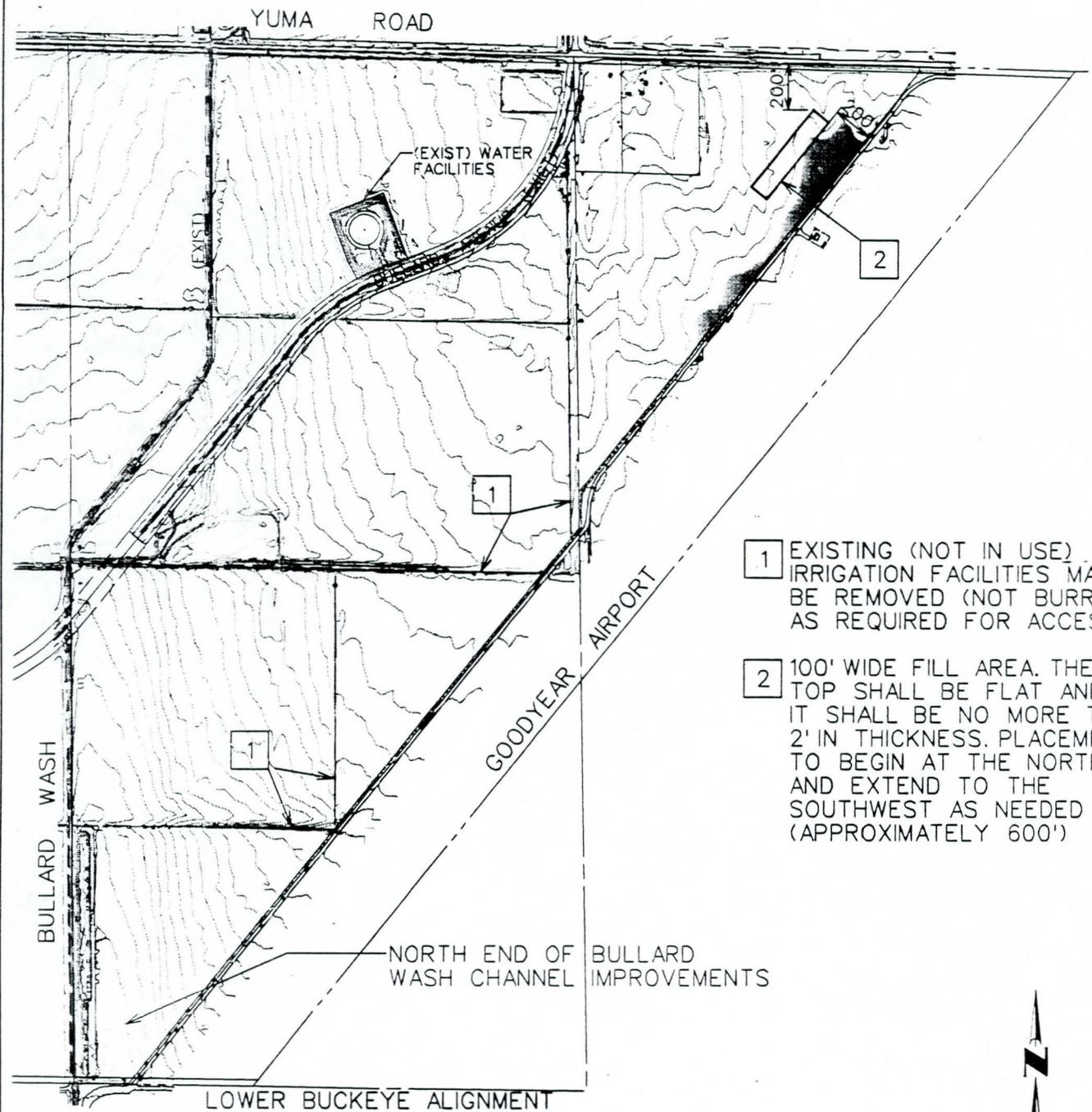
Contractor WARRANTS that this Agreement has been thoroughly reviewed by Contractor's insurance agent(s)/broker(s), who have been instructed by Contractor to procure the insurance coverage required by this Agreement.

If Contractor fails to procure and maintain insurance as required, Railroad may elect to do so at the cost of Contractor.

The fact that insurance is obtained by Contractor shall not be deemed to release or diminish the liability of Contractor, including, without limitation, liability under the indemnity provisions of this Agreement. Damages recoverable by Railroad shall not be limited by the amount of the required insurance coverage.

APPENDIX "B"

**"SUNCHASE" SPOIL SITE
LOCATION MAP**



- 1 EXISTING (NOT IN USE) IRRIGATION FACILITIES MAY BE REMOVED (NOT BURIED) AS REQUIRED FOR ACCESS
- 2 100' WIDE FILL AREA. THE TOP SHALL BE FLAT AND IT SHALL BE NO MORE THAN 2' IN THICKNESS. PLACEMENT TO BEGIN AT THE NORTHEAST AND EXTEND TO THE SOUTHWEST AS NEEDED (APPROXIMATELY 600')



SUNCHASE SPOIL SITE
EXHIBIT B

JOB NO

4550 NORTH 12TH STREET
PHOENIX, ARIZONA 85014
TELEPHONE (602) 264-6831

COE & VAN LOO
PLANNING • ENGINEERING • LANDSCAPE ARCHITECTURE

SHEET

1 OF 1

APPENDIX "C"

**CITY OF GOODYEAR
SANITARY SEWER FLOW RATES**

1 HOUR TOTALS (GALLONS) FLOW

Date: 03/09/98 11:15 File: A006079A.835
 CITY OF GOODYEAR
 FLOW STUDIES

260 A06079
 15INCH
 ON BROADWAY BETWEEN
 BULLARD & ESTLA PK

Metering Period:
 03/05/98 12:00 - 03/09/98 11:10

Report Period:
 03/05/98 12:00 - 03/09/98 11:

From	To	03/05/98	03/06/98	03/07/98	03/08/98	03/09/98
00:00	01:00	-	17.80K	13.38K	13.81K	16.58K
01:00	02:00	-	14.10K	10.78K	11.50K	11.29K
02:00	03:00	-	10.38K	9.53K	9.26K	8.71K
03:00	04:00	-	8.31K	8.04K	7.81K	4.89K
04:00	05:00	-	7.37K	6.58K	6.08K	3.65K
05:00	06:00	-	6.22K	6.86K	5.26K	3.86K
06:00	07:00	-	5.78K	7.38K	5.52K	3.08K
07:00	08:00	-	7.00K	7.90K	5.08K	3.52K
08:00	09:00	-	12.22K	10.38K	5.36K	10.76K
09:00	10:00	-	19.00K	12.31K	11.01K	23.00K
10:00	11:00	-	19.70K	20.20K	18.02K	15.58K
11:00	12:00	-	18.05K	25.38K	20.08K	0.00 *
12:00	13:00	19.31K	18.86K	23.90K	22.30K	-
13:00	14:00	19.74K	17.77K	27.41K	26.18K	-
14:00	15:00	17.91K	18.75K	25.98K	26.01K	-
15:00	16:00	17.48K	17.99K	22.68K	21.53K	-
16:00	17:00	16.24K	16.96K	19.36K	21.89K	-
17:00	18:00	14.45K	15.84K	17.14K	17.98K	-
18:00	19:00	14.69K	16.52K	18.91K	18.92K	-
19:00	20:00	16.26K	16.55K	19.01K	17.38K	-
20:00	21:00	15.33K	16.97K	19.14K	19.80K	-
21:00	22:00	21.13K	18.52K	19.73K	21.49K	-
22:00	23:00	19.29K	17.40K	17.92K	20.84K	-
23:00	00:00	20.50K	15.29K	14.50K	20.96K	-
		212.34K*	353.35K	384.40K	374.06K	104.91K*

Total for report period = 1,429,065.00 GALLONS

Codes:

- K Multiply data by 1,000
- M Multiply data by 1,000,000
- No data for period
- * Incomplete data for period
- < Data less than cutout value
- | Fill Data for period

1 HOUR AVERAGES

Date: 03/09/98 11:23 File: A006079A.835
 CITY OF GOODYEAR
 FLOW STUDIES

260 A06079
 15 INCH
 ON BROADWAY BETWE
 BULLARD & ESTLA

Metering Period:
 03/05/98 12:00 - 03/09/98 11:10

Report Period:
 03/05/98 12:00 - 03/09/98 11:10

START Date Time	FLO GPM	LEV in.	VEL FPS	START Date Time	FLO GPM	LEV in.	VEL FPS
03/05 12:00	321.81	4.48	2.32	03/07 06:00	122.95	2.84	1.9
03/05 13:00	329.07	4.61	2.27	03/07 07:00	131.75	2.94	1.8
03/05 14:00	298.52	4.28	2.30	03/07 08:00	173.03	3.30	1.9
03/05 15:00	291.41	4.28	2.25	03/07 09:00	205.08	3.56	2.1
03/05 16:00	270.66	4.07	2.26	03/07 10:00	336.61	4.46	2.4
03/05 17:00	240.78	3.98	2.07	03/07 11:00	422.99	4.99	2.5
03/05 18:00	244.85	3.95	2.14	03/07 12:00	398.27	4.85	2.4
03/05 19:00	271.03	4.06	2.26	03/07 13:00	456.80	5.10	2.7
03/05 20:00	255.46	3.98	2.20	03/07 14:00	433.08	4.97	2.6
03/05 21:00	352.20	4.67	2.38	03/07 15:00	378.06	4.77	2.5
03/05 22:00	321.57	4.42	2.36	03/07 16:00	322.71	4.38	2.4
03/05 23:00	341.60	4.61	2.35	03/07 17:00	285.67	4.11	2.3
03/06 00:00	296.74	4.26	2.30	03/07 18:00	315.09	4.31	2.4
03/06 01:00	235.07	3.80	2.18	03/07 19:00	316.75	4.31	2.4
0 6 02:00	172.97	3.38	1.91	03/07 20:00	319.08	4.34	2.4
03/06 03:00	138.53	3.06	1.80	03/07 21:00	328.82	4.39	2.4
03/06 04:00	122.81	2.88	1.75	03/07 22:00	298.64	4.18	2.3
03/06 05:00	103.64	2.67	1.67	03/07 23:00	241.65	3.89	2.1
03/06 06:00	96.27	2.59	1.63	03/08 00:00	230.20	3.71	2.2
03/06 07:00	116.65	2.80	1.75	03/08 01:00	191.67	3.44	2.1
03/06 08:00	203.64	3.53	2.07	03/08 02:00	154.37	3.12	1.9
03/06 09:00	316.67	4.39	2.35	03/08 03:00	130.13	2.93	1.8
03/06 10:00	328.28	4.46	2.38	03/08 04:00	101.32	2.59	1.7
03/06 11:00	300.90	4.23	2.36	03/08 05:00	87.73	2.46	1.6
03/06 12:00	314.41	4.34	2.38	03/08 06:00	91.95	2.47	1.6
03/06 13:00	296.18	4.31	2.26	03/08 07:00	84.63	2.37	1.6
03/06 14:00	312.47	4.35	2.35	03/08 08:00	89.39	2.43	1.6
03/06 15:00	299.85	4.28	2.31	03/08 09:00	183.54	3.29	2.0
03/06 16:00	282.74	4.17	2.27	03/08 10:00	300.27	4.18	2.4
03/06 17:00	263.93	4.01	2.24	03/08 11:00	334.63	4.42	2.5
03/06 18:00	275.34	4.07	2.29	03/08 12:00	371.60	4.64	2.5
03/06 19:00	275.89	4.10	2.28	03/08 13:00	436.39	4.99	2.6
03/06 20:00	282.75	4.20	2.25	03/08 14:00	433.53	5.02	2.6
03/06 21:00	308.64	4.23	2.43	03/08 15:00	358.78	4.73	2.5
03/06 22:00	289.93	4.15	2.34	03/08 16:00	364.81	4.59	2.5
03/06 23:00	254.90	4.24	1.99	03/08 17:00	299.71	4.22	2.4
03/07 00:00	223.02	4.10	1.84	03/08 18:00	315.39	4.26	2.4
03/07 01:00	179.62	3.68	1.75	03/08 19:00	289.62	4.20	2.3
03/07 02:00	158.79	3.39	1.75	03/08 20:00	329.95	4.44	2.4
03/07 03:00	134.06	3.07	1.73	03/08 21:00	358.13	4.64	2.5
03/07 04:00	109.69	2.78	1.65	03/08 22:00	347.37	4.55	2.4
03/07 05:00	114.40	2.77	1.74	03/08 23:00	349.26	4.57	2.4

START	FLO	LEV	VEL
Date Time	GPM	in.	FPS
----	----	----	----
03/09 00:00	276.35	4.11	2.26
03/09 01:00	188.11	3.47	2.00
03/09 02:00	145.21	3.05	1.88
03/09 03:00	81.42	2.35	1.60
03/09 04:00	60.91	2.07	1.46
03/09 05:00	64.30	2.12	1.49
03/09 06:00	51.40	1.91	1.40
03/09 07:00	58.61	2.02	1.45
03/09 08:00	179.29	3.25	1.94
03/09 09:00	383.38	4.71	2.56
03/09 10:00	259.60	3.08	1.75 <
03/09 11:00	0.00 *	0.17 *	0.00 *

Codes:

- K Multiply data by 1,000
- M Multiply data by 1,000,000
- No data for period
- * Incomplete data for period
- < Data below cutout value
- ^ Surcharge (level greater than pipe height)
- | Fill Data for period

1 HOUR MAXIMUMS and MINIMUMS for FLOW

Date: 03/09/98 11:24 File: A006079A.835
 CITY OF GOODYEAR
 FLOW STUDIES

260 A06079
 15 INCH
 ON BROADWAY BETWEEN
 BULLARD & ESTLA PT

Metering Period:
 03/05/98 12:00 - 03/09/98 11:10

Report Period:
 03/05/98 12:00 - 03/09/98 11:10

Date	Time	FLO GPM	LEV in.	VEL FPS	Date	Time	FLO GPM	LEV in.	VEL FPS
03/05	12:00	329.08	4.53	2.33	03/06	02:00	206.60	3.58	2.11
03/05	12:20	317.57	4.45	2.31	03/06	02:50	144.30	3.22	1.73
03/05	13:30	362.75	4.75	2.39	03/06	03:10	146.07	3.11	1.81
03/05	13:00	289.46	4.43	2.12	03/06	03:50	129.50	2.92	1.81
03/05	14:00	312.67	4.43	2.29	03/06	04:10	136.47	3.02	1.81
03/05	14:30	284.43	4.20	2.26	03/06	04:50	108.05	2.72	1.69
03/05	15:10	315.10	4.39	2.34	03/06	05:50	105.60	2.68	1.61
03/05	15:20	270.26	4.40	2.00	03/06	05:20	100.69	2.65	1.61
03/05	16:50	292.83	4.22	2.31	03/06	06:50	101.90	2.66	1.61
03/05	16:20	255.99	3.98	2.21	03/06	06:40	91.28	2.54	1.51
03/05	17:00	287.37	4.18	2.30	03/06	07:50	124.63	2.85	1.81
03/05	17:50	219.87	3.91	1.95	03/06	07:30	109.97	2.72	1.71
03/05	18:20	262.03	4.04	2.21	03/06	08:50	289.00	4.16	2.33
03/05	18:00	217.89	3.90	1.94	03/06	08:00	138.06	3.00	1.81
03/05	19:50	294.50	4.20	2.34	03/06	09:50	331.39	4.50	2.37
03/05	19:00	250.96	3.94	2.20	03/06	09:20	307.81	4.36	2.31
03/05	20:00	278.99	4.10	2.30	03/06	10:10	358.55	4.65	2.44
03/05	20:40	233.40	3.91	2.07	03/06	10:40	309.12	4.30	2.37
03/05	21:20	379.75	4.87	2.41	03/06	11:40	309.51	4.28	2.31
03/05	21:50	322.01	4.53	2.28	03/06	11:20	288.82	4.17	2.32
03/05	22:50	356.74	4.61	2.46	03/06	12:10	333.33	4.48	2.41
03/05	22:20	300.67	4.27	2.33	03/06	12:50	298.09	4.21	2.36
03/05	23:50	369.09	4.64	2.52	03/06	13:50	313.14	4.36	2.31
03/05	23:30	293.91	4.62	2.02	03/06	13:10	258.41	4.33	1.96
03/06	00:00	334.55	4.58	2.33	03/06	14:10	327.45	4.44	2.31
03/06	00:50	257.33	3.97	2.23	03/06	14:50	298.45	4.31	2.21
03/06	01:00	240.69	3.88	2.16	03/06	15:10	328.82	4.44	2.41
03/06	01:50	223.73	3.68	2.18	03/06	15:50	268.87	4.12	2.21

Date	Time	FLO GPM	LEV in.	VEL FPS	Date	Time	FLO GPM	LEV in.	VEL FPS
03/06	16:10	291.90	4.26	2.27	03/07	10:50	401.81	4.87	2.58
03/06	16:40	269.87	4.13	2.20	03/07	10:00	302.18	4.26	2.35
03/06	17:10	299.71	4.19	2.39	03/07	11:20	455.75	5.11	2.68
03/06	17:50	205.72	3.77	1.93	03/07	11:00	397.68	4.98	2.44
03/06	18:20	311.73	4.30	2.39	03/07	12:50	430.60	4.97	2.65
03/06	18:50	237.40	3.80	2.20	03/07	12:20	344.45	4.82	2.22
03/06	19:40	290.57	4.14	2.36	03/07	13:10	470.67	5.12	2.77
03/06	19:00	250.59	3.89	2.24	03/07	13:30	436.26	5.13	2.56
03/06	20:40	317.54	4.34	2.40	03/07	14:00	443.03	4.99	2.71
03/06	20:20	230.32	4.20	1.83	03/07	14:10	426.74	4.88	2.70
03/06	21:50	333.57	4.41	2.46	03/07	15:00	431.25	5.00	2.63
03/06	21:20	282.92	4.08	2.35	03/07	15:30	323.77	4.74	2.14
03/06	22:10	309.31	4.29	2.38	03/07	16:40	335.12	4.40	2.48
03/06	22:40	249.82	3.94	2.19	03/07	16:10	313.36	4.35	2.36
03/06	23:00	310.93	4.34	2.35	03/07	17:00	303.87	4.24	2.38
03/06	23:50	211.48	4.09	1.75	03/07	17:20	273.08	4.01	2.33
03/07	00:40	232.40	4.18	1.86	03/07	18:50	323.98	4.35	2.44
03/07	00:10	213.05	4.05	1.79	03/07	18:00	305.84	4.27	2.37
03/07	01:00	201.48	3.92	1.78	03/07	19:10	327.22	4.39	2.43
03/07	01:50	160.50	3.54	1.66	03/07	19:40	308.98	4.24	2.42
03/07	02:40	164.57	3.44	1.78	03/07	20:30	331.45	4.38	2.47
03/07	02:20	153.06	3.32	1.75	03/07	20:00	300.96	4.19	2.40
03/07	03:00	147.39	3.24	1.75	03/07	21:30	339.98	4.43	2.49
03/07	03:50	123.73	2.93	1.72	03/07	21:10	318.25	4.37	2.38
03/07	04:00	120.27	2.91	1.69	03/07	22:10	315.64	4.30	2.42
03/07	04:40	99.24	2.70	1.57	03/07	22:50	275.52	4.00	2.36
03/07	05:50	120.51	2.83	1.77	03/07	23:10	277.05	4.07	2.31
03/07	05:30	107.33	2.74	1.66	03/07	23:40	194.60	3.70	1.88
03/07	06:10	135.24	2.93	1.88	03/08	00:20	238.90	3.75	2.26
03/07	06:40	111.24	2.72	1.74	03/08	00:50	211.59	3.57	2.16
03/07	07:20	149.99	3.12	1.89	03/08	01:20	194.19	3.43	2.11
03/07	07:50	116.46	2.80	1.74	03/08	01:50	189.67	3.41	2.08
03/07	08:40	206.78	3.56	2.12	03/08	02:00	177.60	3.31	2.04
03/07	08:20	140.99	3.02	1.87	03/08	02:40	141.04	3.00	1.89
03/07	09:50	286.49	4.22	2.26	03/08	03:00	145.45	3.05	1.90
03/07	09:30	159.86	3.26	1.88	03/08	03:50	119.14	2.80	1.78

Date	Time	FLO GPM	LEV in.	VEL FPS	Date	Time	FLO GPM	LEV in.	VEL FPS
03/08	04:00	117.04	2.75	1.80	03/08	22:00	362.96	4.65	2.47
03/08	04:50	89.99	2.47	1.64	03/08	22:50	320.71	4.38	2.47
03/08	05:20	90.49	2.46	1.66	03/08	23:30	371.26	4.67	2.51
03/08	05:50	83.92	2.51	1.49	03/08	23:00	324.31	4.40	2.51
03/08	06:00	98.21	2.55	1.70	03/09	00:00	342.64	4.55	2.47
03/08	06:30	84.40	2.38	1.63	03/09	00:40	214.72	3.85	1.98
03/08	07:20	91.58	2.46	1.68	03/09	01:10	220.45	3.55	2.47
03/08	07:50	76.42	2.27	1.59	03/09	01:50	170.36	3.34	1.98
03/08	08:50	99.99	2.56	1.72	03/09	02:00	171.73	3.27	2.47
03/08	08:00	81.65	2.33	1.63	03/09	02:50	113.80	2.72	1.78
03/08	09:50	296.73	4.14	2.41	03/09	03:00	98.25	2.56	1.98
03/08	09:00	114.45	2.73	1.78	03/09	03:50	69.00	2.20	1.51
03/08	10:50	316.42	4.33	2.40	03/09	04:00	67.98	2.18	1.98
03/08	10:10	285.44	4.07	2.38	03/09	04:50	54.17	1.98	1.98
03/08	11:30	340.50	4.47	2.46	03/09	05:30	75.50	2.28	1.98
03/08	11:10	328.36	4.40	2.43	03/09	05:00	54.56	1.98	1.98
03/08	12:50	421.71	4.89	2.66	03/09	06:00	55.78	1.99	1.98
03/08	12:00	346.02	4.53	2.45	03/09	06:50	48.24	1.86	1.98
03/08	13:30	452.29	5.01	2.75	03/09	07:50	75.88	2.26	1.55
03/08	13:20	417.24	4.98	2.56	03/09	07:00	45.62	1.83	1.98
03/08	14:30	467.73	5.05	2.81	03/09	08:50	382.86	4.68	2.58
03/08	14:20	375.60	5.09	2.23	03/09	08:00	76.14	2.33	1.98
03/08	15:40	385.10	4.71	2.57	03/09	09:00	400.91	4.85	2.56
03/08	15:50	308.64	4.74	2.04	03/09	09:50	370.79	4.63	2.56
03/08	16:00	398.92	4.76	2.62	03/09	10:10	399.87	4.72	2.66
03/08	16:50	326.28	4.37	2.44	03/09	10:40	0.00	-0.12	0.00
03/08	17:00	337.45	4.42	2.48	03/09	11:00	0.00 *	0.17 *	0.00
03/08	17:40	268.51 *	4.00 *	2.30 *	03/09	11:00	0.00 *	0.17 *	0.00
03/08	18:30	336.70	4.28	2.60					
03/08	18:50	292.09	4.12	2.39					
03/08	19:20	306.04	4.26	2.38					
03/08	19:40	269.15	4.16	2.17					
03/08	20:40	352.59	4.55	2.48					
03/08	20:00	303.23	4.33	2.30					
03/08	21:30	374.90	4.70	2.51					
03/08	21:00	330.27	4.49	2.37					

Codes:

- . Multiply data by 1,000
- .1 Multiply data by 1,000,000
- No data for period
- * Incomplete data for period
- < Data less than cutout value
- ^ Surcharge (level greater than pipe height)
- | Fill Data for period