

2. AMENDMENT/MODIFICATION NO. 0003	3. EFFECTIVE DATE 19 August 2003	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO. (If applicable)
6. ISSUED BY Contracting Division USACE, Los Angeles District P.O. Box 532711 Los Angeles, CA 90053-2325		7. ADMINISTERED BY (If other than Item 6) Tropicana Project Office 4440 South Durango Drive Suite D Las Vegas, NV 89147	CODE CESPL-CT-E

8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code)	(√)	9A. AMENDMENT OF SOLICITATION NO. DACW09-03-B-0005
	X	9B. DATED (SEE ITEM 11) 9 June 2003
		10A. MODIFICATION OF CONTRACTS/ORDER NO.
		10B. DATED (SEE ITEM 13)
CODE	FACILITY CODE	

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

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

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

(a) By completing Items 8 and 15, and returning 1 copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

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

A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.

B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).

C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:

D. OTHER (Specify type of modification and authority)

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

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)
Section 0010 - The bid schedule has changed. See attached section 0010.

Section 0800

- Clause 52.232-4001, "Continuing Contracts" - Change the funds available from \$300,000 to \$10,000.
- Clause 252.236-7001 "Contract Drawings, Maps, and Specifications" - A new index of drawings is attached. See page 2 for a list of drawings that have changed.

Other technical specifications have changed (Sections 01200, 01270, 1355, 02230, 02300, 02500, 02700, 02741, 02748, 02821, 03101, 03361, 05502, and 09900). See page 2 for a list of sections that have changes, which are also attached.

Bid opening date has been changed from 1300 21 August 2003 to 1300 4 September 2003.

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

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

SF-30 CONTINUATION

DACW09-03-B-0005

AMENDMENT NO. 3

LIST OF DRAWINGS INCLUDED IN AMENDMENT NO. 3

T01_3.cal	T1	VICINITY MAP, PROJECT LOCATION MAP
T02_3.cal	T2	INDEX TO CONTRACT DRAWINGS ABBREVIATIONS AND SYMBOLS
T03_3.cal	T3	SURVEY CONTROL MAP
T04_3.cal	T4	WORK LIMITS BLUE DIAMOND WASH
T05_3.cal	T5	WORK LIMITS BLUE DIAMOND WASH
T06_3.cal	T6	WORK LIMITS STA. 47+01.5462 TO STA. 41+67.2024
T07_3.cal	T7	WORK LIMITS STA. 41+67.2024 TO STA. 37+00.000
T08_3.cal	T8	WORK LIMITS STA. 37+00.00 TO STA 30+19.84
T09_3.cal	T9	WORK LIMITS STA 30+19.84 TO STA. 25+00.00
T10_3.cal	T10	WORK LIMITS STA. 25+00.00 TO STA. 20+00.00
T11_3.cal	T11	WORK LIMITS STA. 20+00.00 TO STA. 14+00.00
T12_3.cal	T12	WORK LIMITS STA. 14+00.00 TO STA 10+00.00
C01_3.cal	C1	PLAN AND PROFILE INLET STRUCTURE TO STA. 51+00.000
C02_3.cal	C2	PLAN AND PROFILE STA. 51+00.00 TO STA. 49+40.00
C03_3.cal	C3	PLAN AND PROFILE STA. 49+40.000 TO STA. 46+20.000
C04_3.cal	C4	PLAN AND PROFILE STA. 46+20.000 TO STA 43+10.000
C05_3.cal	C5	PLAN AND PROFILE STA. 43+10.000 TO STA. 40+00.000
C06_3.cal	C6	PLAN AND PROFILE STA. 40+00.000 TO STA. 37+00.000
C07_3.cal	C7	PLAN AND PROFILE STA. 37+00.00 TO STA. 34+40.000
C08_3.cal	C8	PLAN AND PROFILE STA. 34+40.000 TO STA. 31+20.000
C09_3.cal	C9	PLAN AND PROFILE STA. 31+20.000 TO STA. 28+66.000
C11_3.cal	C11	PLAN AND PROFILE STA. 25+80.000 TO STA. 22+80.000
C12_3.cal	C12	PLAN AND PROFILE STA. 22+80.000 TO STA. 19+80.000
C13_3.cal	C13	PLAN AND PROFILE STA. 19+80.000 TO STA. 16+80.000
C14_3.cal	C14	PLAN AND PROFILE STA. 16+80.000 TO STA. 14+40.000
C15_3.cal	C15	PLAN AND PROFILE STA. 14+40.000 TO STA. 11+80.000
C16_3.cal	C16	PLAN AND PROFILE STA. 11+80.000 TO STA. 10+00.000
C17_3.cal	C17	PLAN AND PROFILE RHODES RANCH LATERAL
C19_3.cal	C19	PLAN AND PROFILE BELTWAY LATERAL
C20_3.cal	C20	TYPICAL CROSS SECTIONS
C21_3.cal	C21	TYPICAL CROSS SECTIONS
C22_3.cal	C22	TYPICAL CROSS SECTIONS
C23_3.cal	C23	TYPICAL CROSS SECTIONS
C24_3.cal	C24	TYPICAL CROSS SECTIONS
C24_3.cal	C24A	TYPICAL CROSS SECTIONS
C25_3.cal	C25	TYPICAL CROSS SECTIONS
C26_3.cal	C26	TYPICAL CROSS SECTIONS
C27_3.cal	C27	TYPICAL CROSS SECTIONS
C28_3.cal	C28	ACCESS RAMP TYPICAL CROSS SECTIONS
C29_3.cal	C29	CONCRETE OVERFLOW STRUCTURES STA. 37+88.000 TO STA. 40+68.000
C30_3.cal	C30	CONCRETE OVERFLOW STRUCTURES STA. 31+04.220 TO STA. 43+15.428
C31_3.cal	C31	UPPER BLUE DIAMOND WASH SLOPE PROTECTION BERM
C32_3.cal	C32	INLET STRUCTURE GRADING PLAN
C33_3.cal	C33	INLET STRUCTURE SECTIONS AND DETAILS
C35_3.cal	C35	ACCESS RAMP PROFILES
C36_3.cal	C36	OUTLET CONDUIT PLAN AND PROFILE

SF-30 CONTINUATION

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AMENDMENT NO. 3

LIST OF DRAWINGS INCLUDED IN AMENDMENT NO. 3

S02_3.cal S2 CHANNEL WALL SCHEDULE, DETAILS AND INVERT ACCESS LADDER DETAILS
 S03_3.cal S3 BOX CONDUIT SCHEDULE AND DETAILS
 S04_3.cal S4 BELTWAY CONFLUENCE PLAN, SECTIONS AND DETAILS
 S05_3.cal S5 BELTWAY CONFLUENCE SECTIONS AND DETAILS
 S08_3.cal S8 RHODES RANCH CONFLUENCE PLAN, SECTIONS AND DETAILS
 S09_3.cal S9 RHODES RANCH CONFLUENCE SECTIONS AND DETAILS
 S10_3.cal S10 INVERT ACCESS RAMP PLAN, PROFILE, SECTIONS AND DETAILS STA.
 17+66.000 TO STA 16+99.919
 S12_3.cal S12 INVERT ACCESS RAMP PLAN, PROFILE, SECTION AND DETAILS STA. 50+57.231
 TO STA. 49+93.000
 S13_3.cal S13 MANHOLE SCHEDULE AND DETAILS
 S14_3.cal S14 SIDE DRAIN TABULATION AND DETAILS
 S17_3.cal S17 INLET STRUCTURE-OUTLET TOWER
 S19_3.cal S19 RHODES RANCH/BELTWAY LATERAL DETAILS
 S20_3.cal S20 BELTWAY LATERAL TRANSITION DETAILS
 M01_3.cal M1 CHAIN LINK FENCING, MANWAY AND MAINTENANCE ROAD DETAILS
 M02_3.cal M2 PIPE SAFETY RAILING AND PIPE ACCESS RAMP GATE DETAILS AND SECTIONS
 M03_3.cal M3 POST AND CABLE SAFETY RAILING DETAILS
 M04_3.cal M4 ORNAMENTAL METAL FENCE DETAILS.
 M05_3.cal M5 CHAIN LINK FENCE AND GATE DETAILS
 G08_3.cal G8 LOGS OF EXPLORATION
 G09_3.cal G9 LOGS OF EXPLORATION
 G10_3.cal G10 LOGS OF EXPLORATION
 G11_3.cal G11 LOGS OF EXPLORATION
 G12_3.cal G12 LOGS OF EXPLORATION
 G13_3.cal G13 LOGS OF EXPLORATION
 D01A_3.cal D1A GENERAL AND CONSTRUCTION NOTES
 D03_3.cal D3 UTILITY CROSSING DETAILS, UBDDR STA. 17+90, 20+74, AND 22+55
 D04_3.cal D4 UTILITY CROSSING DETAILS, UBDDR STA. 33+25, 34+88, AND 37+24.4
 D05_3.cal D5 UTILITY CROSSING DETAILS, UBDDR STA. 37+87, 40+70, AND 43+34
 D06_3.cal D6 UTILITY CROSSING DETAILS, UBDDR STA. 45+44, 46+81, AND 47+36
 D08_3.cal D8 FRONTAGE ROAD DETOUR PLAN, CONSTRUCTION SIGNING & STRIPING
 D13_3.cal D13 REMOVAL AND RECONSTRUCTION, RHODES RANCH PARKWAY
 D15_3.cal D15 ROADWAY CONSTRUCTION PLAN, DURANGO DRIVE, STA. -7+50 TO STA. 4+00
 D16_3.cal D16 ROADWAY CONSTRUCTION PLAN, DURANGO DRIVE, STA. 4+00 TO STA. 15+00
 D17_3.cal D17 ROADWAY CONSTRUCTION PLAN, DURANGO DRIVE, STA. 15+00 TO STA.26+00
 D18_3.cal D18 ROADWAY CONSTRUCTION PLAN, DURANGO DRIVE, STA.26+00 TO STA. 36+00

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BID SCHEDULE

PART 1 GENERAL

1.1 Bid Items

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

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SECTION 00010

BID SCHEDULE

PART 1 GENERAL

Note : Some of the lump sum and unit price items reference drawings and plans that utilize English units of measurements.

1.1 Bid Items

Item	Description	Quantity	Unit		
			Unit	Price	Amount
0001	TRAFFIC CONTROL	1.00	LS	\$____.____	\$_____.____
0002	DIVERSION AND CONTROL OF WATER	1.00	LS	\$____.____	\$_____.____
0003	CLEAR SITE AND REMOVE OBSTRUCTIONS	1.00	LS	\$____.____	\$_____.____
0004	STRIP AND STOCKPILE TOPSOIL, BLM LANDS	2,655	m ³	\$____.____	\$_____.____
0005	EXCAVATION CHANNEL, NON BLM LAND	136,361	m ³	\$____.____	\$_____.____
0006	EXCAVATION CHANNEL, BLM LAND	10,792	m³	\$____.____	\$_____.____
0007	EXCAVATION INLET STRUCTURE, BLM LAND	6,786	m³	\$____.____	\$_____.____
0008	COMPACTED FILL, CHANNEL, NON BLM LAND	111,466	m ³	\$____.____	\$_____.____
0009	COMPACTED FILL, CHANNEL, BLM LAND	15,860	m ³	\$____.____	\$_____.____
0010	COMPACTED FILL, INLET STRUCTURE EMBANKMENT AND INVERT, BLM LAND	14,954	m ³	\$____.____	\$_____.____
0011	MISCELLANEOUS FILL, INLET STRUCTURE EMBANKMENT AND INVERT, BLM LAND	14,954	m³	\$____.____	\$_____.____

Item	Description	Quantity	Unit	Unit Price	Amount
0012	PLANT NURSERY AREA, TEMPORARY	1.00	LS	\$____.____	\$____.____
0013	OVERBURDEN RHODES RANCH	19,990	m ³	\$____.____	\$____.____
0014	CONCRETE, CHANNEL INVERT SLAB	2,781	m ³	\$____.____	\$____.____
0015	CONCRETE, CHANNEL WALLS	2,880	m ³	\$____.____	\$____.____
0016	CONCRETE OVERFLOW STRUCTURE STA. 43+15.428	1.00	LS	\$____.____	\$____.____
0017	CONCRETE OVERFLOW STRUCTURE STA. 40+68.000	1.00	LS	\$____.____	\$____.____
0018	CONCRETE OVERFLOW STRUCTURE STA. 37+88.000	1.00	LS	\$____.____	\$____.____
0019	CONCRETE OVERFLOW STRUCTURE STA. 31+04.220	1.00	LS	\$____.____	\$____.____
0020	GROUTED RIPRAP	261	m ³	\$____.____	\$____.____
0021	REINFORCING STEEL	510	t	\$____.____	\$____.____
0022	AGGREGATE BASE COURSE	3,200	t	\$____.____	\$____.____
0023	ASPHALT CONCRETE PAVEMENT	782	t	\$____.____	\$____.____
0024	WEEPHOLE SYSTEM	1.00	LS	\$____.____	\$____.____
0025	RCB CHANNEL AND BELTWAY LATERAL CONFLUENCE STRUCTURE	1.00	LS	\$____.____	\$____.____
0026	CHANNEL AND A PORTION OF BELTWAY LATERAL STRUCTURE	1.00	LS	\$____.____	\$____.____
0027	RCB CHANNEL FRONTAGE ROAD	1.00	LS	\$____.____	\$____.____
0028	RCB CHANNEL TIBERTI NORTH	1.00	LS	\$____.____	\$____.____
0029	CHANNEL AND RHODES RANCH CONFLUENCE STRUCTURE	1.00	LS	\$____.____	\$____.____

Item	Description	Quantity	Unit	Unit Price	Amount
0030	CHANNEL AND A PORTION OF RHODES RANCH LATERAL STRUCTURE	1.00	LS	\$____.____	\$_____.____
0031	RHODES RANCH LATERAL	1.00	LS	\$____.____	\$_____.____
0032	RHODES RANCH LATERAL END	1.00	LS	\$____.____	\$_____.____
0033	RCB CHANNEL RHODES RANCH	1.00	LS	\$____.____	\$_____.____
0034	RCB CHANNEL WINDMILL ROAD THROUGH SHELBOURNE AVE	1.00	LS	\$____.____	\$_____.____
0035	INVERT ACCESS RAMP 1	1.00	LS	\$____.____	\$_____.____
0036	INVERT ACCESS RAMP 2	1.00	LS	\$____.____	\$_____.____
0037	INVERT ACCESS RAMP 3	1.00	LS	\$____.____	\$_____.____
0038	INLET STRUCTURE SOIL CEMENT ARMOR	2,800	m ³	\$____.____	\$_____.____
0039	PORTLAND CEMENT FOR SOIL CEMENT	438	t	\$____.____	\$_____.____
0040	POZZOLAN FOR SOIL CEMENT	77	t	\$____.____	\$_____.____
0041	INLET STRUCTURE OUTLET RCB	1.00	LS	\$____.____	\$_____.____
0042	INLET STRUCTURE OUTLET TOWER	1.00	LS	\$____.____	\$_____.____
0043	SIDE DRAIN, STA. 47+38.569 RT	1.372	1.00	LS	\$____.____
0044	SIDE DRAIN, STA. 35+66.161 RT	0.762	1.00	LS	\$____.____
0045	SIDE DRAIN, STA. 34+77.325 RT	0.762	1.00	LS	\$____.____
0046	SIDE DRAIN, STA. 30+22.976 LT	0.610	1.00	LS	\$____.____
0047	SIDE DRAIN, STA. 22+82.178 RT	0.610	1.00	LS	\$____.____
0048	SIDE DRAIN, STA. 20+76.333 RT	0.914	1.00	LS	\$____.____
0049	MANHOLES FOR RCB CONDUITS, CULVERTS, AND LATERALS	1.00	LS	\$____.____	\$_____.____

Item	Description	Quantity	Unit	Unit Price	Amount
0050	ROAD DETOURS AT BELTWAY	1.00	LS	\$____.____	\$____.____
0051	EASTBOUND FRONTAGE ROAD REMOVAL AND RECONSTRUCTION	1.00	LS	\$____.____	\$____.____
0052	CHAIN LINK FENCE, 1.829 M HIGH 9 GAGE	400	m	\$____.____	\$____.____
0053	POST AND CABLE RAILING	4,758	m	\$____.____	\$____.____
0054	DOUBLE SWING GATES	5	ea	\$____.____	\$____.____
0055	PRE-EMERGENT HERBICIDE AND PIGMENTED DUST PALLIATIVE/SOIL STABILIZER ON NON-REVEGETATED AREAS OF INLET STRUCTURE AND CHANNEL	3.5	HA	\$____.____	\$____.____
0056	STATION MARKINGS	1.00	LS	\$____.____	\$____.____
0057	AS-BUILT DRAWINGS	1.00	LS	\$____.____	\$____.____
0058	LADDER SYSTEMS	1.00	LS	\$____.____	\$____.____
0059	SINGLE SWING GATES, MANWAY, 1.000 X 1.829	2	ea	\$____.____	\$____.____
0060	BASIN TRESPASS PREVENTION DEVICES - BOLLARDS	1.00	LS	\$____.____	\$____.____
0061	DURANGO DRIVE REMOVAL AND RECONSTRUCTION	1.00	LS	\$____.____	\$____.____
0062	PROVIDE PLANT STORAGE IRRIGATION DURING CONSTRUCTION	1.00	LS	\$____.____	\$____.____
0063	PROVIDE IRRIGATION FOR 1 YEAR AFTER CONSTRUCTION	1.00	LS	\$____.____	\$____.____
0064	ONE YEAR GUARANTEE ON LANDSCAPE WORK AT INLET STRUCTURE	1.00	LS	\$____.____	\$____.____
0065	TORTOISE FENCE, INLET STRUCTURE	1,000	m	\$____.____	\$____.____
0066	SALVAGE, STORE, AND MAINTAIN PLANTS - CACTUS	1	ea	\$____.____	\$____.____

Item	Description	Quantity	Unit	Price	Amount
0067	SALVAGE, STORE, AND MAINTAIN PLANTS - CREOSOTE BUSH	20	ea	\$____.____	\$____.____
0068	SALVAGE, STORE, AND MAINTAIN PLANTS - WHITE BURSAGE	20	ea	\$____.____	\$____.____
0069	SALVAGE, STORE, AND MAINTAIN PLANTS - MOHAVE YUCCA	6	ea	\$____.____	\$____.____
0070	TRANSPLANT CACTUS	1	ea	\$____.____	\$____.____
0071	TRANSPLANT CREOSOTE BUSH	20	ea	\$____.____	\$____.____
0072	TRANSPLANT WHITE BURSAGE	20	ea	\$____.____	\$____.____
0073	TRANSPLANT MOHAVE YUCCA	6	ea	\$____.____	\$____.____
0074	PLACE TOPSOIL TO FINISH GRADE, DOWNSTREAM SURFACE INLET STRUCTURE EMBANKMENT	8,260	m ³	\$____.____	\$____.____
0075	SEEDING AND FERTILIZATION, DOWNSTREAM SURFACE INLET STRUCTURE EMBANKMENT	4.1	HA	\$____.____	\$____.____
0076	PROVIDE BROWSE PROTECTION	40	ea	\$____.____	\$____.____
0077	SIMULATED DESERT VARNISH ROCK COLOR MITIGATION	1.00	LS	\$____.____	\$____.____
0078	SOIL SAMPLING AND TESTING FOR FERTILITY	4	ea	\$____.____	\$____.____
0079	PIGMENTED DUST PALLIATIVE/SOIL STABILIZER ONLY ON REVEGETATED AREAS	4.1	HA	\$____.____	\$____.____
0080	PROVIDE CHANNEL EXCAVATION SHORING ON WEST SIDE OF EXCAVATION FROM STA. 35+57.644 TO STA. 35+02.853 AND STA. 34+86.656 TO STA. 34+40.000 TO PROTECT STREET IMPROVEMENTS	1.00	LS	\$____.____	\$____.____

Item	Description	Quantity	Unit	Unit Price	Amount
0081	PROVIDE CHANNEL EXCAVATION SHORING ON WEST SIDE OF EXCAVATION FROM STA. 34+40.000 TO STA. 34+16.498 AND ON EAST SIDE OF EXCAVATION FROM STA. 34+30.000 TO STA. 33+02.481 TO PROTECT STREET AND LANDSCAPING IMPROVEMENTS	1.00	LS	\$____.____	\$____.____
0082	RHODES RANCH ENTRY PHASE 1 DETOUR	1.00	LS	\$____.____	\$____.____
0083	RHODES RANCH ENTRY PHASE 2 DETOUR	1.00	LS	\$____.____	\$____.____
0084	RHODES RANCH ENTRY REMOVAL AND RECONSTRUCTION	1.00	LS	\$____.____	\$____.____
0085	DURANGO DRIVE ROAD CLOSURE - ROBINDALE ROAD TO WIGWAM AVENUE	1.00	LS	\$____.____	\$____.____
0086	RCB CHANNEL UNDER BELTWAY ON RAMP	1.00	LS	\$____.____	\$____.____
0087	ORNAMENTAL METAL FENCING	942.0	M	\$____.____	\$____.____
0088	ORNAMENTAL METAL FENCING GATES	2	EA	\$____.____	\$____.____
0089	UTILITY CROSSING ITEMS	1.00	LS	\$____.____	\$____.____
0090	OUTLET CONDUIT SIDE DRAIN STRUCTURE, STA. 51+03.000 RT 0.910 x 0.910	1.00	LS	\$____.____	\$____.____
0091	1.829 M x 1.524 M SIDE DRAIN STRUCTURE, STA. 13+40.000 LT	1.00	LS	\$____.____	\$____.____
0092	WALL TRANSITION STRUCTURE STA. 49+00.000 TO STA. 48+40.000	1.00	LS	\$____.____	\$____.____
0093	WALL TRANSITION STRUCTURE STA. 43+30.730 TO STA. 43+23.130	1.00	LS	\$____.____	\$____.____
0094	WALL TRANSITION STRUCTURE STA. 37+46.980 TO STA. 37+35.580	1.00	LS	\$____.____	\$____.____

Item	Description	Quantity	Unit	Unit	
				Price	Amount
0095	WALL TRANSITION STRUCTURE STA. 33+65.000 TO STA. 33+59.600	1.00	LS	\$____.____	\$____.____
0096	WALL TRANSITION STRUCTURE STA. 30+29.440 TO STA. 30+18.420	1.00	LS	\$____.____	\$____.____
0097	WALL TRANSITION STRUCTURE STA. 22+84.000 TO STA. 22+71.300	1.00	LS	\$____.____	\$____.____
0098	WALL TRANSITION STRUCTURE STA. 16+52.700 TO STA. 16+40.000	1.00	LS	\$____.____	\$____.____
0099	WALL TRANSITION STRUCTURE STA. 15+70.000 TO STA. 15+57.300	1.00	LS	\$____.____	\$____.____
0100	WALL TRANSITION STRUCTURE STA. 12+80.000 TO STA. 12+67.938	1.00	LS	\$____.____	\$____.____
0101	UTILITY MARKERS	26	EA	\$____.____	\$____.____
0102	CONCRETE OVERFLOW STRUCTURE STA. 17+04.885	1.00	LS	\$____.____	\$____.____
0103	ADJUST SEWER MANHOLE FRAMES AND COVERS BETWEEN STATION 43+30.730 THROUGH STATION 37+00.000	10	EA	\$____.____	\$____.____
0104	RCB CHANNEL LOUGHTON POWERS	1.00	LS	\$____.____	\$____.____
0105	RCB CHANNEL BADURA	1.00	LS	\$____.____	\$____.____
0106	OVERBURDEN RHODES RANCH ENTRYWAY	1,976	m ³	\$____.____	\$____.____
0107	WALL TRANSITION STRUCTURE STA. 21+15.700 TO STA. 21+03.000	1.00	LS	\$____.____	\$____.____
0108	PROTECT IN-PLACE ARLINGTON RANCH SEWER LINE	1.00	LS	\$____.____	\$____.____
0109	ADJUST ARLINGTON RANCH SEWER MANHOLES	1.00	LS	\$____.____	\$____.____

Item	Description	Quantity	Unit	Unit Price	Amount
0110	CHAIN LINK FENCE, 1.219 M HIGH	1,084	m	\$____.____	\$____.____
0111	WALL TRANSITION STRUCTURE STA. 17+90.000 TO STA. 17+80.900	1.00	LS	\$____.____	\$____.____
0112	RCB CHANNEL TIBERTI SOUTH	1.00	LS	\$____.____	\$____.____
0113	SINGLE SWING GATES, 1.000 X 1.219	6	ea	\$____.____	\$____.____
0114	BELTWAY LATERAL TRANSITIONAL RCB STRUCTURE AT DURANGO DRIVE	1.00	LS	\$____.____	\$____.____
0115	ORNAMENTAL METAL FENCE GATES, SINGLE SWING, 1.000 X 1.800	6	ea	\$____.____	\$____.____
0116	CHAIN LINK FENCE, 1.829 M HIGH 11 GAGE	1,000	m	\$____.____	\$____.____
0118	SIDE DRAIN, STA. 44+20.000 RT	0.610	1.00	LS	\$____.____
0119	SIDE DRAIN, STA. 44+20.000 LT	0.610	1.00	LS	\$____.____
0120	SIDE DRAIN, STA. 39+40.000 LT	0.610	1.00	LS	\$____.____
0121	SIDE DRAIN, STA. 36+20.000 LT	0.610	1.00	LS	\$____.____
TOTAL ESTIMATED AMOUNT				\$_____.	

Abbreviations:

m = meter
m³ = cubic meter
m² = square meter
t = metric ton (1000 kilograms)
ea = each
LS = lump sum
HA = hectare

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TITLE/ DESCRIPTION	DISTRICT FILE NO.	DRAWING NO.
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INDEX TO CONTRACT DRAWINGS ABBREVIATIONS AND SYMBOLS	214/058	T2
SURVEY CONTROL PLAN	214/059	T3
WORK LIMITS BLUE DIAMOND WASH	214/060	T4
WORK LIMITS BLUE DIAMOND WASH	214/061	T5
WORK LIMITS STA. 47+01.5462 TO STA. 41+67.2024	214/062	T6
WORK LIMITS STA. 41+67.2024 TO STA. 37+00.000	214/063	T7
WORK LIMITS STA. 37+00.00 TO STA 30+19.84	214/064	T8
WORK LIMITS STA 30+19.84 TO STA. 25+00.00	214/065	T9
WORK LIMITS STA. 25+00.00 TO STA. 20+00.00	214/066	T10
WORK LIMITS STA. 20+00.00 TO STA. 14+00.00	214/067	T11
WORK LIMITS STA. 14+00.00 TO STA 10+00.00	214/068	T12
PLAN AND PROFILE INLET STRUCTURE TO STA. 51+00.000	214/071	C1
PLAN AND PROFILE STA. 51+00.00 TO STA. 49+40.00	214/072	C2
PLAN AND PROFILE STA. 49+40.000 TO STA. 46+20.000	214/073	C3
PLAN AND PROFILE STA. 46+20.000 TO STA 43+10.000	214/074	C4
PLAN AND PROFILE STA. 43+10.000 TO STA. 40+00.000	214/075	C5
PLAN AND PROFILE STA. 40+00.000 TO STA. 37+00.000	214/076	C6
PLAN AND PROFILE STA. 37+00.00 TO STA. 34+40.000	214/077	C7
PLAN AND PROFILE STA. 34+40.000 TO STA. 31+20.000	214/078	C8
PLAN AND PROFILE STA. 31+20.000 TO STA. 28+66.000	214/079	C9
PLAN AND PROFILE STA. 28+66.000 TO STA. 25+80.000	214/080	C10
PLAN AND PROFILE STA. 25+80.000 TO STA. 22+88.000	214/081	C11
PLAN AND PROFILE STA. 22+80.000 TO STA. 19+80.000	214/082	C12
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TYPICAL CROSS SECTIONS	214/093	C23
TYPICAL CROSS SECTIONS	214/094	C24
TYPICAL CROSS SECTIONS	214/095	C25
TYPICAL CROSS SECTIONS	214/096	C26
TYPICAL CROSS SECTIONS	214/097	C27
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SECTION 01200

GENERAL REQUIREMENTS

PART 1 GENERAL

1.1 REFERENCES

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

ASME INTERNATIONAL (ASME)

ASME B18.2.1 (1996) Square and Hex Bolts and Screws, Inch Series

ASME B18.2.2 (1987; R 1999) Square and Hex Nuts

ASTM INTERNATIONAL (ASTM)

ASTM F 1667 (2002) Driven Fasteners: Nails, Spikes, and Staples

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

NIST PS 20 (1999) American Softwood Lumber Standards

U.S. DEPARTMENT OF COMMERCE (DOC)

PS1 (1995) Construction and Industrial Plywood

MASTER PAINTERS INSTITUTE (MPI)

MPI 5 (Jan 2003) Exterior Alkyd Wood Primer

MPI 10 (Jan 2003) Exterior Latex, Flat

1.2 SUBMITTALS

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

SD-01 Preconstruction Submittals

Topographic Surveyor; G, RE.

The Topographic Surveyor firm selected by the Contractor must be approved by the Contracting Officer prior to performing surveys for this contract.

1.3 PROJECT FACILITIES

The Contractor shall construct and/or erect the following project facilities as soon as possible and not less than 15 calendar days after notice to proceed.

1.3.1 Construction Signs

The signs shall include the following:

- a. Project Signs: One Project Sign at location designated by the Contracting Officer.
- b. Warning Signs: Facing approaching traffic on all haul roads crossing under overhead power transmission lines.
- c. Hard Hat Signs: Ten hard hat signs at locations directed.

1.3.2 Bulletin Board

Bulletin board shall be erected at the Contractor's office.

1.3.3 Sanitary Facilities

Suitable sanitary facilities shall be provided and maintained by the Contractor.

PART 2 PRODUCTS

2.1 CONSTRUCTION SIGNS

2.1.1 Materials

2.1.1.1 Lumber

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

2.1.1.2 Plywood

PS1, grade A-C, Group 1, exterior type.

2.1.1.3 Bolts, Nuts and Nails

Bolts shall conform to ASME B18.2.1, nuts shall conform to ASME B18.2.2, and nails shall conform to ASTM F 1667.

2.1.1.4 Paints and Oils

Paints shall conform to MPI 5 for primer and MPI 10 for finish paint and lettering.

PART 3 EXECUTION

3.1 CONSTRUCTION OF SIGNS

3.1.1 Project and Hard Hat Signs

Constructed as detailed in Figures 1, 1A, 2, 3 and Safety Signs. Decals signs will be furnished by the Contracting Officer.

3.1.2 Warning Signs

Constructed of plywood not less than 1/2 inch thick and shall be securely bolted to the supports with the bottom of the sign face 3 feet above the ground. The sign face shall be 24 in. x 48 in., all letters shall be 4 in. in height, and the wording shall be: "WARNING: OVERHEAD TRANSMISSION LINES."

3.2 PAINTING SIGNS

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

3.3 PROJECT ENGINEERS'S OFFICE EQUIPMENT

Contractor shall provide computer software (3.5" floppy disc size) to the Contracting Officer for the type of scheduling system to be used and quantity/fill programs for tracking or estimating bid quantities during construction. Scheduling software must be capable of downloading completely to the COE Standard Data Exchange Format. The Contractor shall utilize a hand held radio system for communication between the Contractor's quality control representative and the Government's quality assurance representative. Radio equipment for the Governments use shall include a hand held radio, two batteries and one charger. The Contractor shall provide Government personnel with the following equipment for the duration of the contract: 1 Cellular telephone with voice mail, 2 nickel cadmium batteries, 1 desk top charger, 1 travel charger, and 400 minutes of air time per month or portion thereof.

3.4 BULLETIN BOARD

A weatherproof bulletin board, approximately 36 inches wide and 30 inches high, with hinged glass door shall be provided adjacent to or mounted on the Contractor's project office. If adjacent to the office, the bulletin board shall be securely mounted on no less than 2 posts. Bulletin board and posts shall be painted or have other approved factory finish. The bulletin board shall be easily accessible at all times and shall contain wage rates, equal opportunity notice, and such other items required to be posted.

3.5 MAINTENANCE AND DISPOSAL OF PROJECT FACILITIES

The Contractor shall maintain the project facilities in good condition throughout the life of the project. Upon completion of work under this contract, the facilities covered under this section will remain the property of the Contractor and shall be removed from the site at his expense.

3.6 UNSATISFACTORY AND SCRAP MATERIAL

Materials characterized as unsatisfactory soil in accordance with Section 02300 EARTHWORK and materials indicated to be removed and not indicated to be salvaged, stored or reinstalled are designated as scrap shall become the property of the Contractor and be removed from the site of work. The Contractor by signing this contract hereby acknowledges that he made due allowance for value, if any, of such scrap in the contract price.

3.7 ARCHAEOLOGICAL FINDINGS DURING CONSTRUCTION

Should the Contractor or any of his employees in the performance of this contract find or uncover any archaeological remains, he shall notify the Project Engineer immediately. Such notifications will be a brief statement in writing giving the location and nature of the findings. Should the discovery site require archaeological studies resulting in delays and/or additional work, the Contractor will be compensated by an equitable adjustment under the CONTRACT CLAUSES of the contract.

3.8 PROTECTION OF EXISTING WORK

Before beginning any cutting or removal work, the Contractor shall carefully survey the existing work and examine the drawings and specifications to determine the extent of the work. The Contractor shall take all necessary precautions to insure against damage to such work to remain in place, to be reused, or to remain the property of the Government, and any damage to such work shall be repaired or replaced as approved by the Contracting Officer at no additional cost to the Government. The Contractor shall carefully coordinate the work of this section with all other work and construct and maintain shoring, bracing and supports, as required. The Contractor shall insure that structural elements are not overloaded and be responsible for increasing structural supports or adding new supports as may be required as a result of any cutting, removal, or demolition work performed under any part of this contract.

3.9 PUBLIC UTILITIES, NOTICES, AND RESTRICTIONS

3.9.1 General

The approximate location of all railroads, pipe lines, power and communication lines, and other utilities known to exist within the limits of the work are indicated on the drawings. The sizes, locations, and names of owners of such utilities are given from available information, but their accuracy is not guaranteed. Except as otherwise indicated on the drawings, all existing utilities will be left in place and the Contractor shall

conduct his operations in such a manner that the utilities will be protected from damage at all times, or arrangements shall be made by the Contractor for their relocation at the Contractor's own expense. The Contractor shall be responsible for any damage to utilities known to exist and shall reimburse the owners for such damage caused by his operations.

3.9.2 Relocation or Removal

Utilities to be relocated or removed not as part of this contract are designated "To be Relocated by Others" or "To be Removed by Others", respectively. Utilities shown on the plans and not so designated will be left in place and be subject to the provisions of the CONTRACT CLAUSE: PROTECTION OF EXISTING VEGETATION, STRUCTURES, UTILITIES, AND IMPROVEMENTS.

The Contractor may make arrangements with the owner for the temporary relocation and restoration of utilities not designated to be relocated, or for additional work in excess of the work needed to relocate utilities designated for relocation at no additional cost to the Government.

3.9.3 Utilities Not Shown

If the Contractor encounters, within the construction limits of the entire project, utilities not shown on the plans and not visible as of the date of this contract and if such utilities will interfere with construction operations, he shall immediately notify the Contracting Officer in writing to enable a determination by the Contracting Officer as to the necessity for removal or relocation. If such utilities are left in place, removed or relocated, as directed by the Contracting Officer, the Contractor shall be entitled to an equitable adjustment for any additional work or delay.

3.9.4 Coordination

The Contractor shall consult and cooperate with the owner of utilities that are to be relocated or removed by others to establish a mutual performance schedule and to enable coordination of such work with the construction work. These consultations shall be held as soon as possible after award of the contract or sufficiently in advance of anticipated interference with construction operations to provide required time for the removal or relocation of affected utilities.

3.9.5 Notices

3.9.5.1 Utilities To be Relocated or Protected

The Contractor shall notify the Contracting Officer, in writing, 14 calendar days prior to starting work on any utility to be relocated or protected. On each relocation, notification shall include dates on which the Contractor plans excavation, by-pass work, removal work and/or installation work, as applicable.

3.9.5.2 Existing Bench Marks and R/W Markers

The Contractor shall notify the Contracting Officer, in writing, 7 days in advance of the time he proposes to remove any bench mark or right-of-way marker.

3.9.5.2 Disposal Site

There is no **off project site** disposal site for **non-BLM Lands** excess satisfactory excavated materials. See Paragraph DISPOSAL OF EXCESS EXCAVATED MATERIALS.

3.9.5.3 Spill Reporting

The Contractor shall notify the Contracting Officer immediately after any spill, regardless of quantity, including all personnel exposures. The Contractor shall submit a written notification not later than 7 calendar days after the initial notification. The written notification shall include the following:

- a. Item spilled, leaked or releases in an unauthorized manner (Identification, Quantity and Manifest Numbers).
- b. Whether the amount spilled, leaked or released in an unauthorized manner is EPA reportable and, if reported, a copy of the report.
- c. Exact location of the spill, leak or unauthorized release.
- d. Nature of exposure to personnel.
- e. Containment procedures initiated.
- f. Anticipated cleanup and disposal procedure.
- g. Disposal location of spill, leak or unauthorized release residue.

3.9.5.4 Environmental Assessment Requirement

In order to satisfy the Environmental Assessment for this project, the Contracting Officer is required to have a qualified biologist on site at all times while clearing and grubbing operations South of Shelbourne Avenue are in progress. The biologist will be provided by the government. The Contractor shall notify the Contracting Officer 14 calendar days prior to the start of clearing and grubbing activities immediately South of Shelbourne Avenue on BLM Lands so that a biological monitor shall be required to walk immediately in front of the Contractor's clearing and grubbing equipment to survey for the threatened desert tortoise. For scheduling purposes, the Contractor shall coordinate and complete all clearing and grubbing activities within one-four workday period.

3.9.6 Restrictions

3.9.6.1 Representatives of Other Agencies

Personnel representing owners and agencies may be present for various portions of the work. However, the Contractor will be responsible only to the Contracting Officer.

3.9.6.2 Traffic Control Plan

The Contractor shall develop a Traffic Control Plan and obtain an approval from the Clark County Department of Public Works prior to construction. The plan shall include vehicular detour plans, details of truck haul routes, details of roadway restriping and signage for vehicular circulation, and parking details.

3.9.6.2 Existing Roads

The work shall be planned in such a manner that traffic on the existing roads outside actual construction areas and through the construction area shall be maintained at all times. The work area shall be examined carefully relative to the order and scope of work to be performed, with respect to the limiting provisions of the plans and specifications. The construction schedule shall be prepared giving full consideration to not impacting and maintaining traffic on existing roads outside and through the construction area. Additional work on the existing roads may be done by others during the life of this contract.

3.9.6.3 Access and Haul Roads

Plans shall be submitted for approval for all proposed access and haul roads, whether within or outside the limits of the construction area, at least 15 calendar days prior to construction of such roads. The plans shall indicate width of road, direction of traffic, road markings, type of guardrail, curves, grades, runouts, and other information in sufficient detail for studying safety of the proposed roads. Haul roads shall be proposed so that use of existing residential streets and roads are minimized.

3.9.6.4 Public and Private Access Roads

When it is necessary for heavy equipment to operate on or to cross project roads or arterial roads, flaggers, signs, lights and/or other necessary safeguards shall be furnished to safely control and direct the flow of traffic. When it is necessary to operate on existing roads outside the construction area, all necessary permits shall be obtained from the appropriate private or public authority. Work shall be conducted in such manner so as to obstruct and inconvenience traffic on existing roads outside the construction limits as little as possible. Spillage of earth, dusty materials, boulders, and mud on project roads or other road will not be permitted. If spillage cannot be prevented, the spillage shall be immediately removed and such areas shall be kept clear throughout the workday. At the conclusion of each workday, such traveled areas shall be cleared of spillage, boulders, and mud.

3.9.6.5 Maintenance of Roads

All haul and access roads, within the construction area, including the borrow areas, shall be maintained to provide vehicular access for the Government's vehicles and the Contractor's vehicles and equipment. Road maintenance shall include rock/mud slides, washouts, and any incident which would restrict vehicular/equipment access. Prior to any alterations of any road alignment, the Contractor shall receive an approval from the

Contracting Officer. Road maintenance and alterations shall be performed by the Contractor at no additional cost to the Government.

3.9.6.6 Traffic Safety

In accordance with CONTRACT CLAUSE: ACCIDENT PREVENTION, signs, barricades, and warning devices shall be provided, installed, and maintained as are required for protection of vehicular traffic at any location where operations interfere with public roads. Signs, barricades, lights, and signals, shall be in conformance with DOT D-6.1.

3.9.6.7 Rock and Gravel

Rock and gravel for use on haul roads and other facilities may be obtained from any source with the excavation limits or stockpiles within the project boundaries not designated for other use. The use of any such source shall be subject to approval by the Contracting Officer.

3.9.6.8 Cooperation with Others

In addition to CONTRACT CLAUSE: OTHER CONTRACTS, agreements shall be made for cooperative use and maintenance of project road directly between the Contractors concerned and shall be subject to approval by the Contracting Officer. No maintenance shall be charged for its use of the roads. During the life of this contract, the Contractor is advised that the activities of other contractors will require access to portions of the Project Limits. These activities are listed at the end of this section under, SPECIAL CONSTRUCTION REQUIREMENTS. The Contractor shall coordinate his activities and cooperate with other contractors as to not delay or interfere with their work.

3.9.6.9 Temporary Culverts

Temporary culverts shall be provided as required for road drainage. Temporary culverts shall be corrugated metal pipe of adequate diameter. Exact locations of the temporary culverts shall be subject to approval by the Contracting Officer.

- a. All culverts within the construction area, including the borrow areas, shall be maintained to provide unrestricted flow through the culverts. Culvert maintenance shall include debris cleaning, repair of failures, and extension of culverts due to road alterations. Culvert maintenance shall be performed by the Contractor at no additional cost to the Government.

3.9.7 Working Hours

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

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

No work will be permitted on Sundays or Federal Holidays without the prior

written approval from the Contracting Officer.

3.9.8 Construction Water

There are no known developed sources for water at or in the immediate vicinity of the project site. The Contractor shall be responsible for obtaining water for construction purposes at no additional cost to the Government.

3.9.9 Lighting

The Contractor shall provide a minimum of 5 foot-candle lighting intensity for all construction areas during the contract performance period.

3.9.10 Identification of Vehicles

All the Contractor's vehicles shall display suitable permanent identification.

3.9.11 Construction Method Observation

Any construction method, plant, or piece of equipment used on this contract shall not be considered proprietary, and can be inspected or photographed at any time by the Government, regulatory agencies, or any group approved by the Government.

3.9.12 Contractor's Equipment

The planned method of transportation and operation of cranes and other heavy equipment to be used in the performance of this contract shall be submitted for approval by the Contracting Officer. The plan shall include the type, size, loadings of equipment, the proposed transportation routes, and work areas to be used on the project.

3.10 PUBLIC SAFETY

Attention is directed to the CONTRACT CLAUSE: PERMITS AND RESPONSIBILITIES.

The Contractor shall provide temporary fencing, barricades, and/or guards, as required, to provide protection in the interest of public safety. Whenever the contractor's operations create a condition hazardous to the public, he shall furnish at his own expense and without cost to the Government, such flagmen and guards as are necessary to give adequate warning to the public of any dangerous conditions to be encountered and he shall furnish, erect, or maintain such fences, barricades, lights, signs and other devices as are necessary to prevent accidents and avoid damage or injury to the public. Flagmen and guards, while on duty and assigned to give warning and safety devices shall conform to applicable city, county, and state requirements. Should the Contractor appear to be neglectful or negligent in furnishing adequate warning and protection measures, the Contracting Officer may direct attention to the existence of a hazard and the necessary warning and protective measures shall be furnished and installed by the Contractor without additional cost to the Government. Should the Contracting Officer point out the inadequacy of warning and protective measures, such action of the Contracting Officer shall not

relieve the Contractor from any responsibility for public safety or abrogate his obligation to furnish and pay for those devices. The installation of any general illumination shall not relieve the Contractor of his responsibility for furnishing and maintaining any protective facility.

3.10.1 CONTRACTOR SAFETY PERSONNEL REQUIREMENT

3.10.1.1 General

Full-time, on-site, safety coverage by Contractor shall be required at all times during this contract. The Contractor shall employ at the project site to cover all hours of work at least one Safety and Occupational Health Technician per shift, to manage the Contractor's accident prevention program. In addition, the Contractor shall have one Safety and Occupational Health Professional to manage the overall Safety program. The principal safety person (the Safety Professional) shall report to and work directly for the Contractors on-site top manager, higher level official, or corporate safety office. The Safety and Health staff shall have the authority to take immediate steps to correct unsafe or unhealthful conditions. The presence of a Safety and Health person will not abrogate safety responsibilities of other personnel. The Safety and Health person shall be assigned no other duties.

3.10.1.2 Qualifications for Safety and Health Professional(s)

- a. Shall have a degree in engineering or safety in at least a four year program from an accredited school and in addition, shall have been engaged in safety and occupational health for at least two (2) years, no time being credited to these two (2) years unless at least fifty (50) percent of the time each year was devoted to safety and occupational health; or
- b. Shall have legal registration as a Professional Engineer, Certified Safety Professional, or a Certified Safety Manager, and, in addition, shall have been engaged in safety and occupational health for at least one (1) year, no time being credited to this one (1) year experience unless at least fifty (50) percent of the time was devoted to safety and occupational health; or
- c. Shall have degree other than that specified in (a) above and in addition, shall have been engaged in safety and occupational health for at least three (3) years, no time being credited to these three (3) years unless at least fifth (5) percent of the time each year was devoted to safety and occupational health; or
- d. In lieu of a degree, shall have been engaged in safety and occupational health for at least five (5) years, no time being credited to these five (5) years unless at least fifty (50) percent of the time each year was devoted to safety and occupational health.
- e. First aid work is not creditable experience.

3.10.1.3 Qualification for Safety and Health Technicians

- a. A bachelors degree in safety or an associated discipline and currently employed in a safety position; or
- b. An associate degree in Safety or an associated discipline and currently experience in Safety, and currently employed in a safety position; or
- c. Five years field experience in safety or an associated discipline and currently employed in a safety position.
- d. First Aid work is not creditable experience.

3.10.1.4 Names and Duties

The name and qualifications of nominated safety persons shall be furnished to the Contracting Officer (in resume format) for acceptability. A functional description of duties shall be provided prior to the pre-work conference. In addition, a copy of a letter from an authorized official of the Contractor which describes the duties and authority of the safety professional, including delegating sufficient authority to stop work to immediately correct the unsafe or unhealthful conditions.

3.11 OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA) STANDARDS

The OCCUPATIONAL SAFETY and HEALTH ACT (OSHA) STANDARDS for CONSTRUCTION (Title 29, Code of Federal Regulations Part 1926 as revised from time to time) and the Corps of Engineers General Safety and Health Requirements Manual, EM 385-1-1, are both applicable to this contract. The most stringent requirement of the two standards will be applicable.

3.11.1 Accident Reporting

In accordance with EM 385-1-1, the Contractor shall submit a written summary of worker's compensation claims which have been filled by worker's in connection with work on the project. The summary shall be submitted at the time when the work is approximately 50 percent complete and at project completion. The summary shall include all subcontractors. The Contractor's and subcontractor's compensation insurance carrier shall certify that the summaries are "correct and true".

3.12 PERMITS

3.12.1 General

Reference is made to the article of the contract entitled "Permits and Responsibilities", which obligates the Contractor to obtain all required licenses and permits.

3.12.2 Air Pollution Permit (APP)

The Contractor shall obtain an APP from the Clark County Health Department. For further information, contact Ms. Cynthia Mikes at telephone number (702) 383-1276.

3.12.3 National Pollutant Discharge Elimination System (NPDES) Permit

The Contractor shall obtain a NPDES permit from the United States Environmental Protection Agency (USEPA) under the Nation Wide Permit (NWP) program, which requires that a Storm Water Pollution Prevention Plan (SWPPP) shall be prepared and maintained on-site throughout the construction period. A copy of the plan will be submitted to the Contracting Officer. In accordance with the NWP, a minimum of two (2) days prior to the start of construction activities, the Contractor shall submit a Notice of Intent (NOI) with fees to the Nevada Division of USEPA. The NOI shall be submitted on the standard EPA Form 3510-6 (8-92), and copies shall be provided to the Contracting Officer. For further information, contact Mr. Robb Saunders at telephone number (702) 687-4670.

3.13 NOTICE OF PARTNERSHIP

The Government intends to encourage the foundation of a cohesive partnership with the Contractor and its subcontractors. This partnership will be structured to draw on the strengths of each organization to identify and achieve reciprocal goals. The objectives are effective and efficient contract performance and intended to achieve completion within budget, on schedule, and in accordance with plans and specifications. This partnership would be bilateral in makeup, and participation will be totally voluntary. Any cost associated with effectuating this partnership will be agreed to by both parties and will be shared equally with no change in contract price. To implement this partnership initiative it is anticipated that within 60 days of Notice to Proceed the Contractor's on-site project manager and the Government's Resident Engineer would attend a two day partnership development seminar/team building workshop together with the Contractor's key on-site staff and key Government personnel. Follow-up workshop of 1 to 2 days duration would be held periodically throughout the duration of the contract as agreed to by the Contractor and Government.

3.14 TIME EXTENSIONS FOR UNUSUALLY SEVERE WEATHER (ER 415-1-15, 31 OCT 89)

- a. This provision specifies the procedure for determination of time extensions for unusually severe weather in accordance with the CONTRACT CLAUSE: DEFAULT (FIXED PRICE CONSTRUCTION). In order for the Contracting Officer to award a time extension under this clause, the following conditions must be satisfied:
 - (1) The weather experienced at the project site during the contract period must be found to be unusually severe, that is, more severe than the adverse weather anticipated for the project location during any given month.
 - (2) The unusually severe weather must actually cause a delay to the completion of the project. The delay must be beyond the control and without the fault or negligence of the Contractor.
- b. The following schedule of monthly anticipated adverse weather delays is based on National Oceanic and Atmospheric Administration (NOAA) or similar data for the project location and will constitute the base line for monthly weather time evaluations. The Contractor's progress

schedule must reflect these anticipated adverse weather delays in all weather dependent activities.

MONTHLY ANTICIPATED ADVERSE WEATHER DAYS

Work Days Based on five (5) Day Work Week

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
6	2	2	1	1	0	2	2	1	1	1	3

- c. Upon acknowledgement of the Notice to Proceed (NTP) and continuing throughout the contract, the Contractor will record on the daily CQC report, the occurrence of adverse weather and resultant impact to normally scheduled work. Actual adverse weather delay days must prevent work on critical activities for 50 percent or more of the Contractor's scheduled work day. The number of actual adverse weather delay days shall include days impacted by actual adverse weather (even if adverse weather occurred in previous month), be calculated chronologically from the first to the last day of each month, and be recorded as full days. If the number of actual adverse weather delay days exceeds the number of days anticipated in subparagraph b, the Contracting Officer will convert any qualifying delays to calendar days, giving full consideration for equivalent fair weather work days, and issue a modification in accordance with the CONTRACT CLAUSE: DEFAULT (FIXED PRICE CONSTRUCTION).

3.15 REQUIRED INSURANCE

The Contractor shall procure and obtain during the entire period of his performance under this contract the following minimum insurance:

- a. General Public Liability insurance for bodily injury and property damage with minimum limits of \$1,000,000 combined single limit per occurrence and \$1,000,000 annual aggregate for bodily injury to or death, personal injury and property damage.
- b. Automobile Liability insurance for bodily injury and property damage with minimum limits of \$1,000,000 combined single limit for each occurrence and \$1,000,000 annual aggregate.
- c. Either Workman's Compensation or Employer's Liability insurance with a minimum limit of \$1,000,000. In every case the insurance coverage shall amount to at least the limits stated above. However, where the Financial Responsibility Compulsory Insurance Law of the State in which the installation is located requires higher limits, the Automobile Liability Insurance Policy should provide coverage of at least those limits. County of Clark, a political subdivision of the state of Nevada, and Clark County Regional Flood Control District shall be named as additional insured parties and all policies issued in performance of work under this contract.

The Contractor does hereby agree to indemnify, defend, and save harmless Clark County and Regional Flood Control District from loss,

damage, liability, costs, or expense to the proportionate extent caused by the Contractor, his employees, agents, or consultants and/or consultants arising out of its performance of this contract, including, but not limited to the negligent acts, errors, omissions, or intentional misconduct of the Contractor, its employees, agents or consultants and/or subconsultants in connection with this contract.

Contractor further does hereby agree, as a precaution to the performance of any work under this contract and as a precaution to any obligation of Clark County to make any payment under this contract, to provide Clark County with a certificate and/or a certificate issued by the State Industrial Insurance System (SIIS) in accordance with Nevada Revised Statute 616.280. Contractor agrees to maintain required workers compensation throughout the entire term of the contract.

If Contractor does not maintain coverage throughout the entire term of the contract, Contractor agrees that Owner may, at any time the coverage is not maintained by Contractor, order the Contractor to stop work, assess liquidated damages as defined herein, suspend the contract, or terminate the contract. For each six month period this contract is in effect, Contractor agrees, prior to the expiration of the six month period, make another written request to SIIS for the provisions of a certificate and notice of lapse in or nonpayment of coverage. If Contractor does not make the request or does not provide the certificate before the expiration of the six month period, Contractor agrees that owner may order the Contractor to stop work, suspend the contract or terminate the contract.

3.16 SPECIAL CONSTRUCTION REQUIREMENTS

Construction of the Upper Blue Diamond Diversion Channel shall be constructed in phases as described herein. The majority of the project may be constructed at any time during this contract provided an overall satisfactory (and approved) channel construction joint plan that will demonstrate safe measures to be employed to protect new work from the various phasing restrictions described herein. The Contractor shall restrict his operation and adapt his construction schedule to accommodate the following:

3.16.1 Project Limits

The Contractor's work, employee parking, operations, staging, equipment assembly and maintenance, and other on-site activities shall be restricted to actual areas of construction within the Project Limits. The Project Limits of the Upper Blue Diamond Diversion Channel are indicated on the drawings, and constitute the maximum limits of the construction area available for Contractor's operations. The Project Limits are generally defined by the Right-of-Way (ROW) and adjoining Temporary Construction Easements (TCE) as shown on the plans, unless designated otherwise (either in the plans, in these Specifications or by the Contracting Officer). The Contractor shall be solely responsible for obtaining agreements with and acquisition from adjacent land owners, when additional land or access points are required to supplement the Contractor's operations or staging needs. No appurtenances or other public access facilities (either

temporary or permanent) shall be constructed beyond the Project Limits.

3.16.2 Order of Channel Construction

Any continuation of the Contractor's operations in and access to those areas following issuance of the Notice to Proceed for the adjacent contract shall be requested in writing, and shall include:

1. A detailed critical-path scheduling diagram of the activities proposed,
2. A projected date of completion, and
3. A proposed method of coordination between potentially conflicting contract operations.

This information shall be reviewed by the Contracting Officer and if deemed acceptable, shall be approved by the Contracting Officer otherwise interim completions and restrictions listed below shall remain in effect.

3.16.2.1 Storm Runoff

In consideration of the potential for high-volume storm runoff occurring during the period of time when existing runoff patterns are disrupted, but the channel is not yet in service, the order of construction needs to be set to avoid significant erosive damage to elements of the project and existing facilities downstream.

The Contractor shall make all practical efforts to:

1. stage the construction of the channel from downstream to upstream (north to south), and
2. avoid long delays between excavation of the channel (and disruption of existing runoff patterns) and construction of the cast-in-place elements of the channel.

3.16.3 DISPOSAL OF EXCESS EXCAVATED MATERIALS

In the event that Contractor chooses to take satisfactory excavated material to BLM property for fill requirements there, the Contractor shall certify in writing that the material is clean and free of hazardous materials in accordance with section 02300 EARTHWORK paragraph BLM IMPORT MATERIAL REQUIREMENTS prior to hauling satisfactory excavated material to BLM Property.

- A. For non BLM Property, non Tiberti Property, non Rhodes Ranch property and non Loughton Powers Property : **Satisfactory excavated materials not utilized as part of the construction shall be considered as excess satisfactory excavated materials and shall become the property of the Contractor and shall be removed from the project site at no additional cost to the Government.** Materials characterized as unsatisfactory soil in accordance with Section 02300 EARTHWORK and materials designated as scrap shall become the property of the Contractor and shall be removed

from the project site and disposed of according to paragraph UNSATISFACTORY AND SCRAP MATERIAL of this section at no additional cost to the Government. If the Contractor elects to temporarily stockpile material within the ROW and TCE, no additional money shall be provided to re-load and haul this material away from the project site. The Contractor shall indicate the approximate quantities of material he proposes to remove from the site. In addition to the above requirements, the Contractor shall notify the Contracting Officer 24 hours in advance of the time he proposes to start operations in which material is removed from the project site, and 48 hours in advance of any material removal from the project site which he proposes to do on Saturday, Sunday or legal holidays.

- B. For BLM Property : Material originating from BLM property will not be allowed to leave BLM property boundaries, with exception of existing construction and manmade debris and trash. **All BLM material will be utilized for the various fills required on the BLM property. The BLM Lands are south of Sta. 47+38.620.**
- C. For Rhodes Ranch Property :
1. The overburden material located on Rhodes Ranch property from Station 43+30.730 through Station 37+21.439 may be utilized elsewhere in the project for various fill requirements excluding on BLM Property. Prior to use, the Rhodes Ranch overburden material shall be processed to meet the contract grading requirements for the intended use. Rhodes Ranch Property overburden material between Station 43+30.730 through Station 37+21.439 not utilized elsewhere within this project shall be spread evenly back on the Rhodes Ranch Property within the boundaries of the ROW and TCE between Station 43+30.730 through Station 37+35.580.
 2. The overburden material located on Rhodes Ranch property from Station 37+21.439 through Station 33+65.000 will be placed back in over the RCB to the lines and grade (topography) equal to pre-excitation work. Satisfactory excess excavated material shall be disposed of in accordance with this section, and this overburden material will not be utilized on BLM Lands because it is considered to be man made fill.
- D. For Loughton Powers Property : Material originating from Loughton Powers property **between Sta. 20+78.580 through Sta. 18+73.180** will not be removed from Loughton Powers property boundaries. The Contractor shall place the excavated Loughton Powers Fill Material within the Loughton Powers property project ROW and TCE boundaries. This material will be used as backfill for the portion of channel that passes through the Loughton Powers property. Excess excavated material shall be neatly graded level between Upper Blue Diamond Diversion Channel ROW and TCE on Loughton Powers property.

3.16.4 Durango Drive Phasing

The construction along Durango Drive shall be conducted in phases so as to

minimize disruptions to merchants, developers, contractors, agencies and public. The Upper Blue Diamond Diversion Channel from Station 10+00.000 through Station 49+40.000 may be constructed at any time during this contract within the constraints identified elsewhere in these specifications and provided an overall satisfactory (and approved) channel construction joint plan is developed that will demonstrate safe measures to be employed to protect new work from the various phasing restrictions described herein. The portion of channel between Station 30+18.420 through Station 25+19.089 is currently being constructed by others and is tentatively scheduled to be completed by **01 January 2004**.

3.16.4.1 Construction Coordination Rhodes Ranch Sewer and Durango Drive Improvementss

The Contractor shall coordinate with the contractor performing the Rhodes Ranch Sewer and Durango Drive improvements. **This work is scheduled to be completed by 01 January 2004. Unless provided with approval from the Contracting Officer, the Contractor shall not interfere with the Improvements.**

3.16.4.2 Construction Coordination for Fill in Durango Drive

The Contractor shall coordinate the fill work for Durango Drive with other contractors, developers and agencies.

3.16.4.3 Construction Coordination with Clark County Warm Springs Durango Drive Project

- A) For the portion of stockpiled area caused by Clark County Warm Springs Durango Drive Project, the Contractor shall survey the stockpiled material and inform the Contracting Officer of the quantity difference in cubic meters between the overburden grade and the existing topographic drawings on the east side of Durango Drive NORTH OF warm Springs prior to performance of earthwork.
- B) The Contractor shall coordinate construction related activities with the Clark County Warm Springs Durango Drive Project contractor.

3.16.4.4 Construction Coordination Rhodes Ranch Landscaping and Durango Drive Median Landscapingg

The Contractor shall coordinate the Rhodes Ranch Landscaping and Durango Drive Median Landscaping with others.

- A) **The Rhodes Ranch Landscaping (trees) will be removed and reinstalled by other contractor(s). The removal should be completed by 24 October 2003. The Contractor shall provide construction coordination with other contractor(s). Rhodes Ranch has been given a 90 calendar day notification of the tree relocation date by Clark County Public Works. Any remaining existing plants, grass and top soil shall be removed by and disposed by the channel contractor which shall include abandoned irrigation lines and landscape lighting components, unless otherwise directed by the Contracting Officer.**

B) The Contractor shall reconnect and maintain any irrigation lines within the earthwork area that provide water from main feeds into irrigation lines for the Durango Drive median and for the Rhodes Ranch landscaping that were disturbed during earthwork procedures and or road detours.

C) Construction Coordination for Overburden on Flood Easement on Westside of Durango Drive, between Station 33+65.000 through Station 37+21.439.

Prior to earthwork, the Contractor shall survey the overburden site and provide the Contracting Officer with information as to the quantity of overburden material in cubic meters and the existing grading of the overburden. Measurement for overburden Rhodes Ranch Entryway will be made on the basis of the actual volume, in cubic meters, as follows, between Station 33+65.000 through Station 37+21.439.

The overburden Rhodes Ranch Entryway quantity shall be surveyed and computed based on the following. The survey shall capture the elevations of a plane 0.610 meters above the top of the reinforced concrete box structure along the overburden area as shown on drawing sheet C22, Channel Typical Section, "Sta. 33+65.000 to Sta. 37+21.439". This 0.610 elevation plane above the reinforced concrete box shall be extended level (same elevation) to the west edge of the TCE limits to create a bottom for the overburden template. This template shall include a 1:1 slope up to daylight at and within the west TCE limit. This bottom of overburden shall then be compared with the actual existing finish grade elevations for the same area to create a volume of overburden. Survey data and calculations shall be submitted to the Contracting Officer prior to removing any overburden.

- D) Nuisance and storm flows out of the Rhodes Ranch development shall not be blocked or otherwise stopped so that water ponds onto private property.
- E) Material under the overburden and excess material under the overburden shall be handled in accordance with Section 02300 EARTHWORK, paragraph DISPOSITION AND DISPOSAL OF EXCAVATED MATERIALS.
- F) Excess satisfactory overburden material shall be handled in accordance with paragraph DISPOSAL OF EXCESS EXCAVATED MATERIAL of this Section.**

3.16.4.5 Construction Coordination for Overburden on Flood Easement on Westside of Durango Drive, between Station 37+21.439 through Station 43+30.730.>

- A) Prior to earthwork, the Contractor shall survey the overburden site and provide the Contracting Officer with information as to the quantity of overburden material in cubic meters and the existing grading of the overburden. **Measurement for overburden Rhodes Ranch will be made on the basis of the actual volume, in cubic meters, as follows, between Station 37+21.439 through Station 43+30.730.**

The overburden Rhodes Ranch quantity shall be surveyed and computed based on the following. The survey shall capture the existing hinge point elevations along the east side of the overburden area as shown on drawing sheet C21, Channel Typical Section, "Sta. 37+21.439 to Sta. 43+30.73". These existing hinge point elevations shall be extended level (same elevation) to the west edge of the TCE limits to create a bottom for the overburden template. This template shall include a 1:1 slope up to daylight at and within the west TCE limit. This bottom of overburden shall then be compared with the actual existing finish grade elevations for the same area to create a volume of overburden. Survey data and calculations shall be submitted to the Contracting Officer prior to removing any overburden.

- B) Access to sewer line easements traveling through the Rhodes Ranch overburden area shall be maintained at all times. In addition, nuisance and storm flows out of the Rhodes Ranch development shall not be blocked or otherwise stopped so that water ponds onto private property.
- C) Material under the overburden and excess material under the overburden shall be handled in accordance with Section 02300 EARTHWORK, paragraph DISPOSITION AND DISPOSAL OF EXCAVATED MATERIALS.
- D) **Excess satisfactory overburden material shall be handled in accordance with paragraph DISPOSAL OF EXCESS EXCAVATED MATERIAL of this Section.**

3.16.4.6 Construction Coordination for School Bus Stop

The Contractor shall notify the Contracting Officer at least 14 calendar days prior to construction work through the school bus stop location.

3.16.4.7 Construction Coordination for Rhodes Ranch Entrance and Exit

The Contractor shall coordinate with Rhodes Ranch concerning the construction phasing for the Rhodes Ranch Entrance and Exit. In accordance with the D Drawings, one side of the Rhodes Entrance shall be maintained open at all times. The contractor shall close the north side first and completely improve that side to include new asphalt, curb and gutter, sidewalk, side drains, channel utility relocations, etc prior to installing the detour and signage for the south side entrance. Once the north side entrance is determined to be complete per the Contracting Officer, permission to proceed with the south side entrance shall be provided.

3.16.4.7 Construction Coordination for Beltway Frontage Road Temporary Detour

Contractor shall coordinate with Clark County Dept of Public Works, and Nevada Dept of Transportation for and during all construction aspects of work involving the Beltway Frontage Road Temporary Detour. Contractor shall not track any earthwork materials onto Beltway Frontage Road. Contractor shall at all times keep all work areas secured by means of fencing and locked gates when not being used for access. During times of construction operation involving access, a flagman/watchman shall be

stationed at each open gate to ensure public non-accessability through said open gate. **All project site construction traffic onto and off Beltway Frontage Road shall be coordinated with flagmen and Clark County approved traffic control plans.**

- A) The RCB CHANNEL FRONTAGE ROAD shall not be started until the traffic has been safely detoured onto the new detour road (see drawing sheets D7 titled BLUE DIAMOND DIVERSION CHANNEL BELTWAY DETOUR CONSTRUCTION PLAN STATION 10+00 TO 19+00 and D8 titled BLUE DIAMOND DURANGO REACH DIVERSION CHANNEL FRONTAGE ROAD DETOUR PLAN CONSTRUCTION SIGNING & STRIPING. Detour signage shall be maintained through the completion of the RCB CHANNEL FRONTAGE ROAD and road asphalt replacement in accordance with drawing sheet D12 titled UPPER BLUE DIAMOND DIVERSION CHANNEL REMOVAL AND RECONSTRUCTION SOUTHERN BELTWAY EASTBOUND FRONTAGE ROAD. Once the traffic is detoured onto the detour alignment, the Contractor shall have 75 calendar days to complete the work from Sta 16+40 to Sta 15+70 to include excavation, channel construction, backfill, road improvements, guard rails and traffic markings.
- B) All work interior to the Beltway (Main Channel/Confluence Sta 15+70 to Sta 10+00, and Lateral Sta 12+33 to Sta 10+00 to include the RCB under the Frontage Road (Sta 16+40 to Sta 15+70, see also above), shall be completed by 1 Mar 04. This shall include asphalt paving, fencing and soil stabilization, and the reconstruction of the borrow site to include any crusher/processing equipment demobilization. No work or equipment shall be allowed to operate in the Beltway after 1 Mar 04 other than that approved or directed to by the Contracting Officer.

3.16.5 Material Processing

In the event that the Contractor chooses to utilize a crusher or mechanical screen to process oversized material from the excavation for use in fills, the crusher(s) or mechanical screen(s) shall be located only within the limits of the Contractors Staggering areas and/or within the beltway borrow site.

3.16.6 Waterline at Sta. 47+36

The waterline at Sta. 47+36 shall be relocated so as not to disrupt service. Any temporary by pass waterlines installed for the purposes of this waterline relocation work shall be coordinated with the Clark County Department of Public Works and the Las Vegas Valley Water District, if approved. Water shall be maintained at all times so as not to disrupt service. **An additional waterline within the ROW of Shelbourne Avenue shall be protected in place by the Contractor.**

3.16.7 Durango Drive Improvements

The Upper Blue Diamond Diversion Channel Contractor is notified that the Durango Drive Improvements (by others) is schedule to commence in April 2004.

Durango Drive will be improved from Arby northwards to the Beltway Frontage Road. Hauling and construction operations shall be coordinated with the various contractors and agencies involved with the improvements to Durango Drive.

3.16.8 Inlet Structure Phased Construction

The Upper Blue Diamond Diversion Channel Inlet Structure shown on drawing sheet C1 shall be phase constructed with the following requirements.

- A) The Contractor shall adhere to Section 02910 NATIVE PLANT EXTRACTION, SALVAGE AND STORAGE, paragraph EXTRACTION TIME, which prevents the Contractor from performing any earthwork per Section 02300 EARTHWORK to be done until the plants are salvaged.
- B) As part of the phased construction, the Contractor shall not commence construction activities (to include excavation) for the reinforced concrete channel portion of Upper Blue Diamond Diversion Channel between Station 52+34.340 through 49+40.000 prior to the complete (Sta 49+40 to Sta 10+00) channel being ready and available to safely transport water downstream of Sta 49+40.000. The Contractor may proceed with the construction of the Sta 52+34.430 to Sta 49+40 reach prior to completion of the channel downstream of Sta 49+40 contingent upon the requirements included below.**
- C) **The Contractor shall not construct any of the Turning Basin Improvements to include foundation preparation between Sta 0+00 and Sta 0+75 of Upper Blue Diamond Diversion Channel Inlet Embankment until the entire Upper Blue Diamond Diversion Channel from Station 10+00.000 through Station 52+34.340 has been completed.** If the Contractor so elects, construction for the Turning Basin Embankment may commence prior to downstream channel construction from embankment Sta 0+75 to the north. In the event that the Contractor elects to proceed with construction of the Upper Blue Diamond Channel from Sta 49+40 to Sta 52+34.340 prior to the channel being complete downstream of Sta 49+40, a temporary drainage plug approved by the Contracting Officer shall be installed at Sta 49+35 that will prevent storm waters from entering the portion of the channel downstream of Sta 49+35. This plug shall be designed, installed and removed at the Contractors expense and shall in no way damage any portion of the permanent channel to remain. In the event that a portion of the Turning Basin embankment Sta 0+75 to 2+77 and Upper Blue Diamond Channel Sta 57+34.340 to Sta 49+40.000 are completed to include the outlet works, additional temporary plugs shall be installed to prevent water from entering the downstream portion of uncompleted channel. The Contractor shall provide a temporary block of 95% compacted fill from the spillway invert slab to the top of spillway channel wall of the Upper Blue Diamond Diversion Channel between Station 52+00.000 through Station 51+50.000 until the Upper Blue Diamond Diversion Channel from Station 10+00.000 through Station 52+34.340 has been completed. This shall also include the prevention of water from entering the outlet tower. The Contractor may perform all other Upper Blue Diamond Diversion Channel Inlet Embankment work except as noted above in this paragraph at any time during the construction duration. Once the entire Upper Blue Diamond Diversion Channel from Station 10+00.000 through Station 52+34.340 has been completed for safe passage of storm waters, the Contractor shall construct the portion of Upper Blue Diamond Diversion Channel Inlet Structure Embankment between Station 0+00.000 through Inlet Embankment

Station 0+75.000. Once work commences on Sta 0+00 to Sta 0+75 all plugs temporarily blocking the completed channel flow shall be removed in their entirety. Note that the portion of channel between Station 30+18.420 through Station 25+19.089 is being constructed by others.

3.16.9 Existing and New Utility Lines

There are numerous existing utility lines that will interface with the Upper Blue Diamond Diversion Channel or its Side Drains/Laterals. The Upper Blue Diamond Diversion Channel Contractor shall coordinate their work with these existing lines. Recognized interfaces include relocations, and supporting in place existing service(s). The Upper Blue Diamond Diversion Channel Contractor shall coordinate their channel work with these utility interfaces and allow the utility companies contractors and representatives reasonable access to the Upper Blue Diamond Diversion Channel TCE and ROW areas as required to complete their work. The Upper Blue Diamond Diversion Channel TCE and ROW limits are not intended to be reserved for the sole use by the Upper Blue Diamond Diversion Channel Contractor.

3.16.9.1 Gas Utility Lines

Numerous areas of the Upper Blue Diamond Diversion Channel parallel, cross or interface with existing gas lines. As identified by the design, the Upper Blue Diamond Diversion Channel Contractor shall protect in place, support in place and concrete encase these lines in accordance with the drawing sheets and specifications. Currently, there are no gas lines that are scheduled to be relocated. Affected gas lines shall be supported and protected by the Contractor concurrently with the mass excavation through the area where the gas utility line is located. The Upper Blue Diamond Diversion Channel Contractor shall expose and temporarily support/protect in place these gas lines that cross the Upper Blue Diamond Diversion Channel until the channel structure is completed in that area of crossing. The Contractor shall allow the gas company access to inspect these gas lines during and after the mass excavation and fill through these areas is completed, and shall ensure that proper notification coordination with the gas company has been made.

3.16.9.2 Telephone Lines

Numerous areas of the Upper Blue Diamond Diversion Channel and Laterals cross or interface with existing telephone lines. As identified by the design, the Upper Blue Diamond Diversion Channel Contractor shall support in place and/or concrete encase these telephone lines in accordance with the drawing sheets and specifications. Currently, there are no telephone lines that are scheduled to be relocated by others. Telephone lines affected shall be supported and protected by the Contractor concurrently with the mass excavation through the area where the telephone line is located. The Upper Blue Diamond Diversion Channel Contractor shall expose and temporarily support/protect in place these telephone lines that cross the Upper Blue Diamond Diversion Channel until the channel structure is completed in that area of crossing. The Contractor shall allow the telephone company access to inspect these lines during and after the mass excavation and fill through these areas is completed, and shall ensure that proper notification/coordination with the telephone company has been made.

Furthermore, the Government expects that the Contractor shall allow the telephone company a total of ten (10) working days to relocate any lines during and after the mass excavation through these areas is completed in the event the telephone company decides to relocate telephone lines. Existing conduits to be raised to facilitate the new channel beneath shall be fully coordinated with Sprint. The Contractor should anticipate cutting existing conduit and installing split sleeve conduit of the similar diameter and length required to complete the raising. Elongation of existing cables (release of slack) shall be fully coordinated with Sprint to allow the installation of the longer split sleeve conduit. Spare conduits may be cut and replaced after completion of the RCB subject to that below. All existing conduits for the telephone utility lines that which are temporarily disturbed by the Upper Blue Diamond Diversion Channel Contractor shall be reconnected, mandrelled and have the pull ropes re-installed by the Upper Blue Diamond Diversion Channel Contractor. Rigid steel (wrapped) conduits shall be utilized for all bends. Relocations by the utility owner does not include those utilities identified by the Upper Blue Diamond Diversion Channel design to be supported and protected in place and concrete encased by the Upper Blue Diamond Diversion Channel Contractor. The Contractor shall allow the telephone company access to inspect these telephone lines during and after the mass excavation and fill through these areas is completed, and shall ensure that proper notification coordination with the telephone company has been made.

3.16.9.3 Nevada Power

Numerous areas of the Upper Blue Diamond Diversion Channel and Laterals cross or interface (aerial and underground) with existing Nevada Power circuits/ductbanks. As identified by the design, the Upper Blue Diamond Diversion Channel Contractor shall coordinate their construction with support in place, or protection in place, and concrete encase requirements for Nevada Power interfaces. Currently, there are no power lines that are schedule to be relocated by others. Power lines affected shall be supported and protected by the Contractor concurrently with the mass excavation through the area where the power line is located. The Upper Blue Diamond Diversion Channel Contractor shall expose and temporarily support/protect in place these any power lines that cross the Upper Blue Diamond Diversion Channel until the channel structure is completed in that area of crossing. The Contractor shall allow the power company access to inspect these lines during and after the mass excavation and fill through these areas is completed, and shall ensure that proper notification coordination with the power company has been made. Circuits/ductbanks to be relocated shall be fully coordinated with Nevada Power as described herein. Raising of existing circuits/ductbanks shall include the removal of concrete encasement, new split sleeve conduit, new concrete encasement and mandrelleing for spares and the full coordination of Nevada Power. Rigid steel (wrapped) conduit shall be utilized for all bends in new alignments. Furthermore, the Government expects that the Contractor shall allow Nevada Power a total of ten (10) working days to relocate any power lines during and after the mass excavation through these areas is completed in the event Nevada Power company decides to relocate power lines. The Upper Blue Diamond Diversion Channel Contractor shall schedule all Upper Blue Diamond Diversion Channel work so that these utility areas may be worked around until the services are relocated by others.

3.16.10 Active Side Drains/Storm Flows

The Upper Blue Diamond Diversion Channel will be constructed in and through existing residential and commercial neighborhoods. As a result, the Upper Blue Diamond Diversion Channel Contractor shall anticipate runoff into the channel and channel construction area(s) from both storm flows and nuisance flows (excessive irrigation). The Upper Blue Diamond Diversion Channel Contractor shall complete the new channel work by providing protection from these water flows to include pumping out of excavations or channels that are not free draining due to the many phases of work for this contract. Water shall not be allowed to pond within a concrete channel section (invert, walls and or roof) that is not free draining. Pumped water shall comply with the requirements of the Contractors Storm Water Prevention Permit. **Active side drains include but are not limited to golf course drains, Nigro constructed channel side drains (from Sta. 30+18 through 25+19) Warm Springs Lateral (Clark County Warm Springs Durango Drive Project), Rhodes Ranch Lateral, Beltway Lateral, overflow swales, and side drain inlets.**

3.16.11 Phasing between Shelbourne and Windmill

Phasing of channel construction is required between Shelbourne and Windmill to maintain access to two private residences, **and to construction access and business access as indicated below..** Prior to commencing work from Sta 48+40 and Sta 43+30, the Contractor shall submit their proposed construction phasing and resident/**construction/business** access plan for this reach to the Contracting Officer.

3.16.11.1 Residential Access

One resident is west of Durango on Shelbourne and the other is west of Durango on Mistral. Access to these two residences shall be provided along existing paved streets and/or through the Channel ROW/TCE areas at all times (24 hours per day), shall be well graded and include dust control. The Contractor shall phase and fully coordinate their construction with these two residences. As a minimum, resident access shall include an 3.353 meter (11 foot) wide well maintained travel way with turning radii that support that type of vehicles requiring access to these residences.

3.16.11.2 Construction Access for Auburn Hills in Rhodes Ranch

Within the limits of this projects boundaries, the Contractor shall maintain local access crossings near Shelbourne and Mistral for both local residential access and construction traffic access related to the Auburn Hills in Rhodes Ranch. The Contractor shall coordinate the phasing of channel work with the Developer.

3.16.11.3 Construction and Local Access for Property at Northeast Corner of Windmill and Durango

Construction is scheduled between the beginning of September 2003 through to the end of April 2004, with the business open during April 2004 and beyond. The Contractor shall coordinate access, within limits of the

project boundaries, to this location with the business and developer/contractor.

3.16.11.4 Expiring Temporary Construction Easement (TCE) on West Side from Sta. 45+35.38 through Sta. 43+30.93

The Contractor shall complete construction activities and clean up the area between channel ROW and TCE from station 45+35.38 through station 43+30.93 on west side of channel prior to 31 December 2004. Station 45+35.38 is centerline of Mistral Avenue. Station 43+30.93 is centerline of Windmill.

3.16.12 Salvaged Riprap from Beltway

Salvaged rip rap from the Beltway shall be cleaned (no material less than 3 inches in size) and stockpiled adjacent to the existing channel just east of Sta 10+00 (main line channel). Rip rap stockpile shall be configured so as not to pond water and shall be a minimum 20 feet from the existing channel edge.

3.16.13 Station 25+19 through Station 16+40

All channel construction from Sta 25+19.089 to Sta 16+40 shall be completed with 240 calendar days of the contract notice to proceed. All work to include soil stabilization, fencing, cable railing, asphalt and manhole utility markers shall be completed at this time so that work by others within this channel TCE/ROW may commence unimpeded by others.

3.16.13.1 Loughton Powers Property Temporary Construction Easement (TCE) East Side of Channel Between Sta. 20+78.58 through 18+73.188

The Contractor shall complete construction activities and clean up the area between channel ROW and TCE from station 20+78.58 through station 18+73.18 on east side of channel prior to 30 June 2004. Station 20+78.58 is centerline of Badura. Station 18+73.18 is centerline of Maule.

3.16.14 Sewerline between Sta 48+40 through 30+18.420

Sewerline work by others is required to be completed before excavation for the new channel can commence between Sta 48+40 and Sta 30+18.420. This new and relocated sewerline is not anticipated to be completed prior to 1 Jan 04. **The Contractor shall not perform construction work between Sta. 47+38.62 through Sta. 30+18.420 until 01 January 2004, or as directed by the Contracting Officer. This date shall also include the use of Durango ROW for the satisfactory excavated material fill site from Robindale to Windmill.**

3.17 CONTRACTOR'S SURVEYS

3.17.1 Survey Data

Reference is made to SECTION 00800: SPECIAL CONTRACT REQUIREMENTS, QUANTITY SURVEYS, ALTERNATE I, FAR 52.236-16 which requires payments based on surveys. Progress payments will be based upon Contractor's surveys. The Contractor's survey shall provide full coverage of the entire area for

which progress payment is being submitted. It is further emphasized that survey data which does not meet all applicable requirements and quality assurance verifications will not constitute a valid request for payment. Contractor's surveys shall be performed electronically (automated) and the data shall be provided and submitted to the Government on an electronic media (IBM compatible, ASCII format) in delimited files of easting, northing, and depth (x,y,z), where the depth is indicated as positive if recorded above mean sea level. The first lines of the data file will list the information as follows:

- * Project Name: UPPER BLUE DIAMOND Diversion Channel; ENTIRE PROJECT SITE 2003
- * Surveyor's Name and Company Name
- * Area Surveyed
- * Type of Survey and Date of Survey (i.e. Pre-construction, MM/DD/YR)
- * Vertical Datum
- * Horizontal Datum

These first 6 lines will be preceded by an asterisk (*), which indicates a comment line.

For both the pre-construction and post construction surveys, three (3) copies of the survey plotted on paper will accompany the x,y,z data (electronic file) and all data shall be collected and plotted in metric units (meters).

3.17.2 Survey Data Standards

The Contractor's surveys for progress payment shall meet or exceed the survey standards listed in EM 1110-1-1005, Topographic Surveying for topographic surveys. Surveys shall be in the State Plane Coordinate System of 1983 - meters (SPCS 83), State of Nevada, and be performed by an independent survey contractor with at least three (3) years of experience in topographic surveying of land features and have either a current Land Surveyor's or a Professional Engineer's license, authorized to certify surveys in the State of Nevada. The Topographic Surveyor firm selected by the Contractor must be approved by the Contracting Officer prior to performing surveys for this contract.

3.17.3 Positioning System

It is required that surveys shall be conducted using an RTK or similar modern electronic surveying equipment using Differential Global Positioning System (DGPS) with positional accuracy equal to or exceeding the survey standards listed in EM 1110-1-1003 and EM 1110-1-1005.

3.17.4 Survey Firm Acceptance

For the Contracting Officer to approve the selected survey firm, the Contractor must provide documentation indicating that modern electronic surveying equipment will be used for the surveys to be performed as well as documentation verifying the experience of the operators using the equipment. Typical information that will be required, as a minimum, includes the name, model, and year of manufacture of the electronic

equipment, and the manufacturer's stated accuracies, and capability of the equipment proposed for usage. The Contractor shall submit credentials/qualifications as evidence that qualified, experienced staff are available and will be used for the operation of the electronic positioning and surveying equipment.

3.17.5 Data Processing

The Contractor shall use a Data Processing System to map the survey data and calculate quantities. Reduced survey data shall then be imported into the Data Processing System where cross-sections are compared to fill templates and volume quantities are calculated. The software shall be capable of digital terrain modeling and shall produce, as a minimum, topographic survey sheets, cross section profiles, 3-dimensional area profiles, and quantity volume calculations using the Triangulated Irregular Network (TIN) method.

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SECTION 01270

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.1 REFERENCES (NOT USED)

1.2 CONTRACT PRICE AND PAYMENT

The contract price and payment shall constitute full compensation as stated in the Contract Clause, CONTRACT PRICES - BIDDING SCHEDULES, for completion of the work. No separate payment will be made for any material or work necessary to complete the work that is not specifically mentioned, such materials and work shall be considered incidental to all bid items. As stated in Contract Clause, SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION, the word "provided" shall be understood to mean "furnished and installed" when used in this section or elsewhere in the technical sections.

1.3 LUMP SUM PAYMENT ITEMS

Payment items for the work of this contract for which contract lump sum payments will be made are listed in the BIDDING SCHEDULE and described below. All costs for items of work, which are not specifically mentioned to be included in a particular lump sum or unit price payment item, shall be included in the listed lump sum item most closely associated with the work involved. The lump sum price and payment made for each item listed shall constitute full compensation for furnishing all plant, labor, materials, and equipment, and performing any associated Contractor quality control, environmental protection, meeting safety requirements, tests and reports, and for performing all work required for which separate payment is not otherwise provided. Some of the lump sum payment items reference drawings and plans that utilize english units of measurements. Base bid items are limited to channel facilities North of Warm Spring's.

1.4 UNIT PRICE PAYMENT ITEMS

Payment items for the work of this contract on which the contract unit price payments will be made are listed in the BIDDING SCHEDULE and described below. The unit price and payment made for each item listed shall constitute full compensation for furnishing all plant, labor, materials, and equipment, and performing any associated Contractor quality control, environmental protection, meeting safety requirements, tests and reports, and for performing all work required for each of the unit price items. Some of the unit price payment items reference drawings and plans that utilize english units of measurements. Base bid items are limited to channel facilities North of Warm Spring's.

1.5 TRAFFIC CONTROL (Bid Item 0001)

Payment for Traffic Control will be made at the applicable contract price, which payment shall constitute full compensation for traffic control

including but not limited to earthwork and grading, construction and removal of temporary roadways; providing temporary and permanent safety barriers; providing traffic warning and control signs and lighting; stripping; flag men as required, except where covered under other bid items.

1.6 DIVERSION AND CONTROL OF WATER (Bid Item 0002).

Payment for Diversion and Control of Water will be made at the applicable contract price, which payment shall constitute full compensation for maintaining the work area in a dry condition.

1.7 CLEAR SITE AND REMOVE OBSTRUCTIONS (Bid Item 0003).

Payment for Clear Site and Remove Obstructions shall include all costs for clearing, removal, replacement, and restoration work (except work by others) including all existing obstructions within the construction work area, except for clearing, removal, replacement and restoration work specifically specified in other bid items throughout this project. Except as otherwise specified, payment for clearing and removal work includes applicable earthwork; filling holes; removal of abandoned utility lines; removal of existing surface trash and debris, including trees and vegetation and debris piles (consisting of construction debris and/or dumped soils, dumped gravels, dumped rocks and dumped boulders), including vehicle debris (vehicle bodies and/or vehicle parts) and appliance debris (whole and/or parts), and grubbing from within the Channel right-of-way and temporary construction easement; including removal of existing riprap rock **and salvaging riprap rock for reuse unless it is paid for under another bid item**, removal of existing filter fabric **and or geotextile fabric under riprap in existing beltway channel**, removal of existing grouted riprap rock as shown on the drawings; removal of existing concrete pavement and concrete curb and gutter and plantmix bituminous surface (pbs) as shown on the drawings; **including sawcutting and removal of necessary portion of the existing precast 1.829 M x 1.524 M (6' x 5') RCB structure at approximate Sta. 13+40.000 (left side of channel looking upstream) to allow for placement of new channel and side drain structure; including sawcutting and removal of necessary portion (approximately 1.83 meters) of the existing Beltway Lateral Channel to Beltway Lateral Channel Station 12+33.13 to allow for placement of Beltway Lateral Transitional Structure at Durango Drive**; removal, protection, replacement or restoration of existing structures and features indicated and disposal of all materials. Payment for Clear Site and Remove Obstructions will be made at the applicable contract price, which payment shall constitute full compensation for clearing, obstruction removal, and protection work, complete.

1.8 STRIP AND STOCKPILE TOPSOIL, BLM LANDS (Bid Item 0004)

Payment for strip and stockpile topsoil will be made at the applicable contract price per cubic meter for the basin site, which payment shall constitute full compensation for stripping and stockpiling specified surface soils, including clearing of grasses and weeds, debris and roots, after plant salvaging operations, as indicated in the specifications. **The BLM lands are south of Sta. 47+38.620.**

1.9 EXCAVATION.

1.9.1 EXCAVATION CHANNEL, NON BLM LAND (Bid Item 0005), EXCAVATION CHANNEL, BLM LAND (Bid Item 0006), EXCAVATION INLET STRUCTURE, BLM LAND (Bid Item 0007))

1.9.1.1 Measurement

A survey of the site shall be made by the Contractor prior to commencement of work, and all measurements will be based on this survey without regard to any changes in the site that may be made between the excavation lines and grades indicated on the drawings or staked in the field and the ground surfaces as indicated by the above mentioned survey. Measurement shall be based on the difference between surveyed original grade and the grade and slope of the theoretical cross sections indicated on the drawings. The actual slopes as excavated may be greater or less than those indicated or staked, depending on the materials excavated and methods used in performing the work, but such alterations shall not change the measurement for payment from the original lines as specified herein. The quantity of directed excavation necessary for the removal of unsatisfactory foundation material as specified shall be included in the measurement of the excavation where the unsatisfactory soils are encountered. Quantities will be computed in cubic meters by the average end area method and the planimeter will be considered a precise instrument for measurement of plotted cross sections. The Contractor has the option of using computer methods for quantity estimations, but all computer methods of quantity estimations shall be approved by the Contracting Officer. All excavation outside of excavation lines shown on the drawings will be considered as being for convenience of the Contractor. **The BLM lands are south of Sta. 47+38.620.**

1.9.1.2 Payment

Payment for excavation will be made at the applicable contract price, which payment shall constitute full compensation for excavation for the inlet structure embankment and spillway/transition structure foundations, inspection trenches, inlet structure invert, channels, roads and other areas as indicated on the drawings including shoring, blasting, rock excavation, and cemented alluvium excavation; shaping and trimming of areas to receive concrete or embankment material, soil cement, loading, stockpiling, crushing, processing, hauling, and dumping suitable materials for fills for the inlet structure embankments, channels, inlet structure spillway/ transition, and backfill for structures and pipes; and loading, stockpiling, hauling, placing and grading excavated materials in the graded basin areas. Excess BLM material shall be placed and graded at areas downstream of the basin on BLM property as directed by the Contracting Officer. **Excess channel excavation material with certification documents shall be imported onto, placed, graded and compacted as required for areas of the basin on BLM property.** Payment will not be included for excavation (including shoring) outside the excavation limits indicated on the drawings or staked in the field, and other earthwork requirements for which separate payments are provided. **The BLM lands are south of Sta. 47+38.620.**

1.9.1.3 Excavation, Inlet Structure

Payment for excavation, Inlet Structure will be made at the applicable

contract unit price per cubic meter, which payment shall constitute full compensation for excavation as indicated on the drawings including foundation preparation for any overexcavation for the inlet structure embankment. Payment for excavation, inlet structure shall not include the quantity included in clearing and grubbing and in strip and stockpile topsoil and other earthwork requirements for which separate payments are provided.

1.9.1.4 Excavation, Channel

Payment for excavation, channel will include excavations for spillway/transition and spillway/transition cutoff walls, and will be made at the applicable contract unit price per cubic meter, which payment shall constitute full compensation for excavation and haul and disposal of excess material. **The BLM lands are south of Sta. 47+38.620.**

1.9.1.5 Subgrade or Foundation Preparation

No separate payment will be made for subgrade or foundation preparation, including required shaping and cleaning of bedrock abutments and placement of mortar or concrete as necessary, and all costs in connection therewith shall be included in the contract prices for excavation or the items to which the work applies.

1.9.1.6 Unsatisfactory Soils

No separate payment will be made for the excavation, hauling, and disposal of unsatisfactory soils. When such excavation is directed, payment therefore will be included in the applicable contract price for the items of work under which the unsuitable soils are encountered. When there is no applicable contract item an adjustment will be made.

1.9.1.7 Excavation for Structures

No separate payment will be made for excavation for structures such as manholes, outlet structures, stilling wells, and headwalls. All costs therefore shall be included in the applicable contract item to which the work applies.

1.9.1.8 Trenches

No separate payment will be made for the excavation and disposal of pipe trenches. All costs therefore shall be included in the applicable contract prices for the items to which the work applies.

1.9.1.9 Shoring

Except where otherwise directed within specific bid items, no separate payment will be made for shoring. The Contractor shall be responsible for method of construction and the use of shoring, stable slope cuts, or other trench safety requirements.

1.9.1.10 Excavation for Utilities

No separate payment will be made for excavation for utilities. All costs therefore shall be included in the applicable contract item to which the work applies.

1.10 FILLS

1.10.1 Measurement.

Measurement for fills will be made between the excavation and structure lines and the fill limit lines, or between the ground lines and fill lines, as indicated or staked in the field. Quantities will be computed in cubic meters by the average end area method and the planimeter will be considered a precise instrument for measuring plotted cross sections. The Contractor has the option of using computer methods of quantity estimation, but all computer methods of quantity estimation shall be approved by the Contracting Officer.

1.10.2 Payment.

1.10.2.1 COMPACTED FILL, CHANNEL, NON BLM LAND (Bid Item 0008).

Payment for Compacted Fill, Channel, non BLM Land will be made at the applicable contract price, which payment shall constitute full compensation for shaping, grading, filling behind the channel walls including access ramps, over covered channels, and other areas shown on the drawings, including at disposal site shown on drawings, and compacting the fill, complete. Payment will not be included for fills outside the fill limits indicated on the drawings or staked in the field, and other fill requirements for which separate payments are provided.

1.10.2.2 COMPACTED FILL, CHANNEL, BLM LAND (Bid Item 0009).

Payment for Compacted Fill, Channel, BLM Land will be made at the applicable contract price, which payment shall constitute full compensation for shaping, grading, filling behind the channel walls including access ramps, over covered channels, and other areas shown on the drawings, and compacting the fill, complete, including processing of certification form for material import onto BLM Lands as necessary. Payment will not be included for fills outside the fill limits indicated on the drawings or staked in the field, and other fill requirements for which separate payments are provided. **The BLM lands are south of Sta. 47+38.620.**

1.10.2.3 COMPACTED FILL, INLET STRUCTURE EMBANKMENT AND INVERT, BLM LAND (Bid Item 0010)

Payment for Compacted Fill, Inlet Structure Embankment and Invert, BLM Land, will be made at the applicable contract unit price per cubic meter, which payment shall constitute full compensation for placing, shaping, grading, foundation preparation backfill, and compacting the fill, including settlement monuments and related work, complete, including processing of certification form for material import onto BLM Lands as necessary.

1.10.2.4 MISCELLANEOUS FILL, INLET STRUCTURE EMBANKMENT AND INVERT, BLM LAND (Bid Item 0011)

Payment for Miscellaneous Fill, Inlet Structure Embankment and Invert, BLM Land, will be made at the applicable contract unit price per cubic meter, which payment shall constitute full compensation for placing, shaping, and grading the fill, complete, including processing of certification form for material import onto BLM Lands as necessary.

1.10.2.5 **Fill or Backfill Around Structures.**

No separate payment will be made for fill or backfill around structures. All such costs shall be included in the applicable contract prices for structure items to which the work applies.

1.10.2.6 **Trenches.**

No separate payment will be made for backfilling for utilities, side drains and confluences. All costs in connection therewith shall be included in the contract prices for items to which the work applies.

1.10.2.7 **Subgrade Preparation.**

No separate payment will be made for subgrade preparation and all costs in connection therewith shall be included in the contract prices for items to which the work applies.

NOTE : Requirements for Bid Item 0012 are in Paragraph 1.88

1.11 OVERBURDEN RHODES RANCH (Bid Item 0013).

1.11.1 Measurement

Measurement for overburden Rhodes Ranch will be made on the basis of the actual volume, in cubic meters, as follows, between Station 37+21.439 through Station 43+30.730.

The overburden Rhodes Ranch quantity shall be surveyed and computed based on the following. The survey shall capture the existing hinge point elevations along the east side of the overburden area as shown on drawing sheet C21, Channel Typical Section, "Sta. 37+21.439 to Sta. 43+30.73". These existing hinge point elevations shall be extended level (same elevation) to the west edge of the TCE limits to create a bottom for the overburden template. This template shall include a 1:1 slope up to daylight at and within the west TCE limit. This bottom of overburden shall then be compared with the actual existing finish grade elevations for the same area to create a volume of overburden. Survey data and calculations shall be submitted to the Contracting Officer prior to removing any overburden.

1.11.2 Payment

Payment for Overburden Rhodes Ranch will be made at the applicable contract price per cubic meter and includes handling of overburden material at identified Rhodes Ranch overburden site which includes overburden material on flood easement on West side of Durango Drive between station 37+21.439 through station 43+30.73 indicated herein; and shall be considered full payment for all work including surveying for quantity verification, stockpiling and grading to final grade lines, **or hauling and processing to be used as compacted fill elsewhere excluding on BLM land**, complete.

1.12 CONCRETE.

1.12.1 Measurement.

Measurement of concrete will be made on the basis of the actual volume, in cubic meters, of concrete within the pay lines of the concrete invert slab, walls, top slab, and slope protection as shown on the drawings.

Measurement of concrete placed against the sides of any excavation without the use of intervening forms will be made only within the pay lines of the structures. No deductions will be made for rounded or beveled edges or space occupied by metalwork, nor voids or embedded items which are either less than 0.15 cubic meter in volume or one-tenth of square meter in cross section. Concrete placed in items of work other than those specifically mentioned above, and concrete wasted or used for the convenience of the Contractor will not be included in measurement for payment.

1.12.2 PAYMENT FOR CONCRETE ITEMS.

Payment for the concrete items will be made at the applicable contract prices for the various items of the schedule, which payments shall constitute full compensation for labor, materials (except reinforcing steel for which separate payment is provided), joint sealant, forming including forming for wall variations at overflow structure locations, furnishing concrete, placing concrete, finishing concrete, curing concrete, and for all equipment and tools to complete the concrete work. Embedded items shall be included in the cost of the concrete except when other payment is specifically provided. No payment will be made for concrete, as such, which is placed in structures for which payment is made on a lump sum basis.

1.12.2.1 CONCRETE, OPEN CHANNEL INVERT SLAB (Bid Item 0014).

Payment for concrete, open channel invert slab will include concrete placed in all open channel invert slab and for the inlet structure spillway invert slab, except for concrete inverts in structures for which payment is made on a lump sum basis, and payment will be made at the applicable contract unit price per cubic meter, which payment shall constitute full compensation for all concrete (including all necessary items described in Paragraph "PAYMENT FOR CONCRETE ITEMS" above) placed for the invert slab of the open channel and inlet structure spillway, keys, starter walls, and cut-off walls, complete.

1.12.2.2 CONCRETE, OPEN CHANNEL WALLS (Bid Item 0015).

Payment for concrete, open channel walls will include concrete placed in all open channel walls and for the inlet structure spillway walls, except

for concrete walls in structures for which payment is made on a lump sum basis, and payment will be made at the applicable contract price, which payment shall constitute full compensation for all concrete (including all necessary items described in Paragraph "PAYMENT FOR CONCRETE ITEMS" above) placed above the starter walls in the vertical walls of the open channel, complete.

1.12.2.3 Concrete, Channel Side Slope.

No separate payment will be made for concrete, channel side slope and all costs in connection therewith shall be included in the contract prices for immediate adjacent items to which the work applies.

1.12.2.4 Concrete, Cut-off Wall.

No separate payment will be made for concrete, cut-off walls and all costs in connection therewith shall be included in the contract prices for items to which the work applies.

1.12.2.5 Concrete, Transition

Payment for concrete, transition and all costs in connection therewith shall be included in the contract prices for concrete, channel walls and concrete, channel invert slab or to the applicable contract price for which the work applies.

1.12.2.6 CONCRETE OVERFLOW STRUCTURE(S) (Bid Item 0016, 0017, 0018, 0019, 0102)

Payment for Concrete Overflow Structure(s) will be made at the applicable contract price, which payment shall constitute full compensation for all concrete (including all necessary items described in Paragraph "PAYMENT FOR CONCRETE ITEMS" above) placed for the concrete overflow structure, including furnishing and placing reinforcing steel, complete except earthwork. The Concrete Overflow Structure centerlines are located at Upper Blue Diamond Diversion Channel Stations 43+15.428, 40+68.000, 37+88.000, 31+04.220, and 17+04.885.

1.13 GROUTED RIPRAP (Bid Item 0020)

1.13.1 Measurement.

Measurement of Grouted Riprap will be made on the basis of the applicable contract unit price per cubic meter for the grouted riprap placed within the design lines of the grouted riprap structure as shown on the drawings. Measurement of grouted riprap placed against the sides of any excavation without the use of intervening forms will be made only within the design lines of the grouted riprap structure. No deductions will be made for rounded or beveled edges or space occupied by metalwork, nor voids or embedded items. Grouted riprap placed in items of work other than those specifically mentioned above, and grouted riprap and grout and riprap wasted or used for the convenience of the Contractor will not be included in measurement for payment.

1.13.2 Payment.

Payment for Grouted Riprap will be made at the applicable contract unit price, which payment shall constitute full compensation for obtaining and placing the grouted riprap and grout, complete including all incidentals.

1.14 REINFORCING STEEL (Bid Item 0021).

1.14.1 Measurement.

Measurement of reinforcing steel in metric tonnes (1,000 kilograms) is limited to reinforcement in concrete structures paid for on a cubic meters basis. Measurement will be made of the lengths of bars actually placed in the completed work in accordance with the plans and specifications, approved bar schedules, or as directed. The measured lengths will be converted to weights for the bar numbers listed by the unit weights per linear foot contained in ASTM A 615. Steel in laps indicated on the drawings, in the specifications, or required by the Contracting Officer will be included in measurement for payment. No measurement will be made for the additional steel in laps which are authorized for the convenience of the Contractor. No measurement will be made of steel supports or spacers. All costs for furnishing and installing supports and spacers shall be included in the various structures requiring the reinforcement.

1.14.2 Payment.

Payment for Reinforcing Steel will be made at the applicable contract price, which payment shall constitute full compensation for furnishing and installing steel reinforcement, complete. No payment will be made for steel reinforcement which is placed in structures for which payment is made on a lump sum basis.

1.15 AGGREGATE BASE COURSE (Bid Item 0022).

1.15.1 Measurement.

Measurement of aggregate base course will be by the metric tonne (1,000 kilograms) of aggregate base course placed within the lines and grades indicated on the drawings.

1.15.2 Payment.

Payment for Aggregate Base Course will be made at the applicable contract price which payment shall constitute full compensation for earthwork required for installation of aggregate base course, furnishing and placing the aggregate base course, complete, including subgrade preparation.

1.16 ASPHALT CONCRETE PAVEMENT (Bid Item 0023).

1.16.1 Measurement.

Measurement for asphalt concrete pavement will be by the metric tonne (1,000 kilograms) of asphalt concrete pavement placed within the lines and grades as indicated on the drawing.

1.16.2 Payment.

Payment for Asphalt Concrete Pavement will be made at the applicable contract price which payment shall constitute full compensation for asphalt concrete pavement in place, complete including tack coat, prime coat and appurtenant work except for aggregate base course. No payment will be made for excessive thickness.

1.17 WEEPHOLE SYSTEM (Bid Item 0024).

Payment for the Weephole System will be made at the applicable contract price, which payment shall constitute full compensation for materials, and installation of the weephole system, complete including applicable earthwork, drain aggregate, geotextile, form openings and appurtenances, complete.

1.18 RCB CHANNEL AND BELTWAY LATERAL CONFLUENCE STRUCTURE (Bid Item 0025).

Payment for RCB Channel and Beltway Lateral Confluence Structure will be made at the applicable contract price, which payment shall constitute full compensation for the RCB structure consisting of the Upper Blue Diamond Diversion Channel from Sta. 14+10.000 to Sta. 13+35.400, including confluence section T shown on drawing "S4", including invert transition section U shown on drawing "S5", and including 5.480 wide x 3.100 high box conduit, complete, except earthwork and except manholes; and including extended headwall shown on drawing "S3", complete; including furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete; protect in place existing utilities; and all incidentals, complete as shown on the drawings except for post and cable railing and chain link fencing.

1.19 CHANNEL AND A PORTION OF BELTWAY LATERAL STRUCTURE (Bid Item 0026).

Payment for the Channel and a Portion of Beltway Lateral Structure will be made at the applicable contract price, which payment shall constitute full compensation for the structure consisting of the Upper Blue Diamond Diversion Channel from Sta. 14+55.422 to Sta. 14+10.000 and a Portion of Beltway Lateral from Sta. 10+00.000 to Sta. 10+45.312, including details of Section R and Section S shown on drawing "S5", and including details of Section P shown on drawing "S4", complete, except earthwork and except weepholes; including furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete; and all incidentals, complete as shown on the drawings except for post and cable railing and chain link fencing.

1.20 RCB CHANNEL FRONTAGE ROAD (Bid Item 0027).

Payment for RCB Channel Frontage Road will be made at the applicable contract price, which payment shall constitute full compensation for the Upper Blue Diamond Diversion Channel Frontage Road RCB Structure from Sta. 16+40.000 to Sta. 15+70.000, except earthwork, complete, including furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete, and all incidentals, including extended headwalls;

except temporary Frontage Road traffic detour and except installing new traffic barriers and maintaining existing traffic barriers on North side and South Side of channel at Frontage Road (Beltway), and except extra traffic control devices that will be left in place after Contractor leaves site on North side and South side of channel at Frontage Road (Beltway), complete as shown on the drawings except for post and cable railing and chain link fencing.

1.21 RCB CHANNEL TIBERTI NORTH (Bid Item 0028).

Payment for RCB Channel Tiberti North will be made at the applicable contract price, which payment shall constitute full compensation for the Upper Blue Diamond Diversion Channel Tiberti North RCB Structure from Sta. 18+73.180 to Sta. 17+90.000, except earthwork, complete, including furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete, and all incidentals, including headwall, complete as shown on the drawings except for chain link fencing and post and cable railing.

1.22 CHANNEL AND RHODES RANCH CONFLUENCE STRUCTURE (Bid Item 0029).

Payment for Channel and Rhodes Ranch Confluence Structure will be made at the applicable contract price, which payment shall constitute full compensation for the structure consisting of the Upper Blue Diamond Diversion Channel from Sta. 33+26.500 to Sta. 32+31.900, including details of Section S shown on drawing "S8", and including details of Section T shown on drawing "S9", except earthwork and except weepholes, complete; including furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete; and all incidentals, complete as shown on the drawings except for post and cable railing and chain link fencing.

1.23 CHANNEL AND A PORTION OF RHODES RANCH LATERAL STRUCTURE (Bid Item 0030).

Payment for Channel and a portion of Rhodes Ranch Lateral Structure will be made at the applicable contract price, which payment shall constitute full compensation for the structure consisting of the Upper Blue Diamond Diversion Channel from Sta. 33+47.421 to Sta. 33+26.500 and a Portion of Rhodes Ranch Lateral from Sta. 10+00.000 to Sta. 10+20.000; except earthwork and except weepholes, complete, including details of Section R shown on drawing "S9"; including furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete; and all incidentals, complete as shown on the drawings except for post and cable railing and chain link fencing.

1.24 RHODES RANCH LATERAL (Bid Item 0031).

Payment for Rhodes Ranch Lateral will be made at the applicable contract price, which payment shall constitute full compensation for the Rhodes Ranch Lateral from Sta. 10+20.000 to Sta. 10+69.530; except earthwork and except weepholes, complete; including furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete; protect in place existing utilities; and all incidentals, complete as shown on the drawings except for post and cable railing and chain link fencing.

1.25 RHODES RANCH LATERAL END(Bid Item 0032).

Payment for the Rhodes Ranch Lateral End will be made at the applicable contract price, which payment shall constitute full compensation for the Rhodes Ranch Lateral End from Sta. 10+78.830 to Sta. 10+69.530, except earthwork and except weepholes, complete; including furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete; and all incidentals, complete as shown on the drawings except for post and cable railing and chain link fencing.

1.26 RCB CHANNEL RHODES RANCH (Bid Item 0033).

Payment for RCB Channel Rhodes Ranch will be made at the applicable contract price, which payment shall constitute full compensation for the Upper Blue Diamond Diversion Channel Rhodes Ranch RCB Structure from Sta. 37+35.580 to Sta. 33+65.000, except earthwork and except manholes, complete; including furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete, and all incidentals, including extended headwalls, complete, as shown on the drawings except for post and cable railing and chain link fencing.

1.27 RCB CHANNEL WINDMILL ROAD THROUGH SHELBOURNE AVE (Bid Item 0034).

Payment for RCB Channel Windmill Road through Shelbourne Ave will be made at the applicable contract price, which payment shall constitute full compensation for the Upper Blue Diamond Diversion Channel Windmill Road through Shelbourne Ave RCB Structure from Sta. 48+40.000 to Sta. 43+30.730, except earthwork and except manholes, complete; including furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete; and all incidentals, including extended headwalls, complete as shown on the drawings except for post and cable railing and chain link fencing.

1.28 INVERT ACCESS RAMP 1 (Bid Item 0035).

Payment for Invert Access Ramp 1 also includes the adjacent open channel from Sta. 17+66.000 to Sta. 16+99.919. Payment will be made at the applicable contract price, which payment shall constitute full compensation for the invert access ramp and open channel, except earthwork and except weepholes, complete, including furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete; including pipe access gate installed at top of access ramp to restrict vehicle access into channel invert and all appurtenances, **including painting of pipe access gate;** and all incidentals, **including padlocks,** complete as shown on the drawings except for post and cable railing and chain link fencing.

1.29 INVERT ACCESS RAMP 2 (Bid Item 0036).

Payment for Invert Access Ramp 2, also includes the adjacent open channel from Sta. 31+23.949 to Sta. 30+58.000. Payment will be made at the applicable contract price, which payment shall constitute full compensation for the invert access ramp and open channel, except earthwork and except weepholes, complete, including furnishing and placing reinforcing steel;

furnishing, placing, finishing and curing concrete; including pipe access gate installed at top of access ramp to restrict vehicle access into channel invert and all appurtenances, **including painting of pipe access gate;** and all incidentals, **including padlocks,** complete as shown on the drawings except for post and cable railing and chain link fencing.

1.30 INVERT ACCESS RAMP 3 (Bid Item 0037).

Payment for Invert Access Ramp 3, also includes the adjacent open channel from Sta. 50+57.231 to Sta. 49+93.000. Payment will be made at the applicable contract price, which payment shall constitute full compensation for the invert access ramp and open channel, except earthwork and except weepholes, complete, including furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete; including pipe access gate installed at top of access ramp to restrict vehicle access into channel invert and all appurtenances, **including painting of pipe access gate;** and all incidentals, **including padlocks,** complete as shown on the drawings except for post and cable railing and chain link fencing.

1.31 INLET STRUCTURE SOIL CEMENT ARMOR (Bid Item 0038)

1.31.1 Measurement

Measurement of soil cement will be made on the basis of actual cubic meters of soil cement placed within the lines and grades indicated on the drawings and specifications, **excluding the quantity placed in the test section.**

1.31.2 Payment

Payment for soil cement will be made at the applicable contract price, which payment shall constitute full compensation for the soil cement including all materials (except portland cement and pozzolan for which separate payments are provided), **costs for test section, cost to develop all soil cement mix designs,** formwork, batching, hauling, placing, compacting, finishing, curing and all equipment and tools to complete the soil cement in place. Embedded items shall be included in the cost of the soil cement except when other payment is specifically provided.

1.32 PORTLAND CEMENT FOR SOIL CEMENT (Bid Item 0039)

1.32.1 Measurement

Quantity of portland cement for soil cement to be paid for will be the number of metric tonnes (1,000 kilograms) of portland cement used for soil cement unless specifically excepted, wasted or used in the soil cement test section or for all soil cement mix designs or used for the convenience of the Contractor. The quantity to be paid for will be determined by multiplying the approved weight of portland cement in kilograms per cubic meter of soil cement by the number of accepted cubic meters of soil cement placed within the lines and grades indicated on the drawings and dividing by 1,000.

1.32.2 Payment

Payments for portland cement for soil cement will be made at the applicable contract price, which payment shall constitute full compensation for furnishing the portland cement ready for use in the work, complete. No payment will be made for portland cement used for structures for which separate payment is provided.

1.33 POZZOLAN FOR SOIL CEMENT (Bid Item 0040)

1.33.1 Measurement

Quantity of pozzolan for soil cement to be paid for will be the number of metric tonnes (1,000 kilograms) of pozzolan used for soil cement unless specifically excepted, wasted, or used in the soil cement test section or for all soil cement mix designs or used for the convenience of the Contractor. The quantity to be paid for will be determined by multiplying the approved weight of pozzolan in kilograms per cubic meters of soil cement by the number of accepted cubic meters of soil cement placed within the lines and grades indicated on the drawings and dividing by 1,000.

1.33.2 Payment

Payments for pozzolan for soil cement will be made at the applicable contract price, which payment shall constitute full compensation for furnishing the pozzolan, complete. No payment will be made for pozzolan used for structures for which separate payment is provided.

1.34 INLET STRUCTURE OUTLET RCB (Reinforced Concrete Box) Bid Item 0041)

Payment for Inlet Structure Outlet RCB will be made at the applicable contract lump sum price for the size and reach of box specified, which payment shall constitute full compensation for RCB and headwalls including earthwork, complete, including: furnishing and placing reinforcing steel; furnishing and placing, finishing and curing concrete, headwalls and manholes on outlet conduits; furnishing and placing plywood plugs; and all incidentals, complete as shown on the drawings, except for manholes and ladder systems **and outlet conduit side drain connection** which have separate bid items. Inlet Structure Basin Outlet Conduit RCB shall be 0.914 m x 0.914 m from Station 11+45.390 to **Station 10+01.000**.

1.35 INLET STRUCTURE OUTLET TOWER (Bid Item 0042)

Payment for the Inlet Structure Outlet Tower will be made at the applicable contract price, which payment shall constitute full compensation for the outlet tower structure, complete, including excavation and compacted fill; furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete; furnishing and placing galvanized steel grating; furnishing and placing 76 diameter PVC pipe; and all incidentals.

1.36 SIDE DRAINS (Bid Items 0043, 0044, 0045, 0046, 0047, 0048, **0118, 0119, 0120, 0121**).

Payment for the various side drains and stub-outs will be made at the applicable contract price, which payment shall constitute full compensation for the side drain and stub-outs, complete, as shown on the drawings,

except earthwork; furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete for the side drain junction structures and inlet structure; furnishing and placing all lengths of concrete pipe as shown on the "C" drawings, fittings and end sections and concrete thrust blocks; and placing temporary pipe barriers (plugs) for stub-outs as necessary. The earthwork included shall be only that earthwork which is located outside the limits of earthwork for which other payment is provided and no payment will be made under this item for inlets, grates, concrete, and concrete pipe for which separate payment is provided.

1.37 MANHOLES FOR BOX CONDUITS, CULVERTS, AND LATERALS (Bid Item 0049).

Payment for Manholes for Box Conduits, Culverts, and Laterals will be paid for according to the applicable contract lump sum price including, excavation, backfill and appurtenances complete and in place, except for ladder systems. No extra payment will be made for pipe fittings required to make connections to manholes.

1.38 ROAD DETOUR AT BELTWAY (Bid Item 0050).

Payment for Road Detours at Beltway will be made at the applicable contract lump sum price, and shall be considered full payment for all work including: remove and salvage chain link fence, **except for chain link fence from Sta. 13+50.000 to Sta. 10+00.000 which shall not be removed during entire project unless directed to do so by the Contracting Officer**; remove and salvage riprap in fill area; roadway embankment fill including all earthwork and provision of borrow materials, **including pre and post surveys of the borrow area, including costs associated with embankment material for detour road may be borrowed from the area immediately north, when the detour road is removed, the Contractor shall restore the borrow area to the grades existing prior to construction; construct v-ditch along toe of slope to provide positive drainage, riprap protect the embankment slope**; type II aggregate base and related work; 63 mm (2-1/2 inch) plantmix bituminous surface (PBS) and related work, with sawcut and match existing at both ends; portable precast concrete barrier rails; ground mounted construction signs (**10 signs**); type 1 lane line (paint); 150 mm (6-inch) wide white painted edge line; flag men as required; and removal of detour roadway embankment and appurtenances and restoration of Frontage Road/Beltway site including PBS, signage, striping, fencing, and flagmen, complete as shown on drawing sheet D7 titled UPPER BLUE DIAMOND DIVERSION CHANNEL, BELTWAY DETOUR CONSTRUCTION PLAN, STATION 10+00 TO 19+00 and on drawing sheet D8 titled UPPER BLUE DIAMOND DIVERSION CHANNEL, FRONTAGE ROAD DETOUR PLAN, CONSTRUCTION SIGNING & STRIPING.

1.39 EASTBOUND FRONTAGE ROAD REMOVAL AND RECONSTRUCTION (Bid Item 0051).

Payment for Eastbound Frontage Road Removal and Reconstruction will be made at the applicable contract lump sum price, and shall be considered full payment for all work including: remove and salvage chain link **fencing**; remove and salvage galvanized guardrail; remove 150 mm (6-inch) asphalt surface including sawcuts; provide and install type II aggregate base **as shown on drawing**; provide and install 150 mm (6-inch) plantmix bituminous surface including primecoat and tackcoat; construct galvanized guardrail per NDOT Standard Drawings; restore pavement markings; except earthwork

which is covered under separate bid item, complete as shown on drawing sheet D12 titled UPPER BLUE DIAMOND DIVERSION CHANNEL, REMOVAL AND RECONSTRUCTION, SOUTHERN BELTWAY EASTBOUND FRONTAGE ROAD.

1.40 CHAIN LINK FENCE, 1.829 M HIGH, 9 GAGE (Bid Item 0052).

1.40.1 Measurement.

Measurement of chain link fence, 1.829 M High, 9 Gage will be by the linear meters of chain link fence, 1.829 M high, 9 Gage, constructed as shown on the drawings.

1.40.2 Payment.

Payment for Chain Link Fence, 1.829 M High, 9 Gage, will be made at the applicable contract price, which payment shall constitute full compensation for chain link fencing, including posts with caps, rail, chain link fabric, stretcher bars, tension bands, wire ties, truss wire, concrete, grounding, and all incidentals, complete as shown on the drawings.

1.41 POST AND CABLE RAILING (Bid Item 0053)

1.41.1 Measurement

Measurement of post and cable railing will be by the linear meter, measured from end to end, of railing installed as shown on the drawings.

1.41.2 Payment

Payment for post and cable railing will be made at the applicable contract unit price per linear meter, which payment shall constitute full compensation for railing, including posts, cable, safety chain gates, anchor plate, bolts, and other galvanized appurtenances, fabrication, grout or dry pack, **including painting of posts on non-Rhodes Ranch property and including painting of posts on Rhodes Ranch property to match ornamental fence paint color**, and all incidentals, **including padlocks**, complete.

1.42 DOUBLE SWING GATES (Bid Item 0054).

1.42.1 Measurement

Measurement of double swing gates will be the number of double swing gates acceptably installed.

1.42.2 Payment.

Payment for Double Swing Gate will be made at the applicable contract price, which payment shall constitute full compensation for fabricating and installing the double swing gates, complete, including posts with caps, chain link fabric, frame members, tension bands, truss rods, stretcher bars, wire ties, truss wire, sleeves, hinges, grout, **concrete, stops and padlocks**, and all incidentals, complete, as shown on the drawings.

1.43 PRE-EMERGENT HERBICIDE AND PIGMENTED DUST PALLIATIVE/SOIL STABILIZER

ON NON-REVEGETATED AREAS OF CHANNEL (Bid Item 0055))

1.43.1 Measurement

Measurement of pre-emergent herbicide and pigmented dust palliative/soil stabilizer will be made on the basis of the actual area in hectares of areas treated with pre-emergent herbicide and pigmented dust palliative/soil stabilizer used for disturbed areas that will not be revegetated as indicated or directed.

1.43.2 Payment

Payment for pre-emergent herbicide and pigmented dust palliative/soil stabilizer will be at the applicable contract unit price per hectare, which payment shall constitute full compensation including furnishing materials, processing, and application, complete in place.

1.44 STATION MARKINGS (Bid Item 0056).

Payment for Station Markings will be made at the applicable contract lump sum price, which shall be considered full payment for preparation, paint and marking, equipment and labor.

1.45 AS-BUILT DRAWINGS (Bid Item 0057).

1.45.1 Measurement

Measurement shall be made on a lump sum basis.

1.45.2 Payment

Payment for As-Built Drawings will be made at the applicable contract price, which payment shall constitute full compensation for furnishing all labor, material, and equipment complete in place for the complete set of as-built drawings, including electronic MicroStation SE or MicroStation J "DGN" file format and PEN FILES/TABLES on Compact Disk, indicating installation of work items not installed according to the contract drawings.

1.46 LADDER SYSTEMS (Bid Item 0058)

Payment for Ladder Systems will be made at the applicable contract lump sum price for installation of all channel access ladders, including access ladders for Manholes for Box Conduits. The contract price for ladder system shall be considered full payment for fabrication, assembly fittings, finishing, paint and marking, installation of ladder steps, and all equipment, labor and fittings.

1.47 SINGLE SWING GATES, MANWAY, 1.000 x 1.829 (Bid Item 0113).

1.47.1 Measurement

Measurement of single swing gates, manway 1.000 x 1.829 will be the number of single swing gates, manway 1.000 x 1.829 acceptably installed.

1.47.2 Payment.

Payment for single swing gates, manway 1.000 x 1.829 will be made at the applicable contract price, which payment shall constitute full compensation for fabricating and installing the single swing gates, manway 1.000 x 1.829, complete, including posts with caps, chain link fabric, frame members, tension bands, truss rods, stretcher bars, wire ties, truss wire, sleeves, hinges, grout, padlocks, and all incidentals, complete, as shown on the drawings.

1.48 BASIN TRESPASS PREVENTION DEVICES - BOLLARDS (Bid Item 0060).

Payment for trespass prevention devices will be made at the applicable lump sum contract price, which payment shall constitute full compensation for trespass prevention devices, including concrete filled bollards and foundation caissons, all associated fabrication, connections including welding, sleeves, lock assemblies, concrete and/or grout and/or drypack, surface preparation and painting, grounding, and all incidentals, including stops and padlocks, complete as shown on the drawings.

1.49 DURANGO DRIVE REMOVAL AND RECONSTRUCTION (Bid Item 0061)

Payment for Durango Drive Removal and Reconstruction will be made at the applicable contract lump sum price, and shall be considered full payment for all work including; remove 50 mm (2-inch) asphalt surface; **install** roadway embankment fill; **install** type II aggregate base; **new** 63 mm (2 1/2-inch) plantmix bituminous surface including sawcut; adjust water valve covers (13 each); and adjust sanitary sewer manhole covers (9 each, **not including Arlington Ranch Sewer Manhole adjustments which are included in another bid item**), complete, as shown on drawing sheets D14 titled UPPER BLUE DIAMOND DIVERSION CHANNEL, REMOVALS AND RELOCATIONS, DURANGO DRIVE, D15 titled UPPER BLUE DIAMOND DIVERSION CHANNEL, ROADWAY RECONSTRUCTION PLAN, DURANGO DRIVE STA. -7+50 TO STA. 4+00, D16 titled UPPER BLUE DIAMOND DIVERSION CHANNEL, ROADWAY RECONSTRUCTION PLAN, DURANGO DRIVE STA. 4+00 TO STA. 15+00, **including coordination and phasing costs required between Contractor with Rhodes Ranch relocated sewer and Durango roadway improvements related work as shown on Drawings D17 titled UPPER BLUE DIAMOND DIVERSION CHANNEL, ROADWAY RECONSTRUCTION PLAN, DURANGO DRIVE STA. 15+00 TO STA. 26+00, and D18 titled UPPER BLUE DIAMOND DIVERSION CHANNEL, ROADWAY RECONSTRUCTION PLAN, DURANGO DRIVE STA. 26+00 TO STA. 36+00.**

1.50 PROVIDE PLANT STORAGE IRRIGATION DURING CONSTRUCTION (Bid Item 0062)

Payment for providing plant storage area irrigation during construction will be made at the applicable contract price, which payment shall constitute full compensation for furnishing water, labor and equipment to maintain plants as specified.

1.51 PROVIDE IRRIGATION FOR ONE YEAR AFTER CONSTRUCTION (Bid Item 0063)

Payment for providing irrigation for one year after construction will be made at the applicable contract price, which payment shall constitute full compensation for furnishing water, labor and necessary equipment to maintain plants placed for revegetation as specified.

1.52 ONE YEAR GUARANTEE ON LANDSCAPE WORK AT INLET STRUCTURE (Bid Item 0064)

Payment for providing a one year guarantee on landscape work will be made at the applicable contract price, which payment shall constitute full compensation for furnishing personnel to complete landscape work as specified, and providing required reports.

1.53 TORTOISE FENCE, INLET STRUCTURE (Bid Item 0065)

1.53.1 Measurement

Measurement of tortoise fence that is provided will be by the linear meter of tortoise fence constructed as shown on the drawings.

1.53.2 Payment

Payment for tortoise fence will be made at the applicable contract unit price per linear meter, which payment shall constitute full compensation for tortoise fence, including steel tee posts and all incidentals complete as shown on the drawings, and scheduling and coordination of the work to comply with Section 01200 GENERAL REQUIREMENTS, paragraph ENVIRONMENTAL ASSESSMENT REQUIREMENT. Payment shall also include complete removal of tortoise fence at the completion of this project.

1.54 SALVAGE, STORE, AND MAINTAIN PLANTS (Bid Items 0066 - 0069)

1.54.1 Measurement

Measurement for salvaging, storing, and maintaining plants will be the number of plants of each type specified, actually salvaged, stored and maintained in a healthy condition.

1.54.2 Payment

The accepted quantities of plants measured for salvaging, storing, and maintaining plants, will be paid at the applicable contract unit price per the type of plant, for plants actually salvaged, stored and maintained in a healthy condition. Such payment shall be full compensation for all the labor, materials, and incidentals necessary to complete the work, except transplanting plants and irrigation water to maintain the plants will be paid separately.

1.55 TRANSPLANT PLANT MATERIALS (Bid Items 0070 - 0073)

1.55.1 Measurement

Measurement for transplanting plant materials will be the number of plants of each type specified, actually planted on the project.

1.55.2 Payment

The accepted quantities of plants measured for transplanting plant materials will be paid at the applicable contract unit price per the type

of plant, identified in each bid item and actually planted on the project. Such payment shall be full compensation for all the labor, materials, and incidentals necessary to complete the work, except irrigation water to maintain the plants will be paid separately.

1.56 PLACE TOPSOIL TO FINISH GRADE, DOWNSTREAM SURFACE INLET STRUCTURE EMBANKMENT (Bid Item 0074)

1.56.1 Measurement

Measurement for placing topsoil to finished grade will be made on the basis of the cubic meters of material placed and graded to a depth of 203 millimeters over surfaces designated for revegetation treatment. Excess material from strip and stockpile for topsoil that is wasted or placed as miscellaneous fill will not be included for measurement under this item.

1.56.2 Payment

Payment for placing topsoil to finished grade will be at the applicable contract price per cubic meter, which payment shall constitute full compensation for materials, equipment, and labor.

1.57 SEEDING AND FERTILIZATION, DOWNSTREAM SURFACE INLET STRUCTURE EMBANKMENT (Bid Item 0075)

1.57.1 Measurement

Measurement for seeding and fertilization will be the number of hectares completed, applied at the specified seed and fertilizer rates in the designated areas, measured along the ground slope.

1.57.2 Payment

Payment for seeding and fertilization will be at the applicable contract price per hectares, which payment shall constitute full compensation for materials, equipment, and labor including tillage, amendments, and plant establishment.

1.58 PROVIDE BROWSE PROTECTION (Bid Item 0076)

Payment for providing browse protection will be made at the applicable contract price for each browse control device including equipment, supplies and labor.

1.59 SIMULATED DESERT VARNISH ROCK COLOR MITIGATION (Bid Item 0077)

1.59.1 Measurement

Measurement of simulated desert varnish rock color mitigation will be made on the basis of the actual area in hectares of exposed excavation, fill, and rock surfaces in the construction areas that are treated.

1.59.2 Payment

Payment for simulated desert varnish rock color mitigation will be at the applicable contract price per hectares, which payment shall constitute full compensation for the simulated desert varnish rock color mitigation including furnishing materials, processing, hauling, and placing, complete in place.

1.60 SOIL SAMPLING AND TESTING FOR FERTILITY (Bid Item 0078)

1.60.1 Measurement

Measurement of soil sampling and testing for fertility will be made at the applicable contract unit price per each soil sample taken as shown on the drawings and tested for fertility.

1.60.2 Payment

Payment for soil sampling and testing for fertility will be made at the applicable contract price for each soil sample taken and tested, which payment shall constitute full compensation for materials, equipment, and labor.

1.61 PIGMENTED DUST PALLIATIVE/SOIL STABILIZER ONLY ON REVEGETATED AREAS (Bid Item 0079)

1.61.1 Measurement

Measurement of pigmented dust palliative/soil stabilizer will be made on the basis of the actual area in hectares used for revegetation as indicated or directed.

1.61.2 Payment

Payment for pigmented dust palliative/soil stabilizer will be at the applicable contract price per hectare, which payment shall constitute full compensation including grading, scarifying, furnishing materials, processing, hauling and applying, complete in place.

1.62 PROVIDE CHANNEL EXCAVATION SHORING ON WEST SIDE OF EXCAVATION FROM STA. 35+57.644 TO STA. 35+02.853 AND STA. 34+86.656 TO STA. 34+40.000 TO PROTECT STREET IMPROVEMENTS (Bid Item 0080))

Payment for providing excavation shoring along provide channel excavation shoring on west side of excavation from Sta. 35+57.644 to Sta. 35+02.853 and Sta. 34+86.656 to Sta. 34+40.000 to protect street improvements will be made at the applicable contract price, which payment shall constitute full compensation for furnishing shoring, labor and necessary equipment, for duration of related construction work in area, to protect street improvements as specified, and removal of said shoring when related work is completed.

1.63 PROVIDE CHANNEL EXCAVATION SHORING ON WEST SIDE OF EXCAVATION FROM STA. 34+40.000 TO STA. 34+16.498 AND ON EAST SIDE OF EXCAVATION FROM STA. 34+30.000 TO STA. 33+02.481 TO PROTECT STREET AND LANDSCAPING IMPROVEMENTS (Bid Item 0081)1)

Payment for providing channel excavation shoring on west side of excavation from Sta. 34+40.000 to Sta. 34+16.498 and on east side of excavation from Sta. 34+30.000 to Sta. 33+02.481 to protect street and landscaping improvements will be made at the applicable contract price, which payment shall constitute full compensation for furnishing shoring, labor and necessary equipment, for duration of related construction work in area, to protect landscaping improvements as specified, and removal of said shoring when related work is completed.

1.64 RHODES RANCH ENTRY PHASE 1 DETOUR (Bid Item 0082).

Payment for Rhodes Ranch Entry Phase 1 Detour will be made at the applicable contract lump sum price, and shall be considered full payment for all work including: **traffic drum with flasher, 24 inch solid white stop bar**, ground mounted construction signs (7 signs); portable precast concrete barrier rails; type III barricade; and removal of Phase 1 detour items when no longer required, complete, except for earthwork, and as shown on drawing sheet D9 titled UPPER BLUE DIAMOND DIVERSION CHANNEL, RHODES RANCH ENTRY, PHASE 1 & 2 DETOUR CONSTRUCTION PLAN.

1.65 RHODES RANCH ENTRY PHASE 2 DETOUR (Bid Item 0083).

Payment for Rhodes Ranch Entry Phase 2 Detour will be made at the applicable contract lump sum price, and shall be considered full payment for all work including: **traffic drum with flasher, 24 inch solid white stop bar**, ground mounted construction signs (10 signs); portable precast concrete barrier rails; removal of landscape median; temporary pavement patch; traffic drums **with flashers**; 4-inch double solid yellow centerline tape; 6-inch white edge line tape; 8-inch solid white edge line paint; 24-inch stop bar paint; **type III barricade**; replace raised median curb, complete, except for earthwork, and as shown on drawing sheet D9 titled UPPER BLUE DIAMOND DIVERSION CHANNEL, RHODES RANCH ENTRY, PHASE 1 & 2 DETOUR CONSTRUCTION PLAN.

1.66 RHODES RANCH ENTRY REMOVAL AND RECONSTRUCTION (Bid Item 0084).

Payment for Rhodes Ranch Entry Removal and Reconstruction will be made at the applicable contract lump sum price, and shall be considered full payment for all work including: remove "L" type curb and gutter; remove "A" type curb; remove 100 mm (4-inch) concrete sidewalk; remove 50 mm (2-inch) asphalt surface; construct 3 each 6.56 m (20 foot) type CM drop inlet; construct 3 each 6.56 m (20 foot) type DM drop inlet; install 0.450 m (18-inch) RCP; install 0.610 m (24-inch) RCP; install 0.760 m (30-inch) RCP; construct "L" type curb & gutter; construct "A" type curb; construct 100 mm (4-inch) concrete sidewalk; install type II aggregate base; construct 2.4 m (8-foot) wide valley gutter; construct 50 mm (2-inch) plantmix bituminous surface permanent signing and striping, complete, as shown on the drawing sheet D13 titled UPPER BLUE DIAMOND DIVERSION CHANNEL, REMOVAL AND RECONSTRUCTION, RHODES RANCH PARKWAY, and on drawing sheet D19 titled UPPER BLUE DIAMOND DIVERSION CHANNEL, STORM DRAIN PROFILES.

1.67 DURANGO DRIVE ROAD CLOSURE - ROBINDALE ROAD TO WIGWAM AVENUE (Bid Item 0085).

Payment for Durango Drive Road Closure - Robindale Road to Wigwam Avenue will be made at the applicable contract lump sum price, and shall be considered full payment for all work including: ground mounted construction signs (21 signs); type III barricade, provision of phased accessibility to existing residence and fire access crash gate off Shelbourne Avenue, complete, as shown on drawing sheet D10 titled UPPER BLUE DIAMOND DIVERSION CHANNEL, ROAD CLOSURE PLAN, DURANGO DRIVE - ROBINDALE RD. TO WIGWAM AVE., **including Contractor costs associated with having to provide construction access and coordination with Rhodes Ranch Contractor/Developer.**

1.68 RCB CHANNEL UNDER BELTWAY ON RAMP (Bid Item 0086).

Payment for RCB Channel Under Beltway On Ramp will be made at the applicable contract price, which payment shall constitute full compensation for the RCB structure consisting of the Upper Blue Diamond Diversion Channel from Sta. 13+35.400 to Sta. 12+80.000, including 5.480 wide x 3.100 high box conduit, complete, except earthwork and except manholes; and including extended headwall shown on drawing "S3", complete; including furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete; protect in place existing utilities; and all incidentals, complete as shown on the drawings except for post and cable railing and chain link fencing.

1.69 ORNAMENTAL METAL FENCING (Bid Item 0087)

1.69.1 Measurement

Measurement of ornamental metal fencing will be by the linear meter, measured from end to end, of ornamental metal fencing installed as shown on the drawings.

1.69.2 Payment

Payment for Ornamental Metal Fencing will be made at the applicable contract price per linear meter, which payment shall constitute full compensation for ornamental metal fencing, including posts with caps, rails, pickets, all associated fabrication, connections including bolting and/or welding, anchor bolt assemblies, base plate assemblies, grout or drypack, concrete, surface preparation and painting, grounding, including all earthwork for posts, and all incidentals, complete as shown on the drawings.

1.70 ORNAMENTAL METAL FENCING GATES (Bid Item 0088).

1.70.1 Measurement

Measurement of ornamental metal fencing gates will be the number of ornamental metal fencing gates acceptably installed.

1.70.2 Payment.

Payment for Ornamental Metal Fencing Gates will be made at the applicable contract price per each unit, which payment shall constitute full

compensation for matching ornamental metal fencing gates, including posts with caps, rails, pickets, frame members, all associated fabrication, connections including bolting and/or welding, anchor bolt assemblies, base plate assemblies, concrete and/or grout and/or drypack, hinges, surface preparation and painting, grounding, and all incidentals, including stops and padlocks, complete as shown on the drawings.

1.71 UTILITY CROSSING ITEMS (Bid Item 0089).

Payment for Utility Crossing Items will be made at the applicable contract lump sum price, and shall be considered full payment for all work including:

- A) excavation shoring for electrical vault Sta. 22+55 and excavation shoring for electrical vault Sta. 23+14 and protect in place underground electrical, telephone (fiber optic), and cable tv conduits at Sta. 20+74 as shown and indicated in note on drawing sheet D3 titled UPPER BLUE DIAMOND DIVERSION CHANNEL, UTILITY CROSSING DETAILS, UBDDR STA. 17+90, 20+74, AND 22+55;
- B) excavation shoring for electrical vault Sta. 33+25 and for Sta. 31+12 as shown and indicated in note on drawing sheet D4 titled UPPER BLUE DIAMOND DIVERSION CHANNEL, UTILITY CROSSING DETAILS, UBDDR STA. 33+25, 34+88, AND 37+24.4;
- C) support and concrete encase 305 mm (12-inch) waterline, electrical conduits, telephone conduits, and 150 mm (6-inch) gas line at Sta. 34+88 and protect sewer line in place at Sta. 37+24.4 as shown and indicated on drawing sheet D4 titled UPPER BLUE DIAMOND DIVERSION CHANNEL, UTILITY CROSSING DETAILS, UBDDR STA. 33+25, 34+88, AND 37+24.4;
- D) support and concrete encase telephone conduits and protect in place sewer line and manholes and waterline at Sta. 43+34 and protect in place sewer lines and manholes at Sta. 40+70 and Sta. 37+87 as shown and indicated on drawing sheet D5 titled UPPER BLUE DIAMOND DIVERSION CHANNEL, UTILITY CROSSING DETAILS, UBDDR STA. 37+87, 40+70, AND 43+34;
- E) support and concrete encase telephone conduits and protect in place high pressure gas line and waterline at Sta. 45+44 as shown and indicated on drawing sheet D6 titled UPPER BLUE DIAMOND DIVERSION CHANNEL, UTILITY CROSSING DETAILS, UBDDR STA. 45+44, 46+81, AND 47+36;
- F) support and concrete encase telephone conduits and protect in place high pressure gas line and waterline at Sta. 46+81 as shown and indicated on drawing sheet D6 titled UPPER BLUE DIAMOND DIVERSION CHANNEL, UTILITY CROSSING DETAILS, UBDDR STA. 45+44, 46+81, AND 47+36;
- G) support and concrete encase telephone conduits and relocate and steel encase 200 mm (8-inch) waterline and protect in place high pressure gas line and waterline at Sta. 47+36, including steel sleeve, elbows, plug and blow off, as shown and indicated on drawing sheet D6 titled UPPER BLUE DIAMOND DIVERSION CHANNEL, UTILITY CROSSING DETAILS, UBDDR STA. 45+44, 46+81, AND 47+36, complete.

1.72 OUTLET CONDUIT SIDE DRAIN STRUCTURE, STA. 51+03.000 RT (Bid Item 0090).

Payment for the outlet conduit side drain structure, sta. 51+03.000 right, will be made at the applicable contract price, which payment shall constitute full compensation for the side drain structure, complete, as shown on the drawings, except earthwork; furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete for the side drain junction structure and inlet structure; and placing temporary barriers (plugs) as necessary. The earthwork included shall be only that earthwork which is located outside the limits of earthwork for which other payment is provided.

1.73 1.829 M x 1.524 M SIDE DRAIN STRUCTURE, STA. 13+40.000 LT (Bid Item 0091).

Payment for the 1.829 M x 1.524 M side drain outlet structure, sta. 13+40.000 left, will be made at the applicable contract price, which payment shall constitute full compensation for the side drain structure, complete, as shown on the drawings, except earthwork; including sawcutting and removal of necessary portion of the existing precast 1.829 M x 1.524 M (6' x 5') RCB structure at STA. 13+40.000 (left side of channel looking upstream) to allow for placement of new channel and side drain structure; furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete for the side drain junction structure; furnishing and placing replacement cast in place RCB structure with all incidentals, and placing temporary barriers (plugs) as necessary. The earthwork included shall be only that earthwork which is located outside the limits of earthwork for which other payment is provided.

1.74 WALL TRANSITION STRUCTURE(S) (Bid Items 0092, 0093, 0094, 0095, 0096, 0097, 0098, 0099, 0100, 0107, 0111)

Payment for Wall Transition Structure(s) will be made at the applicable contract price, which payment shall constitute full compensation for the Upper Blue Diamond Diversion Channel Wall Transition Structure(s) shown on the drawings and identified by Stationing in the respective bid items, including details shown on "S" sheet drawings, except earthwork and except weepholes, complete; including furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete; and all incidentals, complete as shown on the drawings except for post and cable railing and chain link fencing. The Upper Blue Diamond Diversion Channel Wall Transition Structures are located at the following Stations -

STA. 49+00.000 TO STA. 48+40.000
 STA. 43+30.730 TO STA. 43+23.130
 STA. 37+46.980 TO STA. 37+35.580
 STA. 33+65.000 TO STA. 33+59.600
 STA. 30+29.440 TO STA. 30+18.420
 STA. 22+84.000 TO STA. 22+71.300
 STA. 21+15.700 TO STA. 21+03.000
 STA. 17+90.000 TO STA. 17+80.900
 STA. 16+52.700 TO STA. 16+40.000
 STA. 15+70.000 TO STA. 15+57.300

STA. 12+80.000 TO STA. 12+67.938

1.75 UTILITY MARKERS (Bid Item 0101).

1.75.1 Measurement

Measurement of utility markers will be the number of utility markers acceptably installed.

1.75.2 Payment.

Payment for Utility Markers will be made at the applicable contract price, which payment shall constitute full compensation for fabricating and installing the utility marker on the east side of utility being marked, complete, including utility marker consisting of schedule 80 PVC extending 0.610 meter above finished grade filled with grout/concrete and set in concrete filled five gallon bucket, with utility (i.e. electric, telephone, gas, water, sewer, etc.) being stenciled on schedule 80 PVC above finished grade, grout/concrete, paint, earthwork, protection of utility marker while in place, and all incidentals, complete.

1.76 ADJUST SEWER MANHOLE FRAMES AND COVERS (Bid Item 0103)

Measurement and payment shall be made according to the contract unit price for each manhole acceptably adjusted to finished grade elevation. Existing covers, including frames, grates, or lids shall be adjusted to the required elevation by removing such existing covers and adjusting the top of the existing structures by removing or adding concrete, riser, cone, grade rings, or by using cast iron adaptor rings, as the case may be, reinstalling the fixtures by supporting them on a satisfactory collar of Class A concrete constructed as to hold them firmly in place.

1.77 RCB CHANNEL LOUGHTON POWERS (Bid Item 0104).

Payment for RCB Channel Loughton Powers will be made at the applicable contract price, which payment shall constitute full compensation for the Upper Blue Diamond Diversion Channel Loughton Powers RCB Structure from Sta. 20+78.580 to Sta. 18+73.180, except earthwork and except manholes, complete, including furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete, and all incidentals, complete as shown on the drawings.

1.78 RCB CHANNEL BADURA (Bid Item 0105).

Payment for RCB Channel Badura will be made at the applicable contract price, which payment shall constitute full compensation for the Upper Blue Diamond Diversion Channel Badura RCB Structure from Sta. 21+03.000 to Sta. 20+78.580, except earthwork and except manholes, complete, including furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete, and all incidentals, including headwall, complete as shown on the drawings except for chain link fencing.

1.79 OVERBURDEN RHODES RANCH ENTRYWAY (Bid Item 0106).

1.79.1 Measurement

Measurement for overburden Rhodes Ranch Entryway will be made on the basis of the actual volume, in cubic meters, as follows, between Station 33+65.000 through Station 37+21.439.

The overburden Rhodes Ranch Entryway quantity shall be surveyed and computed based on the following. The survey shall capture the elevations of a plane 0.610 meters above the top of the reinforced concrete box structure along the overburden area as shown on drawing sheet C22, Channel Typical Section, "Sta. 33+65.000 to Sta. 37+21.439". This 0.610 elevation plane above the reinforced concrete box shall be extended level (same elevation) to the west edge of the TCE limits to create a bottom for the overburden template. This template shall include a 1:1 slope up to daylight at and within the west TCE limit. This bottom of overburden shall then be compared with the actual existing finish grade elevations for the same area to create a volume of overburden. Survey data and calculations shall be submitted to the Contracting Officer prior to removing any overburden.

1.79.2 Payment

Payment for Overburden Rhodes Ranch Entryway will be made at the applicable contract price per cubic meter and includes handling of overburden material at identified Rhodes Ranch overburden site which includes overburden material on flood easement on West side of Durango Drive between station 33+65.000 through station 37+21.439 indicated herein; and shall be considered full payment for all work including surveying for quantity verification, stockpiling and grading to final grade lines to match existing topography per survey data, or hauling and processing to be used as compacted fill elsewhere excluding on BLM land, complete.

1.80 PROTECT IN-PLACE ARLINGTON RANCH SEWER LINE (Bid Item 0108)

Payment for providing protect in-place Arlington Ranch Sewer Line within excavation limits of channel from Sta. 43+30.000 through Sta. 48+00.000 to protect PVC sewer line for Arlington Ranch improvements will be made at the applicable contract price, which payment shall constitute full compensation for furnishing shoring as necessary, labor and necessary equipment, for duration of related construction work in area, to protect and support in-place Arlington Ranch sewer line improvements as specified, and removal of said shoring if utilized when related work is completed.

1.81 ADJUST ARLINGTON RANCH SEWER MANHOLES (Bid Item 0109)

Payment for providing adjust Arlington Ranch Sewer manholes within excavation limits of channel from Sta. 43+30.000 through Sta. 48+00.000 to adjust the height of 4 manholes for Arlington Ranch improvements will be made at the applicable contract price, which payment shall constitute full compensation for furnishing shoring as necessary, labor and necessary equipment, for duration of related construction work in area, to adjust the height of Arlington Ranch sewer manholes improvements as specified, and removal of said shoring if utilized when related work is completed.

1.82 CHAIN LINK FENCE, 1.219 M HIGH (Bid Item 0110).**1.82.1 Measurement.**

Measurement of chain link fence, 1.219 M HIGH will be by the linear meters of chain link fencing constructed as shown on the drawings.

1.82.2 Payment.

Payment for Chain Link Fence, 1.219 M HIGH will be made at the applicable contract price, which payment shall constitute full compensation for chain link fencing, including posts with caps, rail, chain link fabric, stretcher bars, tension bands, wire ties, truss wire, anchor bolt assemblies, base plate assemblies, grout and/or drypack, grounding, and all incidentals, complete as shown on the drawings.

1.83 RCB CHANNEL TIBERTI SOUTH (Bid Item 0112).

Payment for RCB Channel Tiberti South will be made at the applicable contract price, which payment shall constitute full compensation for the Upper Blue Diamond Diversion Channel Tiberti South RCB Structure from Sta. 25+19.089 to Sta. 22+84.000, except earthwork and except manholes, complete, including furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete, and all incidentals, including headwall, complete as shown on the drawings except for chain link fencing.

1.84 SINGLE SWING GATES, 1.000 X 1.219 (Bid Item 0113).**1.84.1 Measurement**

Measurement of single swing gates, 1.000 x 1.219 will be the number of single swing gates, 1.000 x 1.219 acceptably installed.

1.84.2 Payment.

Payment for Single Swing Gates, 1.000 x 1.219 will be made at the applicable contract price, which payment shall constitute full compensation for fabricating and installing the single swing gates, 1.000 wide x 1.219 high, complete, including posts with caps, chain link fabric, frame members, tension bands, truss rods, stretcher bars, wire ties, truss wire, anchor bolt assemblies, base plate assemblies, hinges, grout and/or drypack, stops and padlocks, and all incidentals, complete, as shown on the drawings.

1.85 BELTWAY LATERAL TRANSITIONAL RCB STRUCTURE AT DURANGO DRIVE (Bid Item 0114).

Payment for Beltway Lateral Transitional RCB Structure at Durango Drive will be made at the applicable contract price, which payment shall constitute full compensation for the Beltway Transitional RCB Structure at Durango Drive from Sta. 12+33.130 to Sta. 12+26.53, except earthwork and except manholes, complete, including furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete, and all incidentals, including headwall, complete as shown on the drawings except

for chain link fencing.

1.86 ORNAMENTAL METAL FENCE GATES, SINGLE SWING, 1.000 X 1.800 (Bid Item 0115).

1.86.1 Measurement

Measurement of ornamental metal fence gates, single swing, 1.000 x 1.800 will be the number of ornamental metal fence gates, single swing, 1.000 wide x 1.800 high acceptably installed.

1.86.2 Payment.

Payment for ornamental metal fence gates, single swing, 1.000 x 1.800 will be made at the applicable contract price, which payment shall constitute full compensation for fabricating and installing the matching ornamental metal fence gates, single swing, 1.000 wide x 1.800 high, complete, including posts with caps, rails, pickets, frame members, all associated fabrication, connections including bolting and/or welding, anchor bolt assemblies, base plate assemblies, concrete and/or grout and/or drypack, hinges, surface preparation and painting, grounding, and all incidentals, including stops and padlocks, complete.

1.87 CHAIN LINK FENCE, 1.829 M HIGH, 11 GAGE (Bid Item 0116).

1.87.1 Measurement.

Measurement of chain link fence, 1.829 M High, 11 Gage will be by the linear meters of chain link fence, 1.829 M high, 11 Gage, constructed as shown on the drawings. The chain link fence, 1.829 M high, 11 gage shall be installed along the Temporary Construction Easement (TCE) of the Rhodes Ranch Property Between Station 43+30.730 through Station 30+18.420

1.87.2 Payment.

Payment for Chain Link Fence, 1.829 M High, 11 Gage, will be made at the applicable contract price, which payment shall constitute full compensation for chain link fencing, including posts with caps, rail, chain link fabric, stretcher bars, tension bands, wire ties, truss wire, concrete, grounding, and all incidentals, complete as shown on the drawings, including coordination of chain link, 1.829 M, 11 gage installation on Rhodes Ranch Property with Rhodes Ranch.

1.88 PLANT NURSERY AREA, TEMPORARY (Bid Item 0012).

Payment for Plant Nursery Area, Temporary will be made at the applicable contract price, which payment shall constitute full compensation for the provision of a 15 meter x 10 meter chain link 9 gage 1.829 m high fenced off area with barbed wire and access gate that will safely store the salvaged desert plants, including site preparation, installation of temporary fence, fence posts, excavation for fence posts, concrete for fence posts, fabric, gate and barbed wire, and removal of temporary plant nursery area including all fence, posts, concrete, gates, barbed wire and debris, prior to conclusion of construction but after replanting of

salvaged desert plants.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

-- End of Section --

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						S U B M I T	B Y	B Y	A C T I O N	D A T E O F	D A T E F R O M	D A T E F R O M	D A T E F R O M	D A T E F R O M			D A T E O F	D A T E O F
	01200		SD-01 Preconstruction Submittals															
			Topographic Surveyor	3.17.2	G RE													
	01321		SD-01 Preconstruction Submittals															
			Qualifications	1.5	G RE													
			Standard Activity Coding Dictionary	1.6.2.5														
			Schedule Development Session scheduler/planner	1.7.2	G RE													
			Preliminary Network Analysis Schedule	1.7.3	G RE													
			Network Analysis Schedule	1.7.4	G RE													
			Accepted Network Analysis Schedule	1.7.6	G RE													
			Summary Network	1.7.8														
			SD-07 Certificates															
			Monthly Network Analysis Updates	1.7.7														
			SD-11 Closeout Submittals															
			As-Built Schedule	1.7.9														
	01330		SD-01 Preconstruction Submittals															
			Submittal register	1.5.1	G RE													
	01355		SD-01 Preconstruction Submittals															
			Environmental Protection Plan	1.7	G RE													
			Joint Condition Survey Report	1.8	G RE													
	01356		SD-01 Preconstruction Submittals															

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						SUBMIT	BY	MATERIAL NEEDED	ACTION	DATE OF ACTION	DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION		DATE OF ACTION	DATE RCD FRM APPR AUTH
	01356		Storm Water Pollution Prevention Plan	Part 3	G RE												
			Receipt of Notice of Intent	Part 3													
			SD-07 Certificates														
			Mill Certificate or Affidavit	2.1.3													
	01702		SD-11 Closeout Submittals														
			As-built Drawings	3.1.1	G RE												
	02100		SD-01 Preconstruction Submittals														
			Diversion and Control of Water Plan	1.2.1	G RE												
	02300		SD-01 Preconstruction Submittals														
			Excavation Plan	3.1	G RE												
			Excavation Plan	3.1.1	G RE												
			Haul Route Plan	3.10.1	G RE												
			BLM Import Material Certification Form	3.1.4	G RE												
			SD-02 Shop Drawings														
			Shop Drawings	3.3													
			Explosive Storage Location	3.2.8.2													
			Pre-construction topographic survey of the entire project site	Part 3													
			Post-construction topographic survey of the entire project site	Part 3													
			SD-05 Design Data														
			Pre-Blast Data Report	3.2.2													
			Post-Blast Data Report	3.2.7													

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						S U B M I T	B Y	B Y	A C T I O N	D A T E O F	D A T E F R O M	D A T E F R O M	D A T E F R O M	D A T E F R O M			D A T E O F	D A T E O F
	02300		SD-06 Test Reports															
			Field Density Tests	3.13.1														
			Treating of Compacted Fill Materials	3.13.1														
	02316		SD-06 Test Reports															
			Field Density Tests	3.4.3														
			Testing of Backfill Materials	3.4.2														
	02380		SD-01 Preconstruction Submittals															
			Source of Stone	1.3.1.2	G RE													
			Testing Laboratory	3.4.1.1	G RE													
			SD-04 Samples															
			Stone Quality	2.1.1.1														
			Bulk Specific Gravity	2.1.1.1														
			SD-05 Design Data															
			Method of Placement	3.1	G RE													
			SD-06 Test Reports															
			Gradation Testing	2.1.1.4														
			Daily Report of Operations	3.2														
			SD-07 Certificates															
			Waybills and Delivery Tickets	3.6.1														
			Weigh Scale Certification	3.1.1														
	02500		SD-03 Product Data															
			Composition Requirements	2.1														
	02510		SD-03 Product Data															
			Installation	3.1														
			Waste Water Disposal Method	3.2														

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ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION	PARAGRAPH	GOVT CLASSIFICATION	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION		APPROVING AUTHORITY				MAILED TO CONTR/	REMARKS	
						APPROVAL NEEDED	MATERIAL NEEDED		DATE OF ACTION	DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION			DATE RCD FRM APPR AUTH
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		02510	Satisfactory Installation	3.5													
			SD-06 Test Reports														
			Bacteriological Disinfection	3.3													
			Bacteriological Disinfection	3.3.1													
			Field Tests	3.7													
			SD-11 Closeout Submittals														
			Framed Instructions	3.7.3													
		02650	SD-05 Design Data														
			Grout Mix Design	2.2													
			SD-07 Certificates														
			Portland Cement	2.1.2													
			Curing Materials	2.1.4													
		02700	SD-02 Shop Drawings														
			Placing Pipe	3.3													
			SD-06 Test Reports														
			Pipeline Testing	3.8													
			SD-07 Certificates														
			Frame and Cover for Gratings	2.2.4													
		02709	SD-04 Samples														
			Filter Material	2.2													
		02722	SD-03 Product Data														
			Plant, Equipment, and Tools	1.6													
			Waybills and Delivery Tickets	3.3													
			Waybills and Delivery Tickets	3.9													
			SD-06 Test Reports														
			Sampling and testing	1.4													

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						S U B M I T	B Y	B Y	A C T I O N	D A T E O F	D A T E R C D F R O M	D A T E F W D T O O T H E R	D A T E R C D F R O M	A C T I O N		D A T E O F	D A T E R C D F R O M
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
	02722		Field Density Tests	1.4.2.4													
	02741		SD-01 Preconstruction Submittals														
			Quality Control Plan for hot-mix asphalt	3.9.1	G RE												
			SD-03 Product Data														
			Waybills and Delivery Tickets	3.6.1													
			Waybills and Delivery Tickets	3.10													
			SD-04 Samples														
			Asphalt Cement Binder	2.2													
			SD-05 Design Data														
			Bituminous Pavement Mix Design	2.3	G RE												
			Job Mix Formula	2.3.1	G RE												
			Properties of Bituminous Pavement Mixture	2.3.1	G RE												
			SD-06 Test Reports														
			Asphalt Content	3.9.3.1													
			Aggregate Gradation	3.9.3.2													
			Aggregate Moisture	3.9.3.3													
			Temperatures	3.9.3.4													
			Moisture Content of Mixture	3.9.3.5													
			Laboratory Air Voids, Marshall	3.9.3.6													
			Stability and Flow														
			In-place Density	3.9.3.7													
			Thickness	3.9.3.8													
			Grade Conformance and Surface Smoothness	3.9.3.9													

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	02741		Asphalt Cement Binder	2.2													
			Aggregates	2.1													
			QC Monitoring	3.9.3.11													
			SD-07 Certificates														
			Testing Laboratory	3.5	G RE												
			Certification of compliance	3.9.3.11													
			Plant Scale Calibration	1.4													
			Certification														
	02748		SD-06 Test Reports														
			Sampling and Testing	3.7													
			SD-07 Certificates														
			Waybills and Delivery Tickets	3.4													
	02821		SD-02 Shop Drawings														
			Post and Cable Railing System	3.10													
			Chain Link Metal Fence and	3.3													
			Gates														
			Ornamental Metal Fencing	2.11													
			System														
			SD-07 Certificates														
			Chain Link Fence	2.1.1													
	02910		SD-01 Preconstruction Submittals														
			Credentials and Past Project	Part 3	G RE												
			Experience Form of the Proposed														
			Landscape Professional														

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						S U B M I T	B Y	B Y	A C T I O N	D A T E O F	D A T E F W D F R O M	D A T E F W D T O O T H E R	D A T E R C D F R O M	D A T E R C D F R O M			A C T I O N
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
	02910		Credentials and Past Project Experience Form of the Proposed Landscape Professional Equipment	3.4	G RE												
			Fencing Materials	2.3													
			Temporary Irrigation Plan	2.2	G RE												
	02921		SD-01 Preconstruction Submittals														
			Equipment	3.1.3													
			Soil Stabilizer	2.4													
			Chemical Treatment Material	2.6													
			Seeding Equipment	3.1.3													
			Temporary Irrigation Plan	3.3.5.1	G RE												
			SD-07 Certificates														
			Availability of topsoil from the stripping and stock piling operations	2.2													
			Finished Grade and Topsoil Status	2.2													
			Finished Grade and Topsoil Status	3.2.1													
			Seed	2.1													
			Fertilizer	2.3.1													
			Pesticide	3.5													
			SD-06 Test Reports														
			Soil Sample Fertility Analyses Report	2.2.1.2	G RE												

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						S U B M I T	B Y	B Y	A C T I O N	D A T E O F	D A T E F R O M	D A T E F R O M	D A T E F R O M	D A T E F R O M			D A T E F R O M	D A T E O F	D A T E F R O M
	02921		Seeding Equipment Calibration	3.1.3	G RE														
			SD-11 Closeout Submittals																
			Bi-Monthly Plant Maintenance Record	3.8.3.4	G RE														
	02930		SD-01 Preconstruction Submittals																
			Soil Stabilizer	2.4															
			Browse Control	2.8															
			Soil Amendments	1.5.1.4															
			SD-02 Shop Drawings																
			Temporary Irrigation Plan	3.1.3.3	G RE														
			SD-06 Test Reports																
			Soil Tests	2.2															
			Laboratory Analysis	2.2															
			Three On-site Percolation Tests	3.1.3.2															
			SD-07 Certificates																
			Plant Material	1.5.1.2															
			Plant Material	1.5.1.2															
			Fertilizer	2.3.1															
			Soil Stabilizer Properties	2.4.1															
			Mycorrhizal Fungi Inoculum	2.5															
			Pesticides	2.9															
			Irrigation Water	2.6															
			SD-11 Closeout Submittals																
			Bi-Monthly Plant Maintenance Record	3.8.9	G RE														

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						S U B M I T	B Y	B Y	A C T I O N	D A T E O F	D A T E F R O M	D A T E F R O M	D A T E F R O M	D A T E F R O M			D A T E O F	D A T E O F
	02930		Bi-Monthly Plant Maintenance Record	3.8.12.2	G RE													
			Maintenance Instructions	3.8.12.1	G RE													
	02950		SD-01 Preconstruction Submittals															
			Equipment	3.1														
			Simulated Desert Varnish	3.4														
	03101		SD-02 Shop Drawings															
			Shop Drawings	3.1.1														
			SD-03 Product Data															
			Materials	2.1														
			SD-07 Certificates															
			Shop Drawings	3.1.1	G RE													
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TITLE AND LOCATION

UPPER BLUE DIAMOND DIVERSION CHANNEL

CONTRACTOR

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SECTION 01355

ENVIRONMENTAL PROTECTION

PART 1 GENERAL

1.1 REFERENCES

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

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

33 CFR 328	Definitions of Waters of the United States
40 CFR 68	Chemical Accident Prevention Provisions
40 CFR 260	Hazardous Waste Management System: General
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 279	Standards for the Management of Used Oil
40 CFR 302	Designation, Reportable Quantities, and Notification
40 CFR 355	Emergency Planning and Notification
49 CFR 171 - 178	Hazardous Materials Regulations

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(1996) U.S. Army Corps of Engineers Safety and Health Requirements Manual
WETLAND MANUAL	Corps of Engineers Wetlands Delineation Manual Technical Report Y-87-1

1.2 DEFINITIONS

1.2.1 Environmental Pollution and Damage

Environmental pollution and damage is the presence of chemical, physical, or biological elements or agents which adversely affect human health or

welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade the environment aesthetically, culturally and/or historically.

1.2.2 Environmental Protection

Environmental protection is the prevention/control of pollution and habitat disruption that may occur to the environment during construction. The control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

1.2.3 Contractor Generated Hazardous Waste

Contractor generated hazardous waste means materials that, if abandoned or disposed of, may meet the definition of a hazardous waste. These waste streams would typically consist of material brought on site by the Contractor to execute work, but are not fully consumed during the course of construction. Examples include, but are not limited to, excess paint thinners (i.e. methyl ethyl ketone, toluene etc.), waste thinners, excess paints, excess solvents, waste solvents, and excess pesticides, and contaminated pesticide equipment rinse water.

1.2.4 Land Application for Discharge Water

The term "Land Application" for discharge water implies that the Contractor shall discharge water at a rate which allows the water to percolate into the soil. No sheeting action, soil erosion, discharge into storm sewers, discharge into defined drainage areas, or discharge into the "waters of the United States" shall occur. Land Application shall be in compliance with all applicable Federal, State, and local laws and regulations.

1.2.5 Surface Discharge

The term "Surface Discharge" implies that the water is discharged with possible sheeting action and subsequent soil erosion may occur. Waters that are surface discharged may terminate in drainage ditches, storm sewers, creeks, and/or "waters of the United States" and would require a permit to discharge water from the governing agency.

1.2.6 Waters of the United States

Waters of the United States refers to all waters which are under the jurisdiction of the Clean Water Act, as defined in 33 CFR 328.

1.2.7 Wetlands

Wetlands means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, and bogs. Official determination of whether or not an

area is classified as a wetland must be done in accordance with WETLAND MANUAL.

1.3 GENERAL REQUIREMENTS

The Contractor shall minimize environmental pollution and damage that may occur as the result of construction operations. The environmental resources within the project boundaries and those affected outside the limits of permanent work shall be protected during the entire duration of this contract. The Contractor shall comply with all applicable Federal, State, and local environmental laws and regulations. The Contractor shall be responsible for any delays resulting from failure to comply with environmental laws and regulations.

1.4 SUBCONTRACTORS

The Contractor shall ensure compliance with this section by subcontractors.

1.5 PAYMENT

No separate payment will be made for work covered under this section. The Contractor shall be responsible for payment of fees associated with environmental permits, application, and/or notices obtained by the Contractor. All costs associated with this section shall be included in the contract price. The Contractor shall be responsible for payment of all fines/fees for violation or non-compliance with Federal, State, Regional and local laws and regulations.

1.6 SUBMITTALS

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

SD-01 Preconstruction Submittals

Environmental Protection Plan; G, RE.

The environmental protection plan.

Joint Condition Survey Report; G, RE.

A report on the joint condition survey.

1.7 ENVIRONMENTAL PROTECTION PLAN

Prior to commencing construction activities or delivery of materials to the site, the Contractor shall submit an Environmental Protection Plan for review and approval by the Contracting Officer. The purpose of the Environmental Protection Plan is to present a comprehensive overview of known or potential environmental issues which the Contractor must address

during construction. Issues of concern shall be defined within the Environmental Protection Plan as outlined in this section. The Contractor shall address each topic at a level of detail commensurate with the environmental issue and required construction task(s). Topics or issues which are not identified in this section, but which the Contractor considers necessary, shall be identified and discussed after those items formally identified in this section. Prior to submittal of the Environmental Protection Plan, the Contractor shall meet with the Contracting Officer for the purpose of discussing the implementation of the initial Environmental Protection Plan; possible subsequent additions and revisions to the plan including any reporting requirements; and methods for administration of the Contractor's Environmental Plans. The Environmental Protection Plan shall be current and maintained onsite by the Contractor. A single copy each of the initial and final Environmental Protection Plans shall be made available to the COE project Environmental Coordinator for review and comment and for future reference.

1.7.1 Compliance

No requirement in this Section shall be construed as relieving the Contractor of any applicable Federal, State, and local environmental protection laws and regulations. During Construction, the Contractor shall be responsible for identifying, implementing, and submitting for approval any additional requirements to be included in the Environmental Protection Plan.

1.7.2 Contents

The environmental protection plan shall include, but shall not be limited to, the following:

- a. Name(s) of person(s) within the Contractor's organization who is(are) responsible for ensuring adherence to the Environmental Protection Plan.
- b. Name(s) and qualifications of person(s) responsible for manifesting hazardous waste to be removed from the site, if applicable.
- c. Name(s) and qualifications of person(s) responsible for training the Contractor's environmental protection personnel.
- d. Description of the Contractor's environmental protection personnel training program.
- e. An erosion and sediment control plan which identifies the type and location of the erosion and sediment controls to be provided. The plan shall include monitoring and reporting requirements to assure that the control measures are in compliance with the erosion and sediment control plan, Federal, State, and local laws and regulations. The Contractor's Storm Water Pollution Prevention Plan (SWPPP) may be substituted for this plan.
- f. Drawings showing locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas,

structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on the site.

g. Traffic control plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather. Plan shall include measures to minimize the amount of mud transported onto paved public roads by vehicles or runoff.

h. Work area plan showing the proposed activity in each portion of the area and identifying the areas of limited use or nonuse. Plan should include measures for marking the limits of use areas including methods for protection of features to be preserved within authorized work areas.

i. Drawing showing the location of borrow areas.

j. The Spill Control plan shall include the procedures, instructions, and reports to be used in the event of an unforeseen spill of a substance regulated by 40 CFR 68, 40 CFR 302, 40 CFR 355, and/or regulated under State or Local laws and regulations. The Spill Control Plan supplements the requirements of EM 385-1-1. This plan shall include as a minimum:

1. The name of the individual who will report any spills or hazardous substance releases and who will follow up with complete documentation. This individual shall immediately notify the Contracting Officer and the local Fire Department in addition to the legally required Federal, State, and local reporting channels (including the National Response Center 1-800-424-8802) if a reportable quantity is released to the environment. The plan shall contain a list of the required reporting channels and telephone numbers.

2. The name and qualifications of the individual who will be responsible for implementing and supervising the containment and cleanup.

3. Training requirements for Contractor's personnel and methods of accomplishing the training.

4. A list of materials and equipment to be immediately available at the job site, tailored to cleanup work of the potential hazard(s) identified.

5. The names and locations of suppliers of containment materials and locations of additional fuel oil recovery, cleanup, restoration, and material-placement equipment available in case of an unforeseen spill emergency.

6. The methods and procedures to be used for expeditious contaminant cleanup.

k. A non-hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris. The plan

shall include schedules for disposal. The Contractor shall identify any subcontractors responsible for the transportation and disposal of solid waste. Licenses or permits shall be submitted for solid waste disposal sites that are not a commercial operating facility. Evidence of the disposal facility's acceptance of the solid waste shall be attached to this plan during the construction. The Contractor shall attach a copy of each of the Non-hazardous Solid Waste Diversion Reports to the disposal plan. The report shall be submitted on the first working day after the first quarter that non-hazardous solid waste has been disposed and/or diverted and shall be for the previous quarter (e.g. the first working day of January, April, July, and October). The report shall indicate the total amount of waste generated and total amount of waste diverted in cubic meters or tons along with the percent that was diverted.

l. A recycling and solid waste minimization plan with a list of measures to reduce consumption of energy and natural resources. The plan shall detail the Contractor's actions to comply with and to participate in Federal, State, Regional, and local government sponsored recycling programs to reduce the volume of solid waste at the source.

m. An air pollution control plan detailing provisions to assure that dust, debris, materials, trash, etc., do not become air borne and travel off the project site. This air pollution control plan shall also include any measures and practices that will be implemented to maintain engine exhaust emissions in compliance with state and federal thresholds.

n. A contaminant prevention plan that: identifies potentially hazardous substances to be used on the job site; identifies the intended actions to prevent introduction of such materials into the air, water, or ground; and details provisions for compliance with Federal, State, and local laws and regulations for storage and handling of these materials. In accordance with EM 385-1-1, a copy of the Material Safety Data Sheets (MSDS) and the maximum quantity of each hazardous material to be on site at any given time shall be included in the contaminant prevention plan. As new hazardous materials are brought on site or removed from the site, the plan shall be updated.

o. A waste water management plan that identifies the methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines. If a settling/retention pond is required, the plan shall include the design of the pond including drawings, removal plan, and testing requirements for possible pollutants. If land application will be the method of disposal for the waste water, the plan shall include a sketch showing the location for land application along with a description of the pretreatment methods to be implemented. If surface discharge will be the method of disposal, a copy of the permit and associated documents shall be included as an attachment prior to discharging the waste water. If disposal is to a sanitary sewer, the plan shall include documentation that the Waste Water Treatment Plant Operator has

approved the flow rate, volume, and type of discharge.

p. A historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands known to be on the project site: and/or identifies procedures to be followed if historical archaeological, cultural resources, biological resources and wetlands not previously known to be onsite or in the area are discovered during construction. The plan shall include methods to assure the protection of known or discovered resources and shall identify lines of communication between Contractor personnel and the Contracting Officer.

1.7.3 Appendix

Copies of all environmental permits, permit application packages, approvals to construct, notifications, certifications, reports, and termination documents shall be attached, as an appendix, to the Environmental Protection Plan.

1.8 PROTECTION OF FEATURES

This paragraph supplements the Contract Clause PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS. Prior to start of any onsite construction activities, the Contractor and the Contracting Officer shall make a joint condition survey. Immediately following the survey, the Contractor shall prepare a brief joint condition survey report including a plan describing the features requiring protection under the provisions of the Contract Clauses, which are not specifically identified on the drawings as environmental features requiring protection along with the condition of trees, shrubs and grassed areas immediately adjacent to the site of work and adjacent to the Contractor's assigned storage area and access route(s), as applicable. This survey report shall be signed by both the the Contractor and the Contracting Officer upon mutual agreement as to its accuracy and completeness. The Contractor shall protect those environmental features included in the survey report and any indicated on the drawings, regardless of interference which their preservation may cause to the Contractor's work under the contract.

1.9 SPECIAL ENVIRONMENTAL REQUIREMENTS

The Contractor shall comply with the special environmental requirements listed here and included at the end of this section. See Table 01355-1.

1.10 ENVIRONMENTAL ASSESSMENT OF CONTRACT DEVIATIONS

Any deviations, requested by the Contractor, from the drawings, plans and specifications which may have an environmental impact will be subject to approval by the Contracting Officer and may require additional Government review and approval time for an extended review, additional processing, additional documentation, at no additional cost to the Government. The Contracting Officer reserves the right to disapprove alternate methods, even if they are more cost effective, if the Contracting Officer determines that the proposed alternate method will have an adverse environmental

impact.

1.11 NOTIFICATION

The Contracting Officer will notify the Contractor in writing of any observed noncompliance with Federal, State or local environmental laws or regulations, permits, and other elements of the Contractor's Environmental Protection plan. The Contractor shall, after receipt of such notice, inform the Contracting Officer of the proposed corrective action and take such action when approved by the Contracting Officer. The Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No time extensions shall be granted or equitable adjustments allowed to the Contractor for any such suspensions. This is in addition to any other actions the Contracting Officer may take under the contract, or in accordance with the Federal Acquisition Regulation or Federal Law.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 ENVIRONMENTAL PERMITS AND COMMITMENTS

This paragraph supplements the Contractor's responsibility under the contract clause "PERMITS AND RESPONSIBILITIES" to the extent that the Government has obtained environmental permits. The Contractor shall comply with the terms and conditions of the attached list of environmental commitments at the end of this section.

The Contractor shall be responsible for obtaining and complying with all environmental permits and commitments required by Federal, State, Regional, and local environmental laws and regulations.

3.2 LAND RESOURCES

The Contractor shall confine all activities to areas defined by the drawings and specifications. Prior to the beginning of any construction, the Contractor shall identify any land resources to be preserved within the work area. Except in areas indicated on the drawings or specified to be cleared, the Contractor shall not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, topsoil, and land forms without approval. No ropes, cables, or guys shall be fastened to or attached to any trees for anchorage unless specifically authorized. The Contractor shall provide effective protection for land and vegetation resources at all times as defined in the following subparagraphs. Stone, soil, or other materials displaced into uncleared areas shall be removed by the Contractor.

3.2.1 Work Area Limits

Prior to commencing construction activities, the Contractor shall mark the areas that need not be disturbed under this contract. Isolated areas within the general work area which are not to be disturbed shall be marked or fenced. Monuments and markers shall be protected before construction

operations commence. Where construction operations are to be conducted during darkness, any markers shall be visible in the dark. The Contractor's personnel shall be knowledgeable of the purpose for marking and/or protecting particular objects.

3.2.2 Landscape

Trees, shrubs, vines, grasses, land forms and other landscape features indicated and defined on the drawings to be preserved shall be clearly identified by marking, fencing, or wrapping with boards, or any other approved techniques. The Contractor shall restore landscape features damaged or destroyed during construction operations outside the limits of the approved work area.

3.2.3 Erosion and Sediment Controls

The Contractor shall be responsible for providing erosion and sediment control measures in accordance with Federal, State, and local laws and regulations. The erosion and sediment controls selected and maintained by the Contractor shall be such that water quality standards are not violated as a result of the Contractor's construction activities. The area of bare soil exposed at any one time by construction operations should be kept to a minimum. The Contractor shall construct or install temporary and permanent erosion and sediment control best management practices (BMPs) as specified in Section 01356 STORM WATER POLLUTION PREVENTION MEASURES. BMPs may include, but not be limited to, vegetation cover, stream bank stabilization, slope stabilization, silt fences, construction of terraces, interceptor channels, sediment traps, inlet and outfall protection, diversion channels, and sedimentation basins. The Contractor's best management practices shall also be in accordance with the National Pollutant Discharge Elimination System (NPDES) and Storm Water Pollution Prevention Plan (SWPPP) which may be reviewed at the Contractors Project Office. Any temporary measures shall be removed after the area has been stabilized.

3.2.3.1 Unprotected Erodible Soils

Earthwork brought to final grade shall be finished as indicated. Side slopes and back slopes shall be protected as soon as practicable upon completion of rough grading. All earthwork shall be planned and conducted to minimize the duration of exposure of unprotected soils. Except in cases where the constructed feature obscures borrow areas, quarries, and waste material areas, these areas shall not initially be totally cleared. Clearing of such areas shall progress in reasonably sized increments as needed to use the developed areas as approved by the Contracting Officer.

3.2.3.2 Disturbed Areas

The Contractor shall effectively prevent erosion and control sedimentation through approved methods including, but not limited to, the following:

- a. Retardation and control of runoff. Runoff from the construction site or from storms shall be controlled, retarded, and diverted to protected drainage courses by means of diversion ditches, benches,

berms, and by any measures required by area wide plans under the Clean Water Act.

3.2.4 Contractor Facilities and Work Areas

The Contractor's field offices, staging areas, stockpile storage, and temporary buildings shall be placed in areas designated on the drawings or as directed by the Contracting Officer. Temporary movement or relocation of Contractor facilities shall be made only when approved. Erosion and sediment controls shall be provided for on-site borrow and spoil areas to prevent sediment from entering nearby waters. Temporary excavation and embankments for plant and/or work areas shall be controlled to protect adjacent areas.

3.3 WATER RESOURCES

The Contractor shall monitor construction activities to prevent pollution of surface and ground waters. Toxic or hazardous chemicals shall not be applied to soil or vegetation unless otherwise indicated. All water areas affected by construction activities shall be monitored by the Contractor. For construction activities immediately adjacent to impaired surface waters, the Contractor shall be capable of quantifying sediment or pollutant loading to that surface water when required by State or Federally issued Clean Water Act permits.

3.3.1 Cofferdams, Diversions, and Dewatering Operations

Construction operations for dewatering, removal of cofferdams, tailrace excavation, and tunnel closure shall be controlled at all times to maintain compliance with existing State water quality standards and designated uses of the surface water body. The Contractor shall comply with the State of Nevada water quality standards and anti-degradation provisions.

3.3.2 Stream Crossings

Stream crossings shall allow movement of materials or equipment without violating water pollution control standards of the Federal, State, and local governments.

3.3.3 Wetlands

The Contractor shall not enter, disturb, destroy, or allow discharge of contaminants into any wetlands.

3.4 AIR RESOURCES

Equipment operation and activities or processes performed by the Contractor in accomplishing the specified construction shall be in accordance with the State's rules and all Federal emission and performance laws and standards. The Contractor shall obtain and comply with Air Quality Permits. Ambient Air Quality Standards set by the Environmental Protection Agency shall be maintained. Monitoring of air quality shall be the Contractor's responsibility. All air areas affected by the construction activities shall be monitored by the Contractor. Monitoring results will be

periodically reviewed by the Government to ensure compliance.

Special management techniques as set out below shall be implemented to control air pollution by the construction activities. These techniques supplement the requirements of Federal, State, and local laws and regulations; and the safety requirements under this Contract. If any of the following techniques conflict with the requirements of Federal, State, or local laws or regulations, or safety requirements under this contract, then those requirements shall be followed in lieu of the following.

3.4.1 Particulates

Dust particles; aerosols and gaseous by-products from construction activities; and processing and preparation of materials, such as from asphaltic batch plants; shall be controlled at all times, including weekends, holidays and hours when work is not in progress. The Contractor shall maintain excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and other work areas within or outside the project boundaries free from particulates which would cause the Federal, State, and local air pollution standards to be exceeded or which would cause a hazard or a nuisance. Sprinkling, chemical treatment of an approved type, baghouse, scrubbers, electrostatic precipitators or other methods will be permitted to control particulates in the work area. Sprinkling, to be efficient, must be repeated to keep the disturbed area damp at all times. The Contractor must have sufficient, competent equipment available to accomplish these tasks. Particulate control shall be performed as the work proceeds and whenever a particulate nuisance or hazard occurs. The Contractor shall comply with all State and local visibility regulations.

3.4.1.1 Other Air Pollutants

All construction equipment and trucks shall have their engines kept in a state of tune that will minimize all exhaust pollutants, and shall use fuel of a quality that does not produce excessive amounts of exhaust plumes. Methods to reduce NO levels may include the following measures:

- a. Require injection timing retard of 2 degrees on all diesel vehicles where applicable.
- b. Install high-pressure injectors on all vehicles, where feasible.
- c. Use Caterpillar pre-chamber diesel engines or equivalent, and perform proper maintenance and operation.
- d. Electrify equipment, where feasible.
- e. Maintain equipment in tune with manufacturers' specifications, except as otherwise stated above.
- f. Restrict the drilling of construction equipment to 10 minutes.
- g. Install catalytic converters on gasoline-powered equipment.

h. Substitute gasoline-powered for diesel-powered equipment, where feasible.

3.4.2 Odors

Odors from construction activities shall be controlled at all times. The odors shall not cause a health hazard and shall be in compliance with State regulations and/or local ordinances.

3.4.3 Sound Intrusions

The Contractor shall keep construction activities under surveillance and control to minimize environment damage by noise. The Contractor shall comply with the provisions of the State of Nevada rules.

3.4.4 Burning

Burning will not be allowed on the project site unless specified in other sections of the specifications or authorized in writing by the Contracting Officer. The specific time, location, and manner of burning shall be subject to approval.

3.5 CHEMICAL MATERIALS MANAGEMENT AND WASTE DISPOSAL

Disposal of wastes shall be as directed below, unless otherwise specified in other sections and/or shown on the drawings.

3.5.1 Solid Wastes

Solid wastes (excluding clearing debris) shall be placed in containers which are emptied on a regular schedule. Handling, storage, and disposal shall be conducted to prevent contamination. Segregation measures shall be employed so that no hazardous or toxic waste will become co-mingled with solid waste. The Contractor shall transport solid waste off Government property and dispose of it in compliance with Federal, State, and local requirements for solid waste disposal. A Subtitle D RCRA permitted landfill shall be the minimum acceptable off-site solid waste disposal option. The Contractor shall verify that the selected transporters and disposal facilities have the necessary permits and licenses to operate. The Contractor shall comply with Federal, State, and local laws and regulations pertaining to the use of landfill areas.

3.5.2 Chemicals and Chemical Wastes

Chemicals shall be dispensed ensuring no spillage to the ground or water. Periodic inspections of dispensing areas to identify leakage and initiate corrective action shall be performed and documented. This documentation will be periodically reviewed by the Government. Chemical waste shall be collected in corrosion resistant, compatible containers. Collection drums shall be monitored and removed to a staging or storage area when contents are within 150 mm of the top. Wastes shall be classified, managed, stored, and disposed of in accordance with Federal, State, and local laws and regulations.

3.5.3 Contractor Generated Hazardous Wastes/Excess Hazardous Materials

Hazardous wastes are defined in 40 CFR 261, or are as defined by applicable State and local regulations. Hazardous materials are defined in 49 CFR 171 - 178. The Contractor shall, at a minimum, manage and store hazardous waste in compliance with 40 CFR 262. The Contractor shall take sufficient measures to prevent spillage of hazardous and toxic materials during dispensing. The Contractor shall segregate hazardous waste from other materials and wastes, shall protect it from the weather by placing it in a safe covered location, and shall take precautionary measures such as berming or other appropriate measures against accidental spillage. The Contractor shall be responsible for storage, describing, packaging, labeling, marking, and placarding of hazardous waste and hazardous material in accordance with 49 CFR 171 - 178, State, and local laws and regulations.

The Contractor shall transport Contractor generated hazardous waste off Government property within 15 calendar days in accordance with the Environmental Protection Agency and the Department of Transportation laws and regulations. The Contractor shall dispose of hazardous waste in compliance with Federal, State and local laws and regulations. Spills of hazardous or toxic materials shall be immediately reported to the Contracting Officer. Cleanup and cleanup costs due to spills shall be the Contractor's responsibility. The disposition of Contractor generated hazardous waste and excess hazardous materials are the Contractor's responsibility.

3.5.4 Fuel and Lubricants

Storage, fueling and lubrication of equipment and motor vehicles shall be conducted in a manner that affords the maximum protection against spill and evaporation. Fuel, lubricants and oil shall be managed and stored in accordance with all Federal, State, Regional, and local laws and regulations. Used lubricants and used oil to be discarded shall be stored in marked corrosion-resistant containers and recycled or disposed in accordance with 40 CFR 279, State, and local laws and regulations. Storage of fuel on the project site shall be accordance with all Federal, State, and local laws and regulations.

3.5.5 Waste Water

Disposal of waste water shall be as specified below.

- a. Waste water from construction activities, such as onsite material processing, concrete curing, foundation and concrete clean-up, water used in concrete trucks, forms, etc. shall not be allowed to enter water ways or to be discharged prior to being treated to remove pollutants. The Contractor shall dispose of the construction related waste water off-Government property in accordance with all Federal, State, Regional and Local laws and regulations.
- b. For discharge of ground water, the Contractor shall surface discharge in accordance with the requirements of the NPDES or State STORM WATER DISCHARGES FROM CONSTRUCTION SITES permit.

- c. Water generated from the flushing of lines after disinfection or disinfection in conjunction with hydrostatic testing shall be discharged into the sanitary sewer with prior approval and/or notification to the Waste Water Treatment Plant's Operator.

3.6 RECYCLING AND WASTE MINIMIZATION

The Contractor shall participate in State and local government sponsored recycling programs. The Contractor is further encouraged to minimize solid waste generation throughout the duration of the project.

3.7 NON-HAZARDOUS SOLID WASTE DIVERSION REPORT

The Contractor shall maintain an inventory of non-hazardous solid waste diversion and disposal of construction and demolition debris. The Contractor shall submit a report to the Contracting Officer on the first working day after each fiscal year quarter, starting the first quarter that non-hazardous solid waste has been generated. The following shall be included in the report:

- a. Construction and Demolition (C&D) Debris Disposed = _____ in cubic meters, as appropriate.
- b. Construction and Demolition (C&D) Debris Recycled = _____ in cubic meters, as appropriate.
- c. Total C&D Debris Generated = _____ in cubic meters, as appropriate.
- d. Waste Sent to Waste-To-Energy Incineration Plant (This amount should not be included in the recycled amount) = _____ in cubic meters, as appropriate.

3.8 HISTORICAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

If during excavation or other construction activities any previously unidentified or unanticipated historical, archaeological, and cultural resources are discovered or found, all activities that may damage or alter such resources shall be temporarily suspended. Resources covered by this paragraph include but are not limited to: any human skeletal remains or burials; artifacts; shell, midden, bone, charcoal, or other deposits; rock or coral alignments, pavings, wall, or other constructed features; and any indication of agricultural or other human activities. Upon such discovery or find, the Contractor shall immediately notify the Contracting Officer so that the appropriate authorities may be notified and a determination made as to their significance and what, if any, special disposition of the finds should be made. The Contractor shall cease all activities that may result in impact to or the destruction of these resources. The Contractor shall secure the area and prevent employees or other persons from trespassing on, removing, or otherwise disturbing such resources.

3.9 BIOLOGICAL RESOURCES

3.9.1 Threatened and Endangered Species Protection

The Contractor shall strictly adhere to the relevant articles of Table 01355-1 found at the end of this section.

If during construction activities any threatened or endangered species (particularly the Desert Tortoise) are observed in or near the construction area, such observations shall be reported immediately to the Contracting Officer so that the appropriate authorities may be notified and a determination made as to what special disposition should be made. In no circumstances shall any employee directly handle any tortoise unless it is in imminent danger. The Contractor shall cease all activities that may result in an impact to or the destruction of these resources. The Contractor shall prevent his employees from trespassing on private property, removing, or otherwise disturbing any threatened or endangered species.

Based on the Nevada Division of Wildlife's (NDOW) February 23, 2001 comments on the January 2001 DSEA (Draft Supplemental Environment Assessment) for the another project (specifically the R-4 Detention Basin and Haul Road Alignment), the Corps has agreed to incorporate protocols to protect the Gila monster into its program to protect the desert tortoise in future projects such as this Upper Blue Diamond Diversion Channel. Separate surveys for the Gila monster are not required. The biological monitor (for the desert tortoise) shall also be trained to recognize the Gila monster and to handle this species according to NDOW protocol. The Gila monster is not federally listed as Threatened or Endangered, but it is classified as a State of Nevada Protected Reptile and a BLM Sensitive Species. If during the preconstruction biological surveys or construction monitoring (for desert tortoise), a Gila monster is discovered, the NDOW will be notified. If the NDOW is not available, the biologist shall photograph the Gila monster, document its location, capture, and release the Gila monster out of harm's way, using precautions to avoid being bitten.

3.9.2 Protection of Biological Resources

The Contractor shall keep construction activities under surveillance, management, and control to minimize interference with, disturbance to, and damage of, native vegetation, fish, and wildlife. The Contractor shall minimize interference with, disturbance to, and damage of wildlife and plants including their habitat. Species that require specific attention along with measures for their protection shall be listed by the Contractor prior to beginning of construction operations. The Contractor shall be responsible for the protection of threatened and endangered animal and plant species including their habitat in accordance with Federal, State, Regional, and local laws and regulations.

3.10 PREVIOUSLY USED EQUIPMENT

The Contractor shall clean all previously used construction equipment prior to bringing it onto the project site. The Contractor shall ensure that the equipment is free from soil residuals, egg deposits from plant pests, noxious weeds, and plant seeds. The Contractor shall consult with the USDA jurisdictional office for additional cleaning requirements.

3.11 MAINTENANCE OF POLLUTION FACILITIES

The Contractor shall maintain permanent and temporary pollution control facilities and devices for the duration of the contract or for that length of time construction activities create the particular pollutant.

3.12 MILITARY MUNITIONS

In the event the Contractor discovers or uncovers military munitions as defined in 40 CFR 260, the Contractor shall immediately stop work in that area and immediately inform the Contracting Officer.

3.13 TRAINING OF CONTRACTOR PERSONNEL

The Contractor's personnel shall be trained in all phases of environmental protection and pollution control. The Contractor shall conduct environmental protection/pollution control meetings for all Contractor personnel prior to commencing construction activities. Additional meetings shall be conducted for new personnel and when site conditions change. The training and meeting agenda shall include: methods of detecting and avoiding pollution; familiarization with statutory and contractual pollution standards; installation and care of devices, vegetative covers, and instruments required for monitoring purposes to ensure adequate and continuous environmental protection/pollution control; anticipated hazardous or toxic chemicals or wastes, and other regulated contaminants; recognition and protection of archaeological sites, artifacts, wetlands, and endangered species and their habitat that are known to be in the area.

3.14 POST CONSTRUCTION CLEANUP

The Contractor shall clean up all areas used for construction in accordance with Contract Clause: "Cleaning Up". The Contractor shall, unless otherwise instructed in writing by the Contracting Officer, obliterate all signs of temporary construction facilities such as haul roads, work area, structures, foundations of temporary structures, stockpiles of excess or waste materials, and other vestiges of construction prior to final acceptance of the work. The disturbed area shall be graded, filled and the entire area seeded unless otherwise indicated.

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SECTION 02230

CLEAR SITE AND REMOVE OBSTRUCTIONS

PART 1 GENERAL

1.1 DEFINITIONS

1.1.1 Clearing

Clearing shall consist of the felling, trimming, and cutting of trees into sections and the satisfactory disposal of the trees and other vegetation designated for removal, including down timber, snags, brush, and including the removal of debris piles (consisting of construction debris and/or dumped soils, dumped gravels, dumped rocks and dumped boulders), and rubbish and/or trash and vehicle debris (vehicle bodies and/or vehicle parts) occurring in the areas to be cleared. In specified bid item, clearing shall also include removal and salvage of existing riprap and shall include removal of existing filter fabric. In specified bid item, clearing shall also include sawcutting and removal of necessary portion of the existing precast 1.829 M x 1.524 M (6' x 5') RCB structure at approximate Sta. 13+40.000 (left side of channel looking upstream) to allow for placement of new channel and side drain structure. In specified bid item, clearing shall also include sawcutting and removal of necessary portion (approximately 1.83 meters) of the existing Beltway Lateral Channel to Beltway Lateral Channel Station 12+33.13.

1.1.2 Grubbing

Grubbing shall consist of the removal and disposal of stumps, roots larger than 75 mm in diameter, and matted roots from the designated grubbing areas.

1.2 SUBMITTALS (NOT APPLICABLE)

1.3 ENVIRONMENTAL PROTECTION

All work and Contractor operations shall comply with the requirements of Section 01355 ENVIRONMENTAL PROTECTION and Section 02300 EARTHWORK.

1.4 BURNING

The use of burning at the project site for the disposal of refuse and debris will not be permitted.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 REQUIREMENTS

3.1.1 General

Except as otherwise specified, and/or indicated, areas to be cleared will be limited to actual excavation areas, and areas on which fills and/or structures are to be placed. The removal of trees, shrubs, turf, and other vegetation outside of these areas shall be held to a minimum and care shall be exercised not to damage any trees, shrubs, turf, or vegetation which can be left in place.

3.1.2 Existing Structures and Obstructions

The Contractor shall clear and grub areas of fill and excavation, and remove and dispose of existing structures and obstructions necessary for project construction, except for those structures which are identified to be protected in place as shown on the drawings.

3.2 CLEARING

All rubbish, waste dumps, and debris areas shall be cleared. Vegetation including grasses, shrubs and weeds shall be removed by grading the existing ground surface to a depth of 0.15 meters, except such vegetation as may be indicated or directed to be left standing. Vegetation to be left standing shall be protected from damage incident to clearing, grubbing, and construction operations by the erection of barriers or by such other means as the circumstances require. Clearing shall also include the removal and disposal of structures that obtrude, encroach upon, or otherwise obstruct the work.

3.3 GRUBBING

Grubbing shall consist of removing non-salvaged roots larger than 75 mm in diameter, matted roots, and other objectionable vegetable matter in the required fill areas, foundation areas, and all excavation areas. In grubbing roots, 610 mm diameter roots shall be removed to below the depth of the required excavation or existing ground level, whichever is lower. Depressions made by grubbing shall be filled with suitable material and compacted to make the surface conform with the original adjacent surface of the ground.

3.4 Trash and Construction Debris

Surface trash and construction debris may be present at the project site. Surface trash and construction debris shall be removed from within the limits of the right-of-way and temporary construction easements. This includes the removal of debris piles (consisting of construction debris, minor construction equipment abandoned, and/or dumped soils, dumped gravels, dumped rocks and dumped boulders), and rubbish and/or trash and/or vehicle debris (vehicle bodies and/or vehicle parts) and/or appliance debris (whole or parts) occurring in the areas to be cleared.

3.5 Environmental Assessment Requirement

The Contractor shall notify the Contracting Officer 14 calendar days prior to the start of clearing and grubbing activities in accordance with Section 01200 GENERAL REQUIREMENTS, Paragraph ENVIRONMENTAL ASSESSMENT REQUIREMENT.

3.6 DISPOSAL OF GRUBBED AND REMOVED MATERIAL

Trash, construction debris, debris piles, rubbish, vehicle debris, appliance debris and material from grubbing, that is designated as scrap, shall become the property of the Contractor, and shall be removed from the site. Scrap and unsatisfactory soils and materials and unstable soils and materials as described in Section 02300 EARTHWORK, paragraph DISPOSITION AND DISPOSAL OF EXCAVATED MATERIALS, shall become the property of the Contractor, and shall be removed from the site. Disposal shall be in accordance with the requirements of Section 01355 ENVIRONMENTAL PROTECTION.

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SECTION 02300

EARTHWORK

PART 1 GENERAL

1.1 REFERENCES

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

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1 (1996) U.S. Army Corps of Engineers Safety and Health Requirements Manual

ASTM INTERNATIONAL (ASTM)

ASTM D 422 (1963; R 1998) Particle-Size Analysis of Soils

ASTM D 1556 (2000) Density and Unit Weight of Soil in Place by the Sand-Cone Method

ASTM D 1557 (2000) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu.m.))

ASTM D 2216 (1998) Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2487 (2000) Soils for Engineering Purposes (Unified Soil Classification System)

ASTM D 2922 (2001) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

ASTM D 4914 (1994) Density of Soil and Rock in Place by the Sand Replacement Method in a Test Pit

ASTM D 5030 (1994) Density of Soil and Rock in Place by the Water Replacement Method in a Test Pit.

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When

used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The "RE" designates that the Resident Office will review the submittal for the Government. Submit the following in accordance with Section 01330, SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Excavation Plan; G, RE.

The Contractor shall submit his excavation plan to the Contracting Officer in conformance with paragraph EXCAVATION PLAN

Haul Route Plan; G, RE.

The Contractor shall submit a haul route plan for removal of required excavated materials and for placing required fill materials.

BLM Import Material Certification Form; G, RE.

The Contractor shall submit the completed material certification form to the Contracting Officer for approval 2 (two) working days prior to importation of material meeting BLM Import material requirements.

SD-02 Shop Drawings

Shop Drawings.

The contractor shall submit shop drawings showing the proposed method of bracing which he intends to use to protect existing property.

Explosive Storage Location.

The contractor shall submit to the Contracting Officer drawings showing the location, access to and type of construction of the proposed storage magazine for explosives, and cap house.

Pre-construction topographic survey of the entire project site.

The contractor shall submit to the Contracting Officer pre-construction surveys of the entire project site shown on the drawings.

Post-construction topographic survey of the entire project site.

The contractor shall submit to the Contracting Officer post-construction surveys of the entire project site for each of the compacted fill work and the stockpiled filled work shown on the drawings.

SD-05 Design Data

Pre-Blast Data Report.

Post-Blast Data Report.

The Contractor shall submit Pre- and Post-Blast Reports which shall contain

all of the pertinent data on the location by station, ground surface elevation in the area of the blast; diameter, spacing, depth, over-depth, pattern and inclination of blast holes; the type, strength, amount, distribution and powder factor for the explosives to be used and actually used per hole and per blast; the sequence and pattern of delays, and description and purpose of special methods.

SD-06 Test Reports

Field Density Tests.

Treating of Compacted Fill Materials.

Copies of all laboratory and field test reports shall be submitted to the Contracting Officer on approved forms within 24 hours of the completion of the tests.

1.3 DEGREE OF COMPACTION

Degree of compaction shall be expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 1557.

1.4 DEFINITION OF SATISFACTORY MATERIALS

Satisfactory materials shall comprise any materials classified by ASTM D 2487 as GW, GP, GM, GC, SW, SP, SM, SC and CL.

1.5 DEFINITION OF UNSATISFACTORY MATERIALS

Unsatisfactory materials include but are not limited to those materials containing roots and other organic matter, trash, debris and materials classified in ASTM D 2487, as Pt, OH, OL, CH, MH, and materials too wet (unstable) to support construction equipment. Unsatisfactory materials also include man-made fills, refuse, or backfills from previous construction.

1.6 MISCELLANEOUS FILL

Miscellaneous fill shall consist of material from the required excavation, including surface soil from stripping that is in excess of topsoil material needed for areas of revegetation treatments. Miscellaneous fill shall be placed in the lines and grades indicated on the drawings and shall be placed with suitable equipment in successive horizontal layers over the entire plane of the work surface and which shall not exceed 600 millimeters in depth before consolidation. Material, including rock, cemented alluvium, BLM topsoil not being reused, from the excavations of this project that would normally be disposed of by the Contractor, may be utilized and buried as miscellaneous fill provided such material does not exceed 600 millimeters in its greatest dimension, is placed in a manner that will prevent the formation of voids, and is placed not less than 600 millimeters below finished grade (including finished grade of side slopes) and importantly, is certified clean for BLM Land import by the Contractor. No depressions in which water might pond shall be left in miscellaneous fill area. The finished areas shall be sloped to drain. Compaction other

than that obtained by the controlled movement of the construction equipment will not be required.

PART 2 PRODUCTS

2.1 SOIL STABILIZER PRODUCT

The dust palliative/soil stabilizer shall be a mixture of plaster and natural fiber mulch. The cellulose fiber mulch shall be produced from grinding clean whole wood chips, or fiber produced from ground newsprint with a labeled ash content not to exceed 7 percent. The plaster shall consist of naturally occurring high purity processed gypsum and additives. The gypsum shall be produced from a mined or quarried source. The gypsum shall be processed to be composed of crushed dry calcium sulfate hemihydrate having a purity of not less than 88 percent. The shipping invoices for the gypsum shall state the gypsum's purity content, dry weight, and source of manufacture. Processed gypsum that has become partially air set, lumpy, or caked shall not be used. The Contractor shall add a color pigment to the dust palliative/soil stabilizer slurry at the time of application. Apply color pigment to match existing soil color at the site, at the application rate recommended by the manufacturer. Color can be matched using the "Davis Colors" chart by Soil-Tech, Las, Vegas, Nevada, or equal. The gypsum and additives shall be furnished either in bags or bulk and be accompanied by bills of lading and shipping invoices. The plaster/cellulose fiber mulch shall be applied at a rate of 6.75 tonnes of plaster mixed with 2.242 tonnes of fiber per hectare.

2.2 BLM IMPORT MATERIAL REQUIREMENTS

BLM IMPORT MATERIAL REQUIREMENTS - Material shall not exceed 600 millimeters in its greatest dimension, shall originate at least 0.5 meters below existing ground level, shall not be from existing fill, backfill, compacted fill, embankment, road embankment, identified overburden, or from a non project stockpile or non project excavation source, but shall be considered newly excavated material, shall be free of any natural or manmade trash, debris, roots, construction materials, automobile or construction fluids.

PART 3 EXECUTION

Prior to the start of construction work (including clear site and remove obstructions, the Contractor shall conduct a pre-construction topographic survey of the entire project site in accordance with Section 01200 GENERAL REQUIREMENTS paragraph CONTRACTOR'S SURVEYS.

At the end of all work associated with this section, the Contractor shall conduct a post-construction topographic survey of the entire project site in accordance with Section 01200 GENERAL REQUIREMENTS paragraph CONTRACTOR'S SURVEYS.

3.1 EXCAVATION, GENERAL

Excavation shall consist of the removal of every type of material encountered in the designated areas or from areas directed. The material

to be removed may include but is not limited to hardpan, silt, sand, gravel, cobbles and boulders, cemented silt/sand/gravel/cobbles/boulders with various degrees of cementation, caliche, asphalt, vegetation, trash, and other debris. Slope lines indicated on the drawings for temporary cuts do not necessarily represent the actual slopes to which the excavation must be made to safely perform the work. Unforeseen conditions may dictate that the temporary cut slope shall be made to the actual slope to which the work can be safely performed. Measurement and payment for excavation will be made in accordance with Section 01270. Excavation for permanent cuts shall be made to the slope lines indicated. Excavation will likely require ripping or other rock-excitation techniques, which may include blasting, and shall be performed in a manner which will not impair the subgrade. Use of heavy tractors equipped with a ripper tooth, hoe-rams, and hydraulic or pneumatic rock breaker could be necessary to excavate highly cemented soils. Rock or cemented material from required excavation to be used in compacted fills and backfills shall be crushed or otherwise reduced in size to meet gradation requirements prior to placement or stockpiling. Except as otherwise specified, the finish surface of subgrades shall be smooth and shall not vary more than 25 mm from indicated grade, except at areas to receive concrete where finished surfaces of subgrade shall not vary more than 12.5 mm from indicated grade. Prior to commencing excavation, the Contractor shall submit his Excavation Plan to the Contracting Officer. All subgrade excavations will be inspected by the Contracting Officer prior to placement of any fill materials.

- A. No subsurface investigation has been conducted by the Corps of Engineers from Sta 10+00 to Sta 16+00 (approx) of the the Upper Blue Diamond Diversion Channel, Sta 10+00 to Sta 12+33 of the Beltway Lateral and the Beltway Borrow Pit Area, due to previous accessibility constraints. These areas are considered to be comprised of highly cemented materials and the Contractor shall be required to utilize blasting or other rock excavation techniques throughout. Oversized rock or cemented materials from the excavation shall be crushed or otherwisely processed to meet compacted fill gradation requirements for new channel backfill, detour and frontage road embankments and grading, and the restoration of the borrow site area.**

3.1.1 Excavation Plan

Prior to commencing excavation, the Contractor shall submit his plan for excavation to the Contracting Officer for acceptance. The plan must show all proposed locations of excavation operations utilizing methods involving blasting, headache balling, hoe ramming, or other techniques as may be applicable. In addition, the plan must include the results of a pre-excavation survey, a detailed blasting plan (if applicable) performed by a certified blasting consultant, and a seismic monitoring plan. The excavation plan shall be updated and resubmitted to the Contracting Officer any time the Contractor proposes altering his methods. The Contractor's methods for excavation are solely his responsibility. Approval of the excavation plan by the Contracting Officer will in no way limit the Contractor's liability regarding property damaged by this operations, nor will it alter the Contractor's sole responsibility for the safety of his operations. The Contractor shall be responsible for all damage caused by his excavation operations and be responsible for answering all complaints.

The Contractor shall provide the Contracting Officer with 30 days advance warning of the use of excavation techniques which may lead to property damage to allow for review of the proposed techniques, to confirm general compliance with these specifications, and to allow monitoring of the excavations methods.

3.1.2 STRIPPING, BLM LAND ONLY

Stripping consists of removing loose (not requiring blasting or ripping) surface soils approximately 200 millimeters deep from the areas of intended channel excavation, basin excavation and embankment footprint, after plant salvage operations in accordance with Section 02910 NATIVE PLANT EXTRACTION, SALVAGE AND STORAGE, on BLM land only. Stripping operations shall include clearing of remaining grasses, weeds, and non-salvaged shrubs. Surface soils so stripped shall be stockpiled, within BLM land ROW and TCE limits, for use as topsoil in areas of revegetation treatment or as miscellaneous fill on the downstream side of the transition inlet structure embankment, on BLM land only. **The BLM lands are south of Sta. 47+38.620.**

3.1.3 BLM LANDS MATERIAL AND ALL OTHER LANDS MATERIAL

All excavated materials from BLM Lands will remain on BLM Lands and used on BLM lands as compacted fill or miscellaneous fill. Trash and debris shall be handled in accordance with Section 02230 CLEAR SITE AND REMOVE OBSTRUCTIONS.

Excavated materials from All Other Lands or from other sites will not be transported, temporarily or permanently, onto BLM Lands, nor utilized as compacted fill or miscellaneous fill for any portion of the project that is on BLM lands, **unless excavated materials from this project are certified by the Contractor to meet BLM requirements as per paragraph BLM IMPORT MATERIAL REQUIREMENTS of this section.** The BLM lands are south of Sta. 47+38.620.

3.1.4 BLM IMPORT MATERIAL REQUIREMENTS

An estimated amount of excavated material originating on non-BLM Lands from this project is required to be imported onto BLM Land for this project, and this material to be imported onto BLM Land is not considered as excess excavated material.

The Contractor shall submit the completed BLM Import Material Certification Form to the Contracting Officer for approval 2 (two) working days prior to importation of material meeting BLM Import material requirements. The form shall be generated by the Contractor and shall be considered complete with the following information:

- A. Typed or written name of individual.
- B. Typed or written name of Company.
- C. Quantity of material to be imported.
- D. Location where material originated from, including Northing, Easting,

and approximate origination depth, including map of origination attached.

E. Location where material will be utilized on BLM Lands, including Northing, Easting, and at approximate station of channel or embankment, including map of destination attached.

F. Paragraph on this form with the following "I certify that this imported material does not exceed 600 millimeters in its greatest dimension; originated at least 0.5 meters below existing ground level from this project; is not from existing fill, backfill, compacted fill, embankment, road embankment, identified overburden, or from a non project stockpile or non project excavation source, but shall be considered newly excavated material from this project; is free of any natural or manmade trash, debris, weeds, seeds, roots, construction materials, automobile or construction fluids. I understand that there may be repercussions should the above not be true.

G. Signature and date of individual.

3.1.5 Excess Excavated Material on All Other Property

3.1.5.1 Satisfactory Materials

Satisfactory excavated material originating from the construction of the Upper Blue Diamond Diversion Channel from Station 10+00.000 through Station 47+51.739 and not utilized as fill material (fills, backfills, compacted fills) for channels, embankments, and roadways (such as Durango Drive), shall be classified as satisfactory excess excavated materials and shall become the property of the Contractor. The Contractor is allowed to dispose of the satisfactory excess excavated material from between Sta. 10+00.000 through Sta. 47+38.620 as follows: off site at no additional cost to the Government.

3.1.5.2 Unsatisfactory Materials

See paragraph DEFINITION OF UNSATISFACTORY MATERIALS for definition of unsatisfactory material. Unsatisfactory materials shall become the property of the Contractor and shall be removed from the project site.

3.1.6 Haul Routes

The Contractor is advised that the roads, streets and highways intersecting through and adjacent to the project site are all currently active and open streets to the Public. Haul routes shall be coordinated through the development of traffic control plans submitted to and approved by Clark County Department of Public Works with copies available to other agencies, developers, contractors and organizations on an as needed basis.

3.2 EXCAVATION, BLASTING

Any method used to excavate the structure or channel using explosives shall be subject to the approval by the Contracting Officer.

3.2.1 General Requirements

The drilling and blasting program and methods shall be the minimum necessary to break up the rock and/or caliche/cemented alluvium into bulldozer-manageable sized pieces for removal. Only the minimum strength explosive that will accomplish the fracturing will be allowed. If multiple charges are deemed necessary, they will be sequenced to produce good breakage of the rock or caliche/cemented alluvium and reduce airblast (sonic impacts) and ground vibrations to minimal levels. In the design of the blasting pattern, no blastholes will be permitted within 60 meters of an active tortoise or Gila Monster burrow. A qualified desert tortoise ecologist is required to be present during all blasting operations to ensure that there are no occupied burrows and/or to remove tortoises or Gila Monsters from the surface or burrows within the 60 meter limit. The desert tortoise ecologist will provide a short report with field notes to the Contracting Officer. The desert tortoise ecologist will be provided by the Contractor as his own expense. Additional restrictions may be imposed during the hibernation period (15 November through 15 March) to protect hibernating tortoises, if necessary and directed by the Contracting Officer. The Contractor shall strictly comply with all State and local regulations regarding construction blasting (e.g., Uniform Standard Specifications for Public Works Construction Off-Site Improvements, Clark County Area, Nevada, Third Edition, subsections 107.10, 203.03.03, and 208.03.01, and Engineer Manual (EM) 1110-2-3800, including all notice and reporting requirements). Under no circumstances shall blasting be performed within 30 meters of concrete that has been placed less than seven days. Blasting within 30 meters of concrete older than seven days will be permitted only if approved by the Contracting Officer.

3.2.2 Blasting

Prior to drilling for each blast, the Contractor shall submit a Pre-Blast data report plan on an approved form, which includes the pertinent data on the location by station, ground surface elevation in the area of the blast; diameter, spacing, depth, overdepth, pattern and inclination of blast holes; the type, strength, amount, distribution and powder factor for the explosives used per hole and per blast; the sequence and pattern of delays, and description and purpose of special methods. The loading of holes shall be done in the presence of a Government inspector. Acceptance by the Contracting Officer of the Pre-Blast data report plan will not relieve the Contractor of his sole responsibility to produce satisfactory results as set forth in these specifications. Drilling and blasting shall be done only to the depth, amount, and at such locations, with explosives of such quantity, distribution and density that will not produce unsafe or damaged rock and/or caliche/cemented alluvium surfaces or damage beyond the prescribed excavation limits. When a drilling and blasting program results in damage to the excavation, or to natural or man-made features, or is injurious to wildlife and habitat, the Contractor will be required to devise and employ methods which will prevent such damage. The revision may include special methods such as presplit and zone blasting, shallow lifts, reduction in size of individual blasts, small diameter blast holes, closely spaced blast holes, reduction of explosives, greater distribution of explosives by use of decking and primacord or variation in density of explosives.

3.2.2.1 Blasting Nearby Structures and Utility Lines

Blasting will not be permitted within 50 meters of existing structures and utility lines. Contractor shall use other rock excavation techniques, and deploy all means necessary to break-out and remove layers of highly cemented soils nearby the structures and utility lines. Contractor shall coordinate with utility owners prior to excavation and blasting in the vicinity of utility lines.

3.2.3 Overshooting

The Contractor shall use controlled blasting techniques so as not to overshoot. All possible care shall be exercised in drilling and blasting operations to prevent formation of discontinuities and to minimize over-break and blast damage of adjacent unexcavated ground and structures. Any material outside the authorized limits which may be shattered or loosened because of blasting shall be removed and/or re-compacted by the Contractor at his expense. Shattered or loosened material below the bottom limits of the required excavation shall be uniformly distributed and compacted or otherwise disposed of in a manner satisfactory to the Contracting Officer. The Contractor shall discontinue any method of blasting which leads to overshooting or is dangerous to the public, destructive of natural or man-made features, or is injurious to wildlife and habitat.

3.2.4 Pre-excavation Survey

The Contractor shall perform a pre-excavation survey which shall include as a minimum; detailed examination of adjacent structures, including video taping and installation of crack monitoring tape along existing structural cracks. Also included shall be a seismic survey performed by a certified seismic survey firm to determine limiting charge weights, distances to structures, etc. for all areas where blasting is proposed and limiting ball weights, height of drop, etc., for all areas where headache balls and/or hoe ram techniques are proposed.

3.2.4.1 Vibration Monitoring

During construction, the Contractor shall hire a certified seismic survey firm to perform a seismic monitoring program to determine the effects of any blasting, headache ball or hoe ram use, or any other specialized excavation technique. Particle velocities measured at an existing structure or 300 meters from the blasting, whichever is closest, shall not exceed statutory limits or 12.5 millimeters per second (whether the result of blasting or other excavation technique). In addition to these requirements, the Contractor shall provide suitable vibration monitoring equipment to measure and record ground motions at the 60 meter distance.

3.2.5 Notifications

The Contractor shall notify each property owner and public utility company having structures or facilities in proximity to the site of the work of his intention to use explosives. Such notice shall be given sufficiently in advance to enable the companies to take such steps as they may deem

necessary to protect their property from injury. Any blasting adjacent to or crossing existing utilities shall be fully coordinated with the owner of the effected utility to include hole spacing, loading and vibration.

3.2.6 Qualifications

During blasting operations, the Contractor shall have on site, and in immediate charge of the blasting, a licensed blaster acceptable to the Contracting Officer who has had no less than 3 years of experience in controlled blasting and rock excavation operations. Powder handlers shall have had no less than one year continuous experience in preparation and loading of powder charges.

3.2.7 Post-Blast Data Reports

In addition to the reporting requirements required above, a separate Post-Blast Data Report of each blast shall be prepared and furnished to the Contracting Officer on an approved form. The report shall indicate the location of the blast by specific stationing, ground surface elevation, depth of round, pounds of explosives used by type and grade, total number of loaded holes, total pounds per delay, quantity and kind of explosive in each hole, maximum measured blast vibration, and all other blast information directed by the Contracting Officer. Original or legible copies of the report shall be provided to the Contracting Officer within 24 hours of the blast event.

3.2.8 Explosives

3.2.8.1 Safety

The contractor shall fully comply with Section 29, Blasting, EM 385-1-1 and any Local or State Laws and Regulations applicable to the proposed Blasting Plan.

3.2.8.2 Storage

The Contractor shall submit to the Contracting Officer, for approval, drawings showing the explosive storage location, access to and type of construction of the proposed storage magazine for explosives, and cap house. The explosives storage magazine and other facilities may be located on project lands if a satisfactory location can be found and is approved by the Contracting Officer. The Contractor shall maintain the explosive storage area at his own expense. The explosives storage magazine shall be securely locked when not in use.

3.3 PRESERVATION OF PROPERTY

All excavation operations shall be conducted in such a manner that concrete structures, embankments, utilities, or other facilities and improvements which are to remain in place permanently will not be subjected to settlement or horizontal movement. The Contractor shall furnish and install sheet piling, cribbing, bulkheads, shores, or whatever means may be necessary to adequately support material carrying such improvements or to support the improvements themselves and shall maintain such means in

position until they are no longer needed. Temporary sheet piling, cribbing, bulkheads, shores or other protective means shall remain the property of the Contractor and when no longer needed shall be removed from the site. The Contractor shall submit for approval shop drawings showing proposed method of bracing which he intends to use. All shoring and bracing shall be designed so that it is effective to the bottom of the excavation, and shall be based upon calculation of pressures exerted by (and the condition and nature of) the materials to be retained, including surcharge imparted to the side of the trench by equipment and stored materials. Removal of shoring shall be performed in such manner as not to disturb or damage the finished concrete or other facility.

3.4 EXCAVATION FOR STRUCTURES

Excavation within the vicinity of existing structures, utilities, roads, and drainage pipes to remain in place shall be performed in a manner to prevent damage to the structure. Earth banks and facilities to remain in place shall be supported as necessary during excavation. Potential for damage resulting from severe vibration may limit the Contractor's operations or choice of equipment. In general, unless otherwise shown or specified, the actual side slopes shall be in accordance with EM 385-1-1.

3.5 EXCAVATION CHANNEL

Channel excavation consists of the removal of all materials within the lines and grades indicated.

3.6 EXCAVATION OF INLET STRUCTURE BASIN

Inlet Structure Basin excavation consists of the removal of all materials to the lines and grades indicated. The finished surface shall be reasonably smooth, free from irregular surface changes, and shall not vary more than 100 millimeters above or below the indicated grade, except that either extreme of such tolerance shall not be continuous over an area greater than 50 square meters. No part of the Inlet Structure Basin area shall be excavated below the finished contours shown on the drawings. If the actual quantities deviate from the estimated quantities, inlet structure Basin area will be expanded, and Contracting Officer will direct additional basin excavation based on the required quantities and final grading plan. The Inlet Structure Basin excavation area shall be regular in shape, graded smoothly and graded to drain. Side slopes shall not be steeper than one vertical to three horizontal and shall be uniform for the entire length of any one side, unless otherwise directed.

3.7 EXCAVATION FOUNDATIONS

3.7.1 Excavation of Inspection Trench

Inspection trench excavation consists of the removal of all materials to the lines and grades indicated after stripping. Additional excavation other than that shown on the project plans may be directed by the Contracting Officer.

3.7.2 Excavation of Inlet Structure Embankment

Excavation of Inlet Structure Embankment consist of removal of all materials within footprint of the dam embankment to the lines and grades shown on the drawings after stripping per paragraph STRIPPING, BLM LAND ONLY. The finished surface shall be reasonably smooth, free from irregular surface changes, and shall not vary more than 50 millimeters above or below the indicated grade, except that either extreme of such tolerance shall not be continuous over an area greater than 50 square meters.

3.8 EXCAVATION OF OUTLET CONDUIT

Excavation of outlet conduit consists of the removal of all materials to the lines and grades indicated for outlet conduit construction.

3.9 REMOVAL OF UNSATISFACTORY MATERIALS

The removal of unsatisfactory materials which are unsatisfactory for the foundation of the channel, or other structures, may be required in certain areas. For definition of unsatisfactory materials see paragraph: DEFINITION OF UNSATISFACTORY MATERIALS. Channel subgrade materials that cannot be brought to 95% compaction after scarification, shall be removed. The Contractor will be required to excavate any such areas to the depth directed and backfill the removal areas with compacted fill conforming to the requirements of Paragraph GENERAL REQUIREMENTS FOR COMPACTED FILLS AND COMPACTED BACKFILLS.

3.10 DISPOSITION AND DISPOSAL OF EXCAVATED MATERIALS

Satisfactory excavated materials originating from the construction of the Upper Blue Diamond Diversion Channel that are suitable for required fills shall be used directly in the work, or if not immediately utilized shall be placed in temporary stockpiles within TCE limits shown on drawing sheets for further processing, hauling, handling, stockpiling and then used directly as compacted fill in portions of the work as scheduled by the Contractor. Any stockpile shall be placed in a manner to preclude ponding of water.

The Contractor shall process the stockpiled material as necessary and haul and utilize the material as compacted fill to the lines and grades in the fill areas shown on drawing sheets.

Materials and soils that the Contractor places in the temporary stockpiles shall be satisfactory excavated material and satisfactory excess excavated material originating from the construction of the Upper Blue Diamond Diversion Channel and shall be free from trash, dumped debris and demolition products, and shall consist of no materials and soils suspected of having characteristics of hazardous and/or toxic waste materials characterized as unsatisfactory soil and material including trash, dumped debris and demolition products, and shall meet the requirements of paragraph of this section. Materials and soils suspected of having characteristics of hazardous and/or toxic waste materials characterized as unsatisfactory soil including trash, dumped debris and demolition products and unstable soils shall become the property of the Contractor and shall be removed from the project site in accordance

with the requirements Section 01355 ENVIRONMENTAL PROTECTION and Section 01200 GENERAL REQUIREMENTS. No excavated material or waste of any kind shall be removed beyond the project limits under this contract without the express written authority of the Contracting Officer, or as allowed under the contract. Prior to placing satisfactory material and satisfactory excess material, the approved stockpile site(s) shall be cleared of trash and vegetation. Vegetation shall be removed by grading the existing ground surface to a depth of 150 mm. Any stockpile shall be placed in a manner to preclude ponding of water. Natural ground and surface soils and materials thus excavated and removed will then be designated as either:

- i. Materials to be salvaged, or
- ii. Scrap and unsatisfactory materials and soils and unstable materials and soils to be treated as specified above and in Section 02230 CLEAR SITE AND REMOVE OBSTRUCTIONS.

3.10.1 Hauled Excavated Material

The Contractor shall develop a haul route plan for haul within the project limits, including removal of required excavated materials and placing fill materials and hauling of excavated material and excess excavated material, that utilizes the drawings provided. The haul route plan shall be submitted to the Contracting Officer for approval. Haul routes for transport of the excavated material and excess excavated material shown on the drawing sheets are approximate. See Section 01200 GENERAL REQUIREMENTS for additional requirements and information on excavated material haul routes. The Contractor shall be responsible for obtaining all permits and licenses necessary to haul material off-site. The Contractor will provide to the Contracting Officer three copies of the proposed street haul route plan for transport of all excavated material and excess excavated material.

3.11 OVERCUT

Except as otherwise specified or specifically ordered in writing, any overcut or excavation beyond the lines and grades indicated in the plans (or as directed) shall be backfilled with compacted fill conforming to the Paragraph GENERAL REQUIREMENTS FOR COMPACTED FILLS AND COMPACTED BACKFILLS, or concrete conforming to the Section 03301 CAST-IN-PLACE STRUCTURAL CONCRETE. Subgrades shall be prepared in accordance with paragraph SUBGRADE PREPARATION. The Contractor shall expect to overbuild and trim back the compacted fill required to backfill overcuts made at trapezoidal channel sections. All excavating, backfilling, compacting of backfill, and concreting occasioned thereby shall be by the Contractor at no additional cost to the Government. Any overcut under existing or newly constructed channels and structures shall be backfilled with concrete.

3.12 COMPACTION EQUIPMENT

Compaction shall be accomplished by tamping roller, rubber tired roller vibratory compactor or mechanical tampers. All equipment, tools, and machines shall be maintained in satisfactory working condition at all times. Compaction equipment shall be suitable for consistently producing uniform soil densities.

3.13 GENERAL REQUIREMENTS FOR COMPACTED FILLS AND COMPACTED BACKFILLS

In accordance with paragraph BLM LANDS MATERIAL AND ALL OTHER LANDS MATERIAL, material generated through earthwork activities on BLM Lands must be reused as fill, compacted and miscellaneous as indicated on the drawings, for the Inlet Structure Embankment and Channel that are on the BLM Lands.

Excess satisfactory excavated material from earthwork activities from Sta. 10+00.000 through Sta. 47+51.739 shall become the property of the Contractor and be removed from the project site at no additional cost to the Government.

3.13.1 Control

Moisture-density relations shall be established by the Contractor. The soil used for each maximum density test shall be classified in accordance with ASTM D 2487 and shall include a particle size analysis in accordance with ASTM D 422. At least one five point maximum density test shall be made for every 10 field density tests. Field density test shall be performed by the Contractor at the frequency established in paragraph Field Control, and in such locations to insure that the specified density is being obtained. Moisture-density relations and field densities shall be reported on approved forms. One copy of density data less dry weight determinations shall be provided on the day each test is taken. The completed field density tests report shall be provided with the Contractor Quality Control Report on the work day following the test. All data related to the treating of compacted fill materials shall be submitted to the Contracting Officer on approved forms within 24 hours of the completion of the tests.

3.13.1.1 Laboratory Control

Moisture-density relations shall be established by the Contractor. One moisture-density relation shall be made for each classification, blend or change in classification of soil materials encountered. Approval of moisture-density relations shall be obtained prior to the compacting of any material in the work. The moisture-density relations shall be determined in a laboratory in accordance with ASTM D 1557.

- a. The desired amount of mixing water will be added for each compaction test specimen, mixed well, and the mixture will be placed in a container with an airtight cover and allowed to cure for 24 hours. A shorter curing time may be allowed where tests show that shortening the curing time will not affect the results.

3.13.1.2 Field Control

Field in-place density shall be determined in accordance with ASTM D 1556. The field moisture content shall be determined in accordance with ASTM D 2216. Determination of in-place densities using the nuclear method ASTM D 2922 may be used to supplement the sand cone density tests ASTM D 1556. When ASTM D 2922 is used, the calibration curves shall be checked and adjusted using only the sand cone method as described in ASTM D 1556. When

material contain considerable amount of rock or coarse gravel in-place density test method ASTM D 4914 or ASTM D 5030 shall be used. At least one adjacent sand cone test shall be performed for every five nuclear density tests performed. If field density tests determined by the nuclear method vary by more than 0.1 kilonewtons per cubic meter from comparison sand-cone tests, and are consistently high or low, adjustment of the calibration curve is necessary.

a. In-Place Densities

(1) One test per 750 cubic meters, for the first 7,500 cubic meters of material and one test for each 1,500 cubic meters thereafter, or fraction thereof, shall be made of each lift of fill or backfill areas compacted by other than hand-operated machines. At least one test shall be made in each 600 mm layer of compacted fill or backfill processed as a unit and not less than one test shall be made in each area. One test per 300 cubic meters, or fraction thereof, shall be made of each lift of fill or backfill areas compacted by hand-operated machines. The contractor CQC shall maintain a log of all tests, which will, updated and submitted to the contracting officer on a weekly basis. The test log shall include: Test number (if retest shall include retest number), date, feature of work, station and offset, elevation, weight of wet soil, weight of dry soil, percent of compaction, optimum moisture content, maximum dry unit weight, soil classification, in-place density test methods either sand-cone or nuclear densimeter.

(2) One test per 400 cubic meters, or fraction thereof, shall be made of each lift of fill or backfill areas compacted by hand-operated machines. The Contractor CQC shall maintain a log of all tests which will updated and submitted to the Contracting Officer on a weekly basis. The test log shall include: Test number (if retest shall include retest number), date, feature of work, station and offset, weight of wet soil, weight of dry soil, percent of compaction, optimum moisture content, maximum dry unit weight, soil classification, in-place density test methods either sand-cone or nuclear densimeter.

3.13.2 Settling of Fills or Backfills with Water

Settling of fills or backfills with water will not be permitted.

3.13.3 FILL MATERIAL

Fill material shall be obtained from the required excavation. Materials considered unsatisfactory for use as compacted fill include but are not limited to those materials containing roots and other organic matter, trash, debris, chunks or clumps of cemented material. Materials classified in ASTM D 2487 as MH, CH, Pt, OH, and OL are also considered unsatisfactory for use as compacted fill. Satisfactory fill material shall contain no stone whose greatest dimension is more than 3/4 the lift thickness. The Contractor shall expect to break-down, crush or otherwise process required excavation material for use as fill material due to the cementation of in-situ soils.

Material for compacted fill behind concrete structures, channel walls, and around box culverts shall contain less than 30 percent by weight passing the .075 mm sieve and shall contain no particle larger than 76 mm.

3.13.3.1 Fill Material for Reconstruction of Frontage Road

Satisfactory materials obtained from required channel excavation and material obtained from existing Frontage road removal shall be used for reconstruction of the Frontage road. Material shall be well graded and free from organic matter, trash, debris, chunks or clumps of cemented material and shall not contain any stones larger than 75 mm.

3.13.3.2 Fill Material for Frontage Road Detour

Satisfactory material obtained from the required excavation shall be used in Frontage Road Detour. Materials considered unsatisfactory for use as compacted fill include but are not limited to those materials containing roots and other organic matter, trash, debris, chunks or clumps of cemented material. Satisfactory fill material shall contain no stone whose greatest dimension is more than 3/4 the lift thickness.

3.13.4 Placement

Fill material shall not be placed against concrete which has not been in place at least 14 days or until the concrete has attained a strength of 17.2 megapascals when tested in accordance with the Section 03301 CAST-IN-PLACE STRUCTURAL CONCRETE. Fill shall not be placed over covered channels (roof decks) until the concrete has obtained 70% of the contract required design strength. Heavy equipment shall not be operated over pipes and buried structures until at least 600 mm of fill material have been placed and compacted over them. Material from the top of the pipe or buried structure to 600 mm above pipe or buried structure shall be compacted by mechanical tampers or other equipment approved by the Contracting Officer. Compacted fill shall be placed with suitable equipment in horizontal layers which before compaction, shall not exceed 300 mm in depth for rubber-tired or vibratory rollers, 200 mm in depth for tamping rollers, 100 mm in depth when mechanical tampers are used. The Contractor may vary the layer thickness within these limits for most efficient operations. Material containing stones shall be placed in a manner to prevent the stones from striking the concrete structures and to prevent the formation of voids.

3.13.4.1 Ground Vibration

Contractor is responsible for any damages to the nearby housing and structures due to the ground vibration caused by movement of heavy conventional equipments or vibratory rollers. The contractor shall deploy all means necessary to mitigate or preclude ground vibration when compaction equipments are operating close by the residential areas.

3.13.5 Moisture Content

Material shall have a uniform moisture content while being placed and compacted. Water shall be added at the source, if required, or by

sprinkling each layer of material during placement. Uniform distribution of moisture shall be obtained by disking, harrowing, or otherwise manipulating the soil during and after time water is added. Material containing an excess of moisture shall be manipulated with suitable implements to facilitate maximum aeration and shall be permitted to dry to the proper consistency before being compacted. Fill shall have a maximum moisture content of not more than 2 percent above optimum and a minimum moisture content of not less than 2 percent below optimum.

3.13.6 Compaction

No layer of fill shall be compacted before the practicable uniform moisture content has been obtained. Scarified areas shall be compacted as specified for the fill placed thereon. Rollers will not be permitted to operate within 300 mm of channel or structure walls or over buried structures until the compacted fill over the top of the structures has reached a depth of 600 mm. Compaction equipment shall be so operated that structures are not damaged nor overstressed during compaction operations. Mechanical tampers shall be used for compaction of fill material adjacent to structures where rolling equipment is impracticable for use in compaction.

3.14 COMPACTED FILL, CHANNEL

3.14.1 Invert

3.14.1.1 Preparation for Placing

The foundation for the compacted fill to be placed shall be cleared of all existing obstructions, vegetation and debris. Any trash or debris shall be removed in accordance with Section 02230 CLEAR SITE AND REMOVE OBSTRUCTIONS. Unsatisfactory or unstable (too wet) material and soils not meeting the requirements for fill material shall be removed where directed.

The existing surfaces for the compacted fill at the channel site shall be scarified to a depth of 150 mm and proofrolled by four passes of the compaction equipment. The subgrade for the channel shall be prepared in accordance with paragraph SUBGRADE PREPARATION.

3.14.1.2 Compaction

Each layer of the material shall be compacted to not less than 95 percent of maximum density, per ASTM D 1557.

3.14.2 Behind Channel Walls

3.14.2.1 Limitations on Equipment

The gross weight of any piece of equipment, or the combined weight of any combinations of equipment coupled together, used to place, moisten and/or compact fill behind channel walls and up to 600 mm above the top of covered sections shall not exceed 16,000 kilograms, including dynamic forces produced by vibratory equipment. Equipment used to compact the fill behind the channel walls shall be of such size as to be capable of operating in the area between the cut slope and the channel wall. Compaction equipment will not be required to operate at elevations lower than 600 mm above the

top of wall footings. This equipment shall be of such size as to be capable of operating in the area between the cut slope and the channel wall at any point 600 mm above the top of the heel of wall footings.

3.14.2.2 Construction Balance

Fills behind wall on one side of the channel shall not exceed by more than 1.5 meters the height of the fill behind the opposite channel wall at any time during construction (except restricted by design).

3.14.2.3 Compaction

Each layer of fill behind channel walls, shall be compacted to not less than 90 percent of maximum density, per ASTM D 1557. The top 300 mm of the maintenance road adjacent to the channel wall shall be compacted to not less than 95 percent of maximum density per ASTM D 1557.

3.14.2.4 Trimming

The top of fill adjacent to channel walls shall be trimmed to the lines indicated on the drawings with a tolerance of plus or minus 25 mm. Any material loosened by trimming shall be recompact and the area moistened and compacted with one pass of a smooth-wheeled roller. Tolerances shall apply after rolling. Fill slopes shall be trimmed to a uniform alignment at the top of the berm and reasonably uniform slope at or outside the lines shown on the drawings.

3.14.2.5 Backfill Against Plywood at Ends of Pipe and Sewer Stubs

Plywood shall be braced or otherwise held flush against the end of the pipe during backfilling. The Contractor shall make sure the plywood is of sufficient size to adequately cover the pipe or sewer stub opening. The Contractor shall attach blocks or shims to roughly fit the inside diameter of the pipe to assure that the plywood is not displaced during backfilling.

3.14.3 Compacted Fill Over Covered Channel

3.14.3.1 General

No fill material shall be placed over the top of the covered channel until all voids at the sides of the covered channel have been filled as described below, and until all caved material has been compacted to the specified density to the top of the roof slab.

3.14.3.2 Material

Materials for filling voids shall be clean sand, free of trash, organic materials, debris, and with 100 percent passing the 4.75 mm sieve and not more than 10 percent passing the 150 mm sieve.

3.14.3.3 Placement

The first layer of fill over the concrete box section shall be 300 mm in thickness and shall be compacted with a rubber-tired or vibratory roller

having a maximum weight of 9,000 kilograms. The remainder of the fill shall be deposited in 150 mm layers and compacted with rubber-tired or vibratory rollers, or other approved equipment with a maximum weight of 9,000 kilograms until the structure has a cover of at least 600 mm. The remainder of the compacted fill shall be placed as specified in paragraph COMPACTED FILL, CHANNEL of this section.

3.14.3.4 Contractors Option

If the Contractor elects to leave the inside forms and shoring in place, permission will be granted to place fill material 48 hours after concrete has been placed.

3.14.3.5 Compaction

Each layer of fill on top of the covered channel shall be compacted to not less than 95 percent of maximum density, per ASTM D 1557. Compacted Fill under streets and maintenance roads shall be compacted per paragraph COMPACTED FILL, ROADWAY.

3.14.4 Compacted Fill, Roadway

3.14.4.1 Compaction

Fill shall be compacted to not less than 95 percent of maximum density per ASTM D 1557 for the width of all traveled ways plus 1 meter on each side thereof.

- A. Compacted Fill, Frontage Road - Fill shall be compacted to not less than 95 percent of maximum density per ASTM D 1557 for the width of traveled ways including road shoulders.**
- B. Compacted Fill, Frontage Road Detour - Fill shall be compacted to not less than 90 percent of maximum density per ASTM D 1557 except top 1 meter that shall be compacted for the width of traveled ways including road shoulders.**

3.14.4.2 Trimming

All street and maintenance road shoulders and side slopes shall be trimmed to the lines indicated on the drawings with a tolerance of plus or minus 25 millimeters. Any material loosened by trimming shall be recompact and the area moistened and compacted with one pass of a smooth-wheeled roller. Tolerances shall apply after rolling. Fill slopes shall be trimmed to a reasonably uniform slope at or outside the lines shown on the drawings.

3.15 COMPACTED FILL, INLET STRUCTURE EMBANKMENT

3.15.1 Foundation Preparation

Before placing material for compacted fill, the foundation surface shall be cleared of all existing obstructions, vegetation, and debris in accordance with Section 02230 CLEAR SITE AND REMOVE OBSTRUCTIONS. Within the inlet structure embankment footprint, excluding miscellaneous fill zone, the

following shall be removed: (1) the upper 1.5 meters of foundation soil within an inspection trench, 4 meters wide, along the centerline of the embankment, (2) the upper 1.5 meters of foundation soil in designated wash areas, (3) the upper 0.610 meters of foundation soil within the footprint of the inlet structure embankment outside of the inspection trench and designated wash areas, and (4) the material shall be removed in accordance with SECTION 02230 CLEAR SITE AND REMOVE OBSTRUCTIONS and this SECTION 02300 EARTHWORK. The inspection trench and the banks of the existing washes shall be excavated as shown on the plans and in accordance with this SECTION 02300 EARTHWORK. Depths may be reduced where hard cemented materials or bedrock is encountered subject to the approval of the Contracting Officer. Unsatisfactory materials not meeting the requirements for fill material shall be removed where directed, and if free of trash, debris, construction materials and/or contamination may be used as miscellaneous fill on BLM Lands of this project. The existing surfaces, including the excavated inspection trench and banks and the areas beneath the outlet structure and conduit within the footprint of the Inlet Structure embankment, shall be scarified to a depth of 150 millimeters and proofrolled by four passes of the compaction equipment before placing the fill. Sloped ground surfaces steeper than one vertical to four horizontal, on which fill or compacted backfill is to be placed, shall be stepped in such a manner that the compaction equipment will bear on the full depth of the layer.

3.15.1.1 Foundation Preparation, Rock Abutments

In the case of exposed rock surfaces at an abutment, detached rock blocks and loose surface material shall be removed. The use of heavy, tracked equipment shall be minimized to protect the in situ rock surfaces. Excavation and cleaning of the abutment may result in exposure of natural bedding planes and joints thereby creating "steps" on the abutment. Large rock overhangs and protrusions shall be removed by the use of pre-splitting or line drilling techniques in such a manner as to minimize damage to the underlying rock, or the spaces beneath overhangs and around protrusions shall be filled with tamped concrete so that satisfactory compaction of embankment materials can be accomplished. Surfaces steeper than 4V:1H shall not be more than 1.0 meter in height, and benches of sufficient width shall be provided as necessary so that the average slope of any rock face is not steeper than 2V:1H. Rough areas that, in the opinion of the Contracting Officer, the compaction of the embankment materials cannot be accomplished satisfactorily with power tampers or other specified compaction equipment shall be filled with mortar or concrete, as directed to the extent necessary, to merit satisfactory use of the compaction equipment. All rock surfaces upon which or against which embankment materials are to be placed shall be broom cleaned. All open joints and cracks greater than 13 mm in width shall be filled with mortar to the depths cleaned. Those portions of such rock surfaces where there are holes greater than 100 mm deep and smaller than 610 mm across shall be filled with mortar or concrete. Mortar and concrete, including forming as necessary, shall conform with the applicable provisions of Section 03301 CAST-IN-PLACE STRUCTURAL CONCRETE FOR CIVIL WORKS. In no case shall a thin coat of mortar be left on smooth, intact rock surfaces. Final cleaning of the residual rock surfaces shall take place as the embankment is being raised. Fill materials shall not be placed against embankment abutments

until approved by the Contracting Officer.

3.15.2 PLACEMENT AND COMPACTION, INLET STRUCTURE EMBANKMENT

Each layer of the material shall be compacted to not less than 95 percent of maximum density, per ASTM D 1557. The Contractor shall construct Inlet Structure embankment by placing successive horizontal lifts over the entire plane of the work surface. All fill materials shall be placed parallel to axis of Inlet Structure in compacted horizontal lifts less than 300 mm thickness. Placement of adjacent fills at different heights is prohibited.

Where interim slopes are allowed by the Contracting Officer, the Contractor shall grade slopes flatter than 3H:1V. The Contractor must bench and moisture condition interim slopes immediately prior to placement of each lift of new fill against interim slopes. Whenever a compacted surface of any lift has been made too smooth to bond to successive layer by concentration of hauling equipment or other reasons, the Contractor shall loosen by scarifying or other equivalent methods and moisture condition surface prior to placement of the succeeding lift. The embankment lift surfaces shall be kept moist. If a lift surface dries out and cracks, the Contractor shall moisture condition to specified range and rework the lift prior to placement of the subsequent lift. Finished surfaces shall be overbuilt and cut to final grade.

3.15.3 Compacted Fill For RCB Outlet Conduit

3.15.3.1 Compaction

Each layer of the material shall be compacted to not less than 95 percent of maximum density, per ASTM D 1557, and shall be in accordance with paragraph PLACEMENT AND COMPACTION, INLET STRUCTURE EMBANKMENT and in accordance with paragraph LIMITATIONS ON EQUIPMENT, RCB OUTLET CONDUIT. Contractor shall utilize paragraph SUBGRADE FOR RCB OUTLET CONDUIT prior to installation of the RCB outlet conduit.

3.15.3.2 SUBGRADE FOR RCB OUTLET CONDUIT

Subgrade preparation for RCB outlet conduit shall include subgrade preparation for areas to receive concrete for RCB outlet conduit. All trash and debris shall be removed in accordance with Section 02230 CLEAR SITE AND REMOVE OBSTRUCTIONS. After the RCB outlet conduit alignment has been excavated to rough grade, the entire RCB outlet conduit invert shall be scarified to a depth of 0.15 meters, moisture conditioned and proofrolled by 4 passes of the compaction equipment and trimmed to a uniform grade and smoothed with a steel-wheeled roller to make the subgrade ready to receive concrete. If the subgrade is disturbed by the Contractor's operations or is overexcavated, or is soft or yielding, the subgrade shall be restored to grade and compacted to a density of 95 percent of maximum density, per ASTM D 1557. The finished surface of the subgrade shall not be more than 13 mm above the indicated grade at any point when tested with a 3 meters straightedge.

3.15.3.3 LIMITATIONS ON EQUIPMENT, RCB OUTLET CONDUIT

The gross weight of any piece of equipment, or the combined weight of any

combinations of equipment coupled together, used to place, moisten and/or compact fill along the sides of the RCB outlet conduit and up to 600 mm above the top of the RCB outlet conduit shall not exceed 16,000 kilograms, including dynamic forces produced by vibratory equipment. Equipment used to compact the fill along the sides and above the top of the RCB outlet conduit shall be of such size as to be capable of operating in the area between the cut slope and the RCB outlet conduit. Compaction equipment will be required to operate at elevations equivalent to the elevation of the bottom of the invert of the RCB outlet conduit. This equipment shall be of such size as to be capable of operating in the area between the cut slope and the RCB outlet conduit.

3.15.4 Settlement

The Contractor shall delay RCC placement for a maximum settlement period of 60 days after embankment in that area reaches full height in order to monitor anticipated settlement of the embankment. The Contractor shall install two surface settlement monuments, one each at STA 00+60.000, and STA 1+20.000 for the Inlet Structure Embankment; the locations with respect to the Inlet Structure centerline will be determined by the Contracting Officer.

3.15.5 Settlement Monitoring

The monuments shall be surveyed by the Contractor within 24 hours of installation and the elevation surveyed on a weekly basis. The survey data shall be provided to the Contracting Officer for review to determine the need for further monitoring. If the survey data indicates there is inconsequential settlement, the Contracting Officer may approve RCC placement before the 60 day settlement period expires. A settlement monument plan including typical details of the surface settlement monuments along with the plan to protect the monument during construction shall be provided by the Contractor for review not less than 14 calendar days prior to installation of the monument.

3.15.6 Settlement Monument Protection Plan

The location of the settlement monument shall be clearly marked and readily visible (red flagged) to equipment operators. In the event of damage to settlement monument or extension resulting from equipment operating within the specified area, the Contractor shall immediately notify the Contracting Officer and shall be responsible for restoring the settlement monument to working order.

3.15.7 Regrading of Embankment Crest

If the Inlet Structure embankment crest settles, the embankment shall be regraded to the lines and grades indicated after the settlement period is completed.

3.15.8 Basin

3.15.8.1 Location

Compacted fill for the basin shall consist of small amount of fill associated with the detention basin grading and access roads to be placed outside of the Inlet Structure embankment footprint. This quantity shall not be measured for payment but shall be considered incidental to basin excavation.

3.15.8.2 Preparation for Placing

The foundation for the compacted fill to be placed in the basin shall be cleared of all existing obstructions, vegetation and debris. Any trash or debris shall be removed in accordance with SECTION 02230 CLEAR SITE AND REMOVE OBSTRUCTIONS and with this section. Unsuitable materials or unstable (too wet) not meeting the requirements for fill material shall be removed where directed. The existing surfaces for compacted fill in the basin shall be scarified to a depth of 0.15 meters and proofrolled by four passes of the compaction equipment.

3.15.8.3 Compaction

Each layer of the material shall be compacted to not less than 90 percent of maximum density, per ASTM D 1557.

3.16 BACKFILL

3.16.1 Structural Backfill

3.16.1.1 Location

Backfill shall consist of all fill against and/or around structures, except compacted fill, channel.

3.16.1.2 Material

Backfill material shall be obtained from the required excavation as approved by the Contracting Officer. In general, the best material available will be designated as backfill and fill about structures. Backfill may consist of sand, gravelly sand, and silty sands. Organic material, silt, clay, broken concrete or pavement, boulders and other unsatisfactory material shall not be used. Backfill for structures shall not contain any stones larger than 75 mm.

3.16.1.3 Placing

Backfill material shall not be placed against concrete which has not been in place at least 14 days or until the concrete has attained a strength of 17.2 megapascals when tested in accordance with Section 03301 CAST-IN-PLACE STRUCTURAL CONCRETE.

3.16.1.4 Compaction

Compaction shall be not less than 95 percent of maximum density, per ASTM D 1557 unless noted or shown otherwise.

3.17 SUBGRADE PREPARATION

3.17.1 Subgrade for Channel

Subgrade preparation for channel shall include subgrade preparation for areas to receive concrete, aggregate base course and/or bituminous paving for streets, access roads, maintenance roads, turnarounds, and invert access ramps. All trash and debris shall be removed in accordance with Section 02230 CLEAR SITE AND REMOVE OBSTRUCTIONS. After the channel has been excavated to rough grade, the entire channel invert, invert access ramp, and other area indicated above shall be scarified to a depth of 0.15 meters, moisture conditioned and proofrolled by 4 passes of the compaction equipment and trimmed to a uniform grade and smoothed with a steel-wheeled roller to make the subgrade ready to receive concrete. If the subgrade is disturbed by the Contractor's operations or is overexcavated, or is soft or yielding, the subgrade shall be restored to grade and compacted to a density of 95 percent of maximum density, per ASTM D 1557. The finished surface of the subgrade shall not be more than 13 mm above the indicated grade at any point when tested with a 3 meters straightedge.

3.18 SOIL STABILIZER

All exposed excavation and fill surfaces and disturbed surface areas in the project area not covered by concrete or asphalt or landscaping work including revegetation shall be treated with a soil stabilizer for soil stabilization and dust control with the concentrations stated in paragraph SOIL STABILIZER PRODUCT after construction is completed. The soil stabilizer shall be watered in per the manufacturer's recommendations.

Processed gypsum that has become partially air set, lumpy, or caked shall not be used. The plaster/cellulose fiber mulch shall be applied at a rate of 6.75 tonnes of plaster mixed with 2.242 tonnes of fiber per hectare.

The plaster/cellulose fiber mulch stabilizer shall formulate a protective crust-like barrier within 4 to 8 hours after application. Application of the plaster/cellulose fiber mulch stabilizer shall not be permitted when weather conditions are unsuitable for concrete placement in accordance with Section 03301 CAST-IN-PLACE STRUCTURAL CONCRETE.

-- End of Section --

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SECTION 02500

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SECTION 02500

STATION MARKINGS

PART 1 GENERAL

1.1 REFERENCES

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

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS TT-P-1952

(Rev D) Paint, Traffic and Airfield
Markings, Water Emulsion Base

1.2 SUBMITTALS

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

SD-03 Product Data

Composition Requirements.

Manufacturer's current printed product description and Material Safety Data Sheets (MSDS) for each type paint/color proposed for use.

PART 2 PRODUCTS

2.1 MATERIALS

The paint shall be homogeneous, easily stirred to smooth consistency, and shall show no hard settlement or other objectionable characteristics during a storage period of 6 months. Paints shall conform to FS TT-P-1952, color non-fading black. Station marking paints shall comply with applicable state and local laws enacted to ensure compliance with Federal Clean Air Standards. Paint materials shall conform to the restrictions of the local Air Pollution Control District. The Contractor shall submit the Composition Requirements of the paint intended for use on the project to the Government for approval prior to use of the paint.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

All markings shall be painted on concrete walls (channel walls, headwalls,

abutments, etc.). Surfaces to be marked shall be thoroughly cleaned before application of the marking material.

3.2 APPLICATION

Paint shall be applied by brush, spray, roller or any combination of these methods to clean, dry surfaces, and only when air and pavement temperatures are above 5 degrees C and less than 35 degrees C. Paint temperature shall be maintained within these same limits. New concrete shall be allowed to cure for a period of not less than 30 days before applications of paint. The Contractor shall provide guide lines and templates or stencils as necessary to control paint application. Special precautions shall be taken in marking numbers, letters, and symbols. Edges of markings shall be sharply outlined.

3.2.1 Marking

The intersection of the channel center line and levee control line with the center line of new, relocated, and existing facilities such as bridges and street intersections, pole lines, underground utility crossings, side drains, upstream and downstream limits of permanent work, and other required information shall be marked by painting station numbers and additional identifying data as listed in the tabulation of location of text of markings. All markings on concrete shall be in uniform capital block letters and numbers, 150 mm, 75 mm wide, and 19 mm width of line. Markings on concrete walls shall be horizontal with the bottom of the marking not lower than 610 mm below the top of the wall.

3.3 TABULATION OF LOCATION AND TEXT OF MARKINGS

3.3.1 Abbreviations

The following abbreviations shall be used where applicable.

R= Right Channel Wall (looking downstream)
L= Left Channel Wall (looking downstream)

3.3.2 Tabulation

Location of Marking on Wall	Station*	Text of Marking	Location of Marking on Wall	Station*	Text of Marking
L	10+00.00	UBDC 23700	L	24+02.08	UBDC 28300
R	10+30.48	UBDC 23800	R	24+32.56	UBDC 28400
L	10+60.96	UBDC 23900	L	24+63.04	UBDC 28500
R	10+91.44	UBDC 24000	R	24+93.52	UBDC 28600
L	11+21.92	UBDC 24100	L	25+24.00	UBDC 28700
R	11+52.40	UBDC 24200	R	25+54.48	UBDC 28800
L	11+82.88	UBDC 24300	L	25+84.96	UBDC 28900
R	12+13.36	UBDC 24400	R	26+15.44	UBDC 29000
L	12+43.84	UBDC 24500	L	26+45.92	UBDC 29100
R	12+74.32	UBDC 24600	R	26+76.40	UBDC 29200
L	13+04.80	UBDC 24700	L	27+06.88	UBDC 29300
R	13+35.28	UBDC 24800	R	27+37.36	UBDC 29400
L	13+65.76	UBDC 24900	L	27+67.84	UBDC 29500
R	13+96.24	UBDC 25000	R	27+98.32	UBDC 29600
L	14+26.72	UBDC 25100	L	28+28.80	UBDC 29700
R	14+57.20	UBDC 25200	R	28+59.28	UBDC 29800
L	14+87.68	UBDC 25300	L	28+89.76	UBDC 29900
R	15+18.16	UBDC 25400	R	29+20.24	UBDC 30000
L	15+48.64	UBDC 25500	L	29+50.72	UBDC 30100
R	15+79.12	UBDC 25600	R	29+81.20	UBDC 30200
L	16+09.60	UBDC 25700	L	30+11.68	UBDC 30300
R	16+40.08	UBDC 25800	R	30+42.16	UBDC 30400
L	16+70.56	UBDC 25900	L	30+72.64	UBDC 30500
R	17+01.04	UBDC 26000	R	31+03.12	UBDC 30600
L	17+31.52	UBDC 26100	L	31+33.60	UBDC 30700
R	17+62.00	UBDC 26200	R	31+64.08	UBDC 30800
L	17+92.48	UBDC 26300	L	31+94.56	UBDC 30900
R	18+22.96	UBDC 26400	R	32+25.04	UBDC 31000
L	18+53.44	UBDC 26500	L	32+55.52	UBDC 31100
R	18+83.92	UBDC 26600	R	32+86.00	UBDC 31200
L	19+14.40	UBDC 26700	L	33+16.48	UBDC 31300
R	19+44.88	UBDC 26800	R	33+46.96	UBDC 31400
L	19+75.36	UBDC 26900	L	33+77.44	UBDC 31500
R	20+05.84	UBDC 27000	R	34+07.92	UBDC 31600
L	20+36.32	UBDC 27100	L	34+38.40	UBDC 31700
R	20+66.80	UBDC 27200	R	34+68.88	UBDC 31800
L	20+97.28	UBDC 27300	L	34+99.36	UBDC 31900
R	21+27.76	UBDC 27400	R	35+29.84	UBDC 32000
L	21+58.24	UBDC 27500	L	35+60.32	UBDC 32100
R	21+88.72	UBDC 27600	R	35+90.80	UBDC 32200
L	22+19.20	UBDC 27700	L	36+21.28	UBDC 32300
R	22+49.68	UBDC 27800	R	36+51.76	UBDC 32400
L	22+80.16	UBDC 27900	L	36+82.24	UBDC 32500
R	23+10.64	UBDC 28000	R	37+12.72	UBDC 32600
L	23+41.12	UBDC 28100	L	37+43.20	UBDC 32700
R	23+71.60	UBDC 28200	R	37+73.68	UBDC 32800

Location of Marking on Wall	Station*	Text of Marking	Location of Marking on Wall	Station*	Text of Marking
L	38+04.16	UBDC 32900	R	45+66.16	UBDC 35400
R	38+34.64	UBDC 33000	L	45+96.64	UBDC 35500
L	38+65.12	UBDC 33100	R	46+27.12	UBDC 35600
R	38+95.60	UBDC 33200	L	46+57.60	UBDC 35700
L	39+26.08	UBDC 33300	R	46+88.08	UBDC 35800
R	39+56.56	UBDC 33400	L	47+18.56	UBDC 35900
L	39+87.04	UBDC 33500	R	47+49.04	UBDC 36000
R	40+17.52	UBDC 33600	L	47+79.52	UBDC 36100
L	40+48.00	UBDC 33700	R	48+10.00	UBDC 36200
R	40+78.48	UBDC 33800	L	48+40.48	UBDC 36300
L	41+08.96	UBDC 33900	R	48+70.96	UBDC 36400
R	41+39.44	UBDC 34000	L	49+01.44	UBDC 36500
L	41+69.92	UBDC 34100	R	49+31.92	UBDC 36600
R	42+00.40	UBDC 34200	L	49+62.40	UBDC 36700
L	42+30.88	UBDC 34300	R	49+92.88	UBDC 36800
R	42+61.36	UBDC 34400	L	50+23.36	UBDC 36900
L	42+91.84	UBDC 34500	R	50+53.84	UBDC 37000
R	43+22.32	UBDC 34600	L	50+84.32	UBDC 37100
L	43+52.80	UBDC 34700	R	51+14.80	UBDC 37200
R	43+83.28	UBDC 34800	L	51+45.28	UBDC 37300
L	44+13.76	UBDC 34900	R	51+75.76	UBDC 37400
R	44+44.24	UBDC 35000	L	52+06.24	UBDC 37500
L	44+74.72	UBDC 35100			
R	45+05.20	UBDC 35200			
L	45+35.68	UBDC 35300			

* = The actual location of the channel station shall be accurate to the nearest half meter.

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SECTION 02700

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SECTION 02700

SIDE DRAINS AND STORM DRAINAGE SYSTEMS

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
(AASHTO)

AASHTO M 198 (1998) Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible Watertight Gaskets

ASTM INTERNATIONAL (ASTM)

ASTM A 48/A 48M (2000) Gray Iron Castings

ASTM C 76 (2002) Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe

ASTM C 270 (2002) Mortar for Unit Masonry

ASTM C 443M (2002) Joints for Concrete Pipe and Manholes, Using Rubber Gaskets (Metric)

ASTM C 655 (2002) Reinforced Concrete D-Load Culvert, Storm Drain, and Sewer Pipe

ASTM C 789 (2000) Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers

ASTM C 828 (2001) Low-Pressure Air Test of Vitrified Clay Pipe Lines

ASTM C 850 (2000) Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers with Less Than 2 Ft. of Cover Subjected to Highway Loadings

ASTM C 924M (2002) Testing Concrete Pipe Sewer Lines by Low-Pressure Air Test Method (Metric)

ASTM C 1103M (2002) Joint Acceptance Testing of Installed Precast Concrete Pipe Sewer

	Lines (Metric)
ASTM D 1556	(2000) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	(2000) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu.m.))
ASTM F 1417	(1992; R 1998) Installation Acceptance of Plastic Gravity Sewer Lines Using Low Pressure Air

1.2 SUBMITTALS

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

SD-02 Shop Drawings

Placing Pipe.

Printed copies of the manufacturer's recommendations for installation procedures of the material being placed, prior to installation.

SD-06 Test Reports

Pipeline Testing.

Certified copies of test reports demonstrating conformance to applicable pipe specifications, before pipe is installed.

SD-07 Certificates

Frame and Cover for Gratings.

Certification on the ability of frame and cover or gratings to carry the imposed live load.

1.3 DELIVERY, STORAGE, AND HANDLING OF MATERIALS.

1.3.1 Delivery and Storage.

Materials delivered to site shall be inspected for damage, unloaded, and stored with the minimum of handling. Do not store materials directly on the ground. Inside of pipes and fittings shall be kept free of dirt and debris. Gasket materials and plastic materials shall be protected from exposure to the direct sunlight over extended periods.

1.3.2 Handling.

Materials shall be handled in such a manner as to insure delivery to the trench in sound undamaged condition. Pipe shall be carried to the trench not dragged.

PART 2 PRODUCTS.

2.1 PIPE FOR SIDE DRAINS.

Pipe for side drains shall be of the sizes indicated and shall conform to the requirements specified.

2.1.1 Concrete Pipe.

Concrete pipe shall conform to ASTM C 76, Class IV or to ASTM C 655 with a D-Load equal to or greater than that indicated to produce a 0.3 mm crack.

2.2 MISCELLANEOUS MATERIALS.

2.2.1 Concrete.

Unless otherwise specified, concrete and reinforced concrete shall conform to the requirements for 25 Mpa (4,000 psi) concrete under Section 03301 CAST-IN-PLACE STRUCTURAL CONCRETE.

2.2.2 Joints.

2.2.2.1 Mortar joints.

Mortar for pipe joints, connections to other drainage structures, and brick or block construction shall conform to ASTM C 270, Type M, except the maximum placement time shall be 1 hour. The quantity of water in the mixture shall be sufficient to produce a stiff workable mortar. Water shall be clean and free of harmful acids, alkalies, and organic impurities.

The mortar shall be used within 30 minutes after the ingredients are mixed with water. The inside of the joint shall be wiped clean and finished smooth. The mortar head on the outside shall be protected from air and sun with a proper covering until satisfactorily cured.

2.2.2.2 Flexible Watertight Joints For Concrete Pipe.

Flexible watertight joints shall be made with plastic or rubber-type gaskets for concrete pipe. The design of joints and the physical requirements for plastic gaskets shall conform to AASHTO M 198, and rubber-type gaskets shall conform to ASTM C 443M. Gaskets shall have not more than one factory-fabricated splice, except that two factory-fabricated splices of the rubber-type gasket are permitted if the nominal diameter of the pipe being gasketed exceeds 1.35 meters.

Flexible watertight joints for concrete pipe that are successfully installed shall then have a mortar joint installed per paragraph mortar joints.

2.2.3 DRAINAGE STRUCTURES

2.2.3.1 Precast Reinforced Concrete Drop Inlet Structure

Precast reinforced concrete drop inlet structure shall be in accordance with the type CM and type DM as shown on drawing sheet D2 titled UPPER BLUE DIAMOND DIVERSION CHANNEL REMOVALS, RELOCATIONS, DETOURS STORM DRAIN AND UTILITY DETAILS.

2.2.3.2 Precast Reinforced Concrete Box

For highway loadings with 600 mm of cover or more or subjected to dead load only, ASTM C 789; for less than 600 mm of cover subjected to highway loading, ASTM C 850.

2.2.4 Frame and Cover for Gratings

Frame and cover for gratings shall be cast gray iron, ASTM A 48/A 48M, Class 35B. Weight, shape, size, and waterway openings for grates and curb inlets shall be as indicated on the plans.

PART 3 EXECUTION.

3.1 EXCAVATION FOR PIPE SIDE DRAINS AND DRAINAGE STRUCTURES.

Excavation of trenches and for appurtenances and backfilling for culverts and storm drains shall be in accordance with the applicable portions of Section 02316 EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS and the requirements specified below.

3.1.1 Trenching.

The width of trenches at any point below the top of the pipe shall be not greater than the outside diameter of the pipe plus 150 mm to permit satisfactory jointing and thorough tamping of the bedding material under and around the pipe. Sheeting and bracing where required shall be placed within the trench width as specified. Care shall be taken not to overexcavate.

3.1.2 REMOVAL OF ROCK.

Rock in either ledge or boulder formation shall be replaced with suitable materials to provide a compacted earth cushion having a thickness between unremoved rock and the pipe of at least 200 mm or 85 mm for each meter of fill over the top of the pipe, whichever is greater, but not more than three-fourths the nominal diameter of the pipe. Where bell-and-spigot pipe is used, the cushion shall be maintained under the bell as well as under the straight portion of the pipe. Unless otherwise specified, material used to replace unstable material or rock excavation should be compacted to a minimum density of 90 percent for cohesive soils and 95 percent for noncohesive soils, as determined by ASTM D 1557. Rock excavation shall be as specified and defined in Section 02316 EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS.

3.1.3 Removal of Unstable Material.

Where wet or otherwise unstable soil incapable of properly supporting the pipe, as determined by the Contracting Officer, is unexpectedly encountered in the bottom of a trench, such material shall be removed to the depth required and replaced to the proper grade with select granular material, compacted as provided in paragraph REMOVAL OF ROCK. When removal of unstable material is due to the fault or neglect of the Contractor in his performance of shoring and sheeting, water removal, or other specified requirements, such removal and replacement shall be performed at no additional cost to the government.

3.2 BEDDING.

3.2.1 Concrete Pipe.

The bedding surface for the pipe shall provide a firm foundation of uniform density throughout the entire length of the pipe. When no bedding class is specified or detailed on the drawings, concrete pipe shall be bedded carefully in a soil foundation accurately shaped and rounded to conform to the lowest one-fourth of the outside portion of circular pipe or to the lower curved portion of pipe arch for the entire length of the pipe or pipe arch. When necessary, the bedding shall be tamped. Bell holes and depressions for joints shall be only of such length, depth, and width as required for properly making the particular type of joint.

3.3 PLACING PIPE.

Each pipe shall be carefully examined before being laid, and defective or damaged pipe shall not be used. Pipelines shall be laid to the grades and alignment indicated. Proper facilities shall be provided for lowering sections of pipe into trenches. Under no circumstances shall pipe be laid in water, and no pipe shall be laid when trench conditions or weather are unsuitable for such work. Diversion of drainage or dewatering of trenches during construction shall be provided as necessary. All pipe in place shall be inspected before backfilling, and those pipes damaged during placement shall be removed and replaced at no cost to the Government.

3.3.1 Concrete Pipe.

Laying shall proceed upgrade with spigot ends of bell-and-spigot pipe and tongue ends of tongue-and-groove pipe pointing in the direction of the flow.

3.4 JOINTS.

3.4.1 Cement-Mortar Bell-and-Spigot Joint.

The first pipe shall be bedded to the established gradeline, with the bell end placed upstream. The interior surface of the bell shall be carefully cleaned with a wet brush and the lower portion of the bell filled with mortar to such depth as to bring inner surfaces of abutting pipes flush and even. The spigot end of each subsequent pipe shall be cleaned with a wet brush and uniformly matched into a bell so that sections are closely fitted. After each section is laid, the remainder of the joint shall be

filled with mortar, and a bead shall be formed around the outside of the joint with sufficient additional mortar. If mortar is not sufficiently stiff to prevent appreciable slump before setting, the outside of the joint shall be wrapped or bandaged with cheesecloth to hold mortar in place.

3.4.2 Cement-Mortar Tongue-and-Groove Joint.

The first pipe shall be bedded carefully to the established gradeline with the groove upstream. A shallow excavation shall be made underneath the pipe at the joint and filled with mortar to provide a bed for the pipe. The grooved end of the first pipe shall be carefully cleaned with a wet brush, and a layer of soft mortar applied to the lower half of the groove. The tongue of the second pipe shall be cleaned carefully with a wet brush; while in horizontal position, a layer of soft mortar shall be applied to the upper half of the tongue. The tongue end of the second pipe then shall be inserted in the grooved end of the first pipe until mortar is squeezed out on interior and exterior surfaces. Sufficient mortar shall be used to fill the joint completely and to form a bead on the outside.

3.4.3 Flexible Watertight Joints For Concrete Pipe.

Flexible watertight plastic or rubber gasketed joints may be used in lieu of other type of joints. Gaskets and jointing materials shall be as recommended by the particular manufacturer in regard to use of lubricants, cements, adhesives, and other special installation requirements. Surfaces to receive lubricants, cements, or adhesives shall be clean and dry. Gaskets and jointing materials shall be affixed to the pipe not more than 24 hours prior to the installation of the pipe, and shall be protected from the sun, blowing dust, and other deleterious agents at all times. Gaskets and jointing materials shall be inspected before installing the pipe; any loose or improperly affixed gaskets and jointing materials shall be removed and replaced. The pipe shall be aligned with the previously installed pipe and the joint pushed home. If, while the joint is being made, the gasket becomes visibly dislocated, the pipe shall be removed and the joint remade.

The gasketed joint assembly area shall receive a layer of soft mortar on both the inside and on the outside, with the soft mortar being worked into the joint recesses. Sufficient mortar shall be used to fill the joint recesses completely and to form a bead on the outside.

3.5 SIDE DRAIN.

3.5.1 Side Drain Junction Structures.

Side drain pipes and stubout pipes shall join the outlet channel with junction structures. Construction of junction structures shall be of reinforced concrete complete as shown on the drawings.

3.6 DRAINAGE STRUCTURES

3.6.1 Inlets

Construction shall be of reinforced concrete or precast reinforced concrete; complete with frames and covers or gratings, per details shown on drawing sheet D2 titled UPPER BLUE DIAMOND DIVERSION CHANNEL REMOVALS,

RELOCATIONS, DETOURS STORM DRAIN AND UTILITY DETAILS. Pipe connections to concrete inlets shall be made with flexible, watertight connectors.

3.7 BACKFILLING.

Backfilling of trenches for culverts and storm drains and backfilling for appurtenances shall be in accordance with the applicable portions of Section 02316 EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS and the requirements specified below.

3.7.1 Backfilling Pipe in Trenches.

After the bedding has been prepared and the pipe installed, selected material from the required excavation at a moisture content that will facilitate compaction, shall be placed along both sides of pipe in layers not exceeding 150 mm in compacted depth. The backfill shall be brought up evenly on both sides of pipe for the full length of pipe. Care shall be taken to insure thorough compaction of the fill under the haunches of the pipe. Each layer shall be thoroughly compacted with mechanical tampers or rammers. This method of filling and compacting shall continue until the fill has reached an elevation of at least 600 mm above the top of the pipe.

The remainder of the trench shall be backfilled and compacted by spreading and rolling or compacted by mechanical rammers or tampers in layers not exceeding 150 mm and compacted to not less than 90 percent for cohesive material and 95 percent of maximum density for cohesionless material, of maximum density ASTM D 1557. In place densities shall be determined using ASTM D 1556. Where it is necessary in the opinion of the Contracting Officer, any sheeting and/or portions of bracing used shall be left in place, and the contract will be adjusted accordingly. Untreated sheeting shall not be left in place beneath structures or pavements.

3.7.2 Backfilling Pipe in Fill Sections.

For pipe placed in fill sections, backfill material and the placement and compaction procedures shall be as specified above. The fill material shall be uniformly spread in layers longitudinally on both sides of pipe, not exceeding 150 mm in compacted depth, and shall be compacted by rolling parallel with pipe or by mechanical tamping or ramming. Prior to commencing normal filling operations, the crown width of the fill at a height of 300 mm above the top of the pipe shall extend a distance of not less than twice the outside pipe diameter on each side of the pipe or 4 meters, whichever is less.

3.7.3 Movement of Construction Machinery.

Operating heavy equipment parallel with the pipe, displacement of or injury to the pipe shall be avoided. Movement of construction machinery over a culvert or storm drain at any stage of the construction shall be at the Contractor's risk. Any pipe damaged thereby shall be repaired or replaced at the expense of the Contractor.

3.8 PIPELINE TESTING

Lines shall be tested for leakage by low pressure air or water testing or

exfiltration tests, as appropriate. Low pressure air testing for concrete pipes shall conform to ASTM C 924M. Low pressure air testing for plastic pipe shall conform to ASTM F 1417. Low pressure air testing procedures for other pipe materials shall use the pressures and testing times prescribed in ASTM C 828 or ASTM C 924M, after consultation with the pipe manufacturer. Testing of individual joints for leakage by low pressure air or water shall conform to ASTM C 1103M. Prior to exfiltration tests, the trench shall be backfilled up to at least the lower half of the pipe. If required, sufficient additional backfill shall be placed to prevent pipe movement during testing, leaving the joints uncovered to permit inspection.

Visible leaks encountered shall be corrected regardless of leakage test results. When the water table is 600 mm or more above the top of the pipe at the upper end of the pipeline section to be tested, infiltration shall be measured using a suitable weir or other device acceptable to the Contracting Officer. An exfiltration test shall be made by filling the line to be tested with water so that a head of at least 600 mm is provided above both the water table and the top of the pipe at the upper end of the pipeline to be tested. The filled line shall be allowed to stand until the pipe has reached its maximum absorption, but not less than 4 hours. After absorption, the head shall be reestablished. The amount of water required to maintain this water level during a 2-hour test period shall be measured.

Leakage as measured by the exfiltration test shall not exceed 60 liters per mm in diameter per kilometer (250 gallons per inch in diameter per mile) of pipeline per day or 9 mL per mm in diameter per 100 meters (0.2 gallons per inch in diameter per 100 feet) of pipeline per hour. When leakage exceeds the maximum amount specified, satisfactory correction shall be made and retesting accomplished. Testing, correcting, and retesting shall be made at no additional cost to the Government.

-- End of Section --

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SECTION 02741

HOT-MIX ASPHALT (HMA) FOR ROADS

PART 1 GENERAL

1.1 REFERENCES

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

ASPHALT INSTITUTE (AI)

AI MS-02 (6th Edition; R 1997) Mix Design Methods for Asphalt

ASTM INTERNATIONAL (ASTM)

ASTM C 117 (1995) Materials Finer Than 75 micrometer (No. 200) Sieve in Mineral Aggregates by Washing

ASTM C 131 (2001) Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

ASTM C 136 (2001) Sieve Analysis of Fine and Coarse Aggregates

ASTM C 150 (2002a) Portland Cement

ASTM C 566 (1997) Total Evaporable Moisture Content of Aggregate by Drying

ASTM D 140 (2001) Sampling Bituminous Materials

ASTM D 422 (1963; R 1998) Particle-Size Analysis of Soils

ASTM D 995 (1995b; R 2002) Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures

ASTM D 1461 (1985; R 2001) Moisture or Volatile Distillates in Bituminous Paving Mixtures

ASTM D 1559 (1989) Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus

ASTM D 2489 (2002) Estimating Degree of Particle

Coating of Bituminous-Aggregate Mixtures

ASTM D 2950	(1991; R 1997) Density of Bituminous Concrete in Place by Nuclear Method
ASTM D 3381	(1992; R 1999) Viscosity-Graded Asphalt Cement for Use in Pavement Construction
ASTM D 3666	(2002) Minimum Requirements for Agencies Testing and Inspecting Bituminous Paving Materials
ASTM D 4318	(2000) Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D 4867/D 4867M	(1996) Effect of Moisture on Asphalt Concrete Paving Mixtures
ASTM D 5444	(1998) Mechanical Size Analysis of Extracted Aggregate

STATE OF NEVADA DEPARTMENT OF TRANSPORTATION (NDOT), MATERIALS TESTING DIVISION

NDOT T230C	(Rev C) Method of Test For Determining the Percent of Fractured Faces
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1.2 DESCRIPTION OF WORK

The work shall consist of pavement courses composed of mineral aggregate and asphalt material heated and mixed in a central mixing plant and placed on a prepared course. HMA designed and constructed in accordance with this section shall conform to the lines, grades, thicknesses, and typical cross sections shown on the drawings. Each course shall be constructed to the depth, section, or elevation required by the drawings and shall be rolled, finished, and approved before the placement of the next course.

1.3 SUBMITTALS

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

SD-01 Preconstruction Submittals

Quality Control Plan for hot-mix asphalt; G, RE.

The Contractor shall develop an approved Quality Control Plan for hot-mix asphalt. Hot-mix asphalt for payment shall not be produced until the quality control plan has been approved.

SD-03 Product Data

Waybills and Delivery Tickets.

Waybills and delivery tickets submitted during progress of the work.

SD-04 Samples

Asphalt Cement Binder.

Samples of the asphalt cement binder specified shall be submitted for approval not less than 14 days before start of the test section.

SD-05 Design Data

Bituminous Pavement Mix Design; G, RE.

Copy of Mix Design selected. Report to be submitted and signed by a Civil Engineer Licensed to Practice in the State of Nevada.

Job Mix Formula; G, RE.

Properties of Bituminous Pavement Mixture; G, RE.

The job mix formula and properties of bituminous pavement mixture shall be submitted in writing by the Contractor for approval at least 14 days prior to the start of paving operations.

SD-06 Test Reports

Asphalt Content.

Aggregate Gradation.

Aggregate Moisture.

Temperatures.

Moisture Content of Mixture.

Laboratory Air Voids, Marshall Stability and Flow.

In-place Density.

Thickness.

Grade Conformance and Surface Smoothness.

Copies of test results. Reports to be submitted and signed by a Civil Engineer Licensed to Practice in the State of Nevada.

Asphalt Cement Binder.

Copies of test data indicating grade certification shall be provided by the supplier at the time of delivery of each load to the mix plant. Copies of these certifications shall be submitted to the Contracting Officer.

Aggregates.

All aggregate test results and samples shall be submitted to the Contracting Officer at least 14 days prior to start of construction.

QC Monitoring.

QC test results.

SD-07 Certificates

Testing Laboratory; G, RE.

Certification of compliance.

Plant Scale Calibration Certification.

Certificate of the testing laboratory, certification of compliance, and plant scale calibration certification.

1.4 ASPHALT MIXING PLANT

Plants used for the preparation of hot-mix asphalt shall conform to the requirements of ASTM D 995 with the following changes:

a. Truck Scales. The asphalt mixture shall be weighed on approved certified scales at the Contractor's expense. Scales shall be inspected and sealed at least annually by an approved calibration laboratory. The plant scale shall have a valid plant scale calibration certification.

b. Testing Facilities. The Contractor shall provide all necessary laboratory facilities for the Contractor's quality control testing and use of the Government for acceptance testing, as necessary.

c. Inspection of Plant. The Contracting Officer shall have access at all times, to all areas of the plant for checking adequacy of equipment; inspecting operation of the plant; verifying weights, proportions, and material properties; checking the temperatures maintained in the preparation of the mixtures and for taking samples. The Contractor shall provide assistance as requested, for the Government to procure any desired samples.

d. Storage Bins. Use of storage bins for temporary storage of hot-mix asphalt will be permitted as follows:

(1) The asphalt mixture may be stored in non-insulated storage bins for a period of time not exceeding 3 hours.

(2) The asphalt mixture may be stored in insulated storage bins for a period of time not exceeding 8 hours. The mix drawn from bins shall meet

the same requirements as mix loaded directly into trucks.

1.5 HAULING EQUIPMENT

Trucks used for hauling hot-mix asphalt shall have tight, clean, and smooth metal beds. To prevent the mixture from adhering to them, the truck beds shall be lightly coated with a minimum amount of paraffin oil, lime solution, or other approved material. Petroleum based products shall not be used as a release agent. Each truck shall have a suitable cover to protect the mixture from adverse weather. When necessary to ensure that the mixture will be delivered to the site at the specified temperature, truck beds shall be insulated or heated and covers (tarps) shall be securely fastened.

1.6 ASPHALT PAVERS

Asphalt pavers shall be self-propelled, with an activated screed, heated as necessary, and shall be capable of spreading and finishing courses of hot-mix asphalt which will meet the specified thickness, smoothness, and grade. The paver shall have sufficient power to propel itself and the hauling equipment without adversely affecting the finished surface. The paver shall have a receiving hopper of sufficient capacity to permit a uniform spreading operation. The hopper shall be equipped with a distribution system to place the mixture uniformly in front of the screed without segregation. The screed shall effectively produce a finished surface of the required evenness and texture without tearing, shoving, or gouging the mixture.

1.7 ROLLERS

Rollers shall be in good condition and shall be operated at slow speeds to avoid displacement of the asphalt mixture. The number, type, and weight of rollers shall be sufficient to compact the mixture to the required density while it is still in a workable condition. Equipment which causes excessive crushing of the aggregate shall not be used.

1.8 STRAIGHTEDGE

The Contractor shall furnish and maintain at the site, in good condition, one 3.66 m straightedge for each bituminous paver. Straightedge shall be made available for Government use. Straightedges shall be constructed of aluminum or other lightweight metal and shall have blades of box or box-girder cross section with flat bottom reinforced to insure rigidity and accuracy. Straightedges shall have handles to facilitate movement on pavement.

1.9 GRADE AND SURFACE-SMOOTHNESS REQUIREMENTS

Finished surface of bituminous courses shall conform to gradeline and elevations shown and to surface smoothness requirements specified.

1.9.1 Plan Grade

The grade of the completed surface shall not deviate more than 15.2 mm from

the plan grade.

1.9.2 Surface Smoothness

When a 3.66 m straightedge is laid on the surface parallel with the centerline of the paved area or transverse from crown to pavement edge, the surface shall vary not more than 6.4 mm from the straightedge.

1.10 GRADE CONTROL

Lines and grades shall be established and maintained by means of line and grade stakes placed at site of work. Elevations of bench marks used by the Contractor for controlling pavement operations at the site of work will be determined, established, and maintained by the Government. Finished pavement elevations shall be established and controlled at the site of work by the Contractor in accordance with bench mark elevations furnished by the Contracting Officer.

1.11 WEATHER LIMITATIONS

The hot-mix asphalt shall not be placed upon a wet surface or when the surface temperature of the underlying course is less than specified in Table 1. The temperature requirements may be waived by the Contracting Officer, if requested; however, all other requirements, including compaction, shall be met.

Table 1. Surface Temperature Limitations of Underlying Course

Mat Thickness, mm	Degrees C
75 or greater	4
Less than 75	7

PART 2 PRODUCTS

2.1 AGGREGATES

Aggregates shall consist of stone, crushed stone, gravel, crushed gravel, screenings, natural sand and mineral filler, as required. The portion of material retained on the 4.75 mm sieve is coarse aggregate. The portion of material passing the 4.75 mm sieve and retained on the 0.075 mm sieve is fine aggregate. The portion passing the 0.075 mm sieve is defined as mineral filler. All aggregate test results and samples shall be submitted to the Contracting Officer at least 14 days prior to start of construction.

2.1.1 Coarse Aggregate

Coarse aggregate shall consist of sound, tough, durable particles, free from films of material that would prevent thorough coating and bonding with the asphalt material and free from organic matter and other deleterious substances. All individual coarse aggregate sources shall meet the following requirements:

a. The percentage of loss shall not be greater than 45 percent after 500 revolutions when tested in accordance with ASTM C 131.

b. The portion of the material larger than the 10 mm screen shall contain at least 75 percent particles having fractured faces when tested in accordance with NDOT T230C.

2.1.2 Fine Aggregate

Fine aggregate shall consist of clean, sound, tough, durable particles. The aggregate particles shall be free from coatings of clay, silt, or any objectionable material and shall contain no clay balls. Fine aggregate shall have a plasticity index of 6 percent or less and a liquid limit of 35 percent or less when tested in accordance with ASTM D 4318.

2.1.3 Mineral Filler

Mineral filler shall consist of Portland cement conforming to ASTM C 150 or shall be mechanically reduced rock with the following gradation.

<u>Grain size (mm)</u>	<u>Percent Finer</u>
0.075	75-100
0.05	65-100
0.02	35-65
0.01	26-35
0.005	10-22

Grain size shall be determined in accordance with ASTM D 422.

2.1.4 Aggregate Gradation

2.1.4.1 Maintenance Road

The combined aggregate gradation shall conform to the gradation specified below, when tested in accordance with ASTM C 136 and ASTM C 117, and shall not vary from the low limit on one sieve to the high limit on the adjacent sieve or vice versa, but grade uniformly from coarse to fine.

Table 2. Aggregate Gradation

<u>Sieve Size, mm</u>	<u>Percent Passing by Mass</u>
25	100
19	90-100
12.5	78-94
9.5	68-84
4.75	50-65
2.36	30-49
0.30	7-25
0.075	2-9

2.1.4.2 Arterial, Detour and Replacement Roads

The gradation and quality of asphalt aggregate shall conform to those normally used locally in the construction of roadways by either State or Public Works Department Agencies.

2.2 ASPHALT CEMENT BINDER

Asphalt cement binder for use in **maintenance road** shall conform to ASTM D 3381 Table 2, Viscosity Grade AC-40. **Asphalt cement for arterial, detour and replacement roads shall conform to either State or Public Works Department requirements.** Test data indicating grade certification shall be provided by the supplier at the time of delivery of each load to the mix plant. Copies of these certifications shall be submitted to the Contracting Officer. The supplier is defined as the last source of any modification to the binder. The Contracting Officer may sample and test the binder at the mix plant at any time before or during mix production. Samples for this verification testing shall be obtained by the Contractor in accordance with ASTM D 140 and in the presence of the Contracting Officer. These samples shall be furnished to the Contracting Officer for the verification testing, which shall be at no cost to the Contractor.

2.3 MIX DESIGN

The Contractor shall develop the bituminous pavement mix design. The asphalt mix shall be composed of a mixture of well-graded aggregate, mineral filler if required, and asphalt material. The aggregate fractions shall be sized, handled in separate size groups, and combined in such proportions that the resulting mixture meets the grading requirements of the job mix formula (JMF). No hot-mix asphalt for payment shall be produced until a JMF has been approved. The hot-mix asphalt shall be designed using procedures contained in AI MS-02 and the criteria shown in Table 3. If the Tensile Strength Ratio (TSR) of the composite mixture, as determined by ASTM D 4867/D 4867M is less than 75, the aggregates shall be rejected or the asphalt mixture treated with an approved anti-stripping agent. The amount of anti-stripping agent added shall be sufficient to produce a TSR of not less than 75. If an antistrip agent is required, it shall be provided by the Contractor at no additional cost. Sufficient materials to produce 90 kg of blended mixture shall be provided to the Contracting Officer for verification of mix design at least 14 days prior to the start of construction.

2.3.1 JMF Requirements

The job mix formula and properties of bituminous pavement mixture shall be submitted in writing by the Contractor for approval at least 14 days prior to the start of paving operations and shall include as a minimum:

- a. Percent passing each sieve size.
- b. Percent of asphalt cement.

- c. Percent of each aggregate and mineral filler to be used.
- d. Asphalt viscosity grade.
- e. Number of blows of hammer per side of molded specimen.
- f. Laboratory mixing temperature.
- g. Lab compaction temperature.
- h. Temperature-viscosity relationship of the asphalt cement.
- i. Plot of the combined gradation on the 0.45 power gradation chart, stating the nominal maximum size.
- j. Graphical plots of stability, flow, air voids, voids in the mineral aggregate, and unit weight versus asphalt content as shown in AI MS-02.
- k. Specific gravity and absorption of each aggregate.
- l. Percent natural sand.
- m. Percent particles with 2 or more fractured faces (in coarse aggregate).
- n. Fine aggregate angularity.
- o. Tensile Strength Ratio (TSR).
- p. Antistrip agent (if required) and amount.
- q. List of all modifiers and amount used.

Table 3. Marshall Design Criteria

<u>Test Property</u>	<u>50 Blow Mix</u>
Stability, newtons minimum	*4450
Flow, 0.25 mm	8-18
Air voids, percent	3-5
TSR, minimum percent	75

* This is a minimum requirement. The average during construction shall be significantly higher than this number to ensure compliance with the specifications.

2.3.2 Adjustments to Field JMF

The Laboratory JMF for each mixture shall be in effect until a new formula is approved in writing by the Contracting Officer. Should a change in sources of any materials be made, a new laboratory design shall be performed and a new JMF approved before the new material is used. The Contractor will be allowed to adjust the Laboratory JMF within the limits specified below to optimize mix volumetric properties with the approval of the Contracting Officer. Adjustments to the Laboratory JMF shall be applied to the field (plant) established JMF and limited to those values as shown. Adjustments shall be targeted to produce or nearly produce 4 percent voids total mix.

Table 4. Field (Plant) Established JMF Tolerances
Sieves Adjustments (plus or minus), percent

12.5 mm	3
4.75 mm	3
2.36 mm	3
0.075 mm	1
Binder Content	0.4

If adjustments are needed that exceed these limits, a new mix design shall be developed. Tolerances given above may permit the aggregate grading to be outside the limits shown in Table 2; while not desirable, this is acceptable.

PART 3 EXECUTION

3.1 PREPARATION OF ASPHALT BINDER MATERIAL

The asphalt cement material shall be heated avoiding local overheating and providing a continuous supply of the asphalt material to the mixer at a uniform temperature. The temperature of unmodified asphalts shall be no more than 160 degrees C when added to the aggregates. Modified asphalts shall be no more than 174 degrees C when added to the aggregates.

3.2 PREPARATION OF MINERAL AGGREGATE

The aggregate for the mixture shall be heated and dried prior to mixing. No damage shall occur to the aggregates due to the maximum temperature and rate of heating used. The temperature of the aggregate and mineral filler shall not exceed 175 degrees C when the asphalt cement is added. The temperature shall not be lower than is required to obtain complete coating and uniform distribution on the aggregate particles and to provide a mixture of satisfactory workability.

3.3 PREPARATION OF HOT-MIX ASPHALT MIXTURE

The aggregates and the asphalt cement shall be weighed or metered and introduced into the mixer in the amount specified by the JMF. The combined materials shall be mixed until the aggregate obtains a uniform coating of

asphalt binder and is thoroughly distributed throughout the mixture. Wet mixing time shall be the shortest time that will produce a satisfactory mixture, but no less than 25 seconds for batch plants. The wet mixing time for all plants shall be established by the Contractor, based on the procedure for determining the percentage of coated particles described in ASTM D 2489, for each individual plant and for each type of aggregate used.

The wet mixing time will be set to at least achieve 95 percent of coated particles. The moisture content of all hot-mix asphalt upon discharge from the plant shall not exceed 0.5 percent by total weight of mixture as measured by ASTM D 1461.

3.4 PREPARATION OF THE UNDERLYING SURFACE

The underlying surface shall be maintained in suitable condition for the placement of asphaltic pavement. Immediately before placing the hot mix asphalt, the underlying course shall be cleaned of dust and debris. The surface of the base course will be inspected for adequate compaction and surface tolerances specified in paragraph: GRADE AND SURFACE-SMOOTHNESS REQUIREMENTS. Unsatisfactory areas shall be corrected, prior to commencement of asphaltic pavement lay down operations.

3.5 TESTING LABORATORY

The laboratory used to develop the JMF shall meet the requirements of ASTM D 3666. A certification signed by the manager of the laboratory stating that it meets these requirements or clearly listing all deficiencies shall be submitted to the Contracting Officer prior to the start of construction. The certification shall contain as a minimum:

- a. Qualifications of personnel; laboratory manager, supervising technician, and testing technicians.
- b. A listing of equipment to be used in developing the job mix.
- c. A copy of the laboratory's quality control system.
- d. Evidence of participation in the AASHTO Materials Reference Laboratory (AMRL) program.

3.6 TRANSPORTING AND PLACING

3.6.1 Transporting

The hot-mix asphalt shall be transported from the mixing plant to the site in clean, tight vehicles. Deliveries shall be scheduled so that placing and compacting of mixture is uniform with minimum stopping and starting of the paver. Adequate artificial lighting shall be provided for night placements. Hauling over freshly placed material will not be permitted until the material has been compacted as specified, and allowed to cool to 60 degrees C. To deliver mix to the paver, the Contractor shall use a material transfer vehicle which shall be operated to produce continuous forward motion of the paver. Waybills and delivery tickets are to be submitted with each load.

3.6.2 Placing

The mix shall be placed and compacted at a temperature suitable for obtaining density, surface smoothness, and other specified requirements. Upon arrival, the mixture shall be placed to the full width by an asphalt paver; it shall be struck off in a uniform layer of such depth that, when the work is completed, it shall have the required thickness and conform to the grade and contour indicated. The speed of the paver shall be regulated to eliminate pulling and tearing of the asphalt mat. Unless otherwise permitted, placement of the mixture shall begin along the centerline of a crowned section or on the high side of areas with a one-way slope. The mixture shall be placed in consecutive adjacent strips having a minimum width of 3 m. The longitudinal joint in one course shall offset the longitudinal joint in the course immediately below by at least 300 mm; however, the joint in the surface course shall be at the centerline of the pavement. Transverse joints in one course shall be offset by at least 3 m from transverse joints in the previous course. Transverse joints in adjacent lanes shall be offset a minimum of 3 m. On isolated areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impractical, the mixture may be spread and luted by hand tools.

3.7 COMPACTION OF MIXTURE

After placing, the mixture shall be thoroughly and uniformly compacted by rolling. The surface shall be compacted as soon as possible without causing displacement, cracking or shoving. The sequence of rolling operations and the type of rollers used shall be at the discretion of the Contractor. The speed of the roller shall, at all times, be sufficiently slow to avoid displacement of the hot mixture and be effective in compaction. Any displacement occurring as a result of reversing the direction of the roller, or from any other cause, shall be corrected at once. Sufficient rollers shall be furnished to handle the output of the plant. Rolling shall continue until the surface is of uniform texture, true to grade and cross section, and the required field density is obtained. After the Contractor is assured of meeting grade and smoothness requirements, rolling shall be continued until all roller marks are eliminated and at least 95 percent of the laboratory maximum density has been achieved. To prevent adhesion of the mixture to the roller, the wheels shall be kept properly moistened but excessive water will not be permitted. In areas not accessible to the roller, the mixture shall be thoroughly compacted with hand tampers. Any mixture that becomes loose and broken, mixed with dirt, contains check-cracking, or is in any way defective shall be removed full depth, replaced with fresh hot mixture and immediately compacted to conform to the surrounding area. This work shall be done at the Contractor's expense. Skin patching will not be allowed.

3.8 JOINTS

The formation of joints shall be made ensuring a continuous bond between the courses and to obtain the required density. All joints shall have the same texture as other sections of the course and meet the requirements for smoothness and grade.

3.8.1 Transverse Joints

The roller shall not pass over the unprotected end of the freshly laid mixture, except when necessary to form a transverse joint. When necessary to form a transverse joint, it shall be made by means of placing a bulkhead or by tapering the course. The tapered edge shall be cut back to its full depth and width on a straight line to expose a vertical face prior to placing material at the joint. The cutback material shall be removed from the project. In both methods, all contact surfaces shall be given a light tack coat of asphalt material before placing any fresh mixture against the joint.

3.8.2 Longitudinal Joints

Longitudinal joints which are irregular, damaged, uncompacted, cold (less than 80 degrees C at the time of placing adjacent lanes), or otherwise defective, shall be cut back a minimum of 50 mm from the edge with a cutting wheel to expose a clean, sound vertical surface for the full depth of the course. All cutback material shall be removed from the project. All contact surfaces shall be given a light tack coat of asphalt material prior to placing any fresh mixture against the joint. The Contractor will be allowed to use an alternate method if it can be demonstrated that density, smoothness, and texture can be met.

3.9 CONTRACTOR QUALITY CONTROL

3.9.1 General Quality Control Requirements

The Contractor shall develop an approved Quality Control Plan for hot-mix asphalt. Hot-mix asphalt for payment shall not be produced until the quality control plan has been approved. The plan shall address all elements which affect the quality of the pavement including, but not limited to:

- a. Mix Design
- b. Aggregate Grading
- c. Quality of Materials
- d. Stockpile Management
- e. Proportioning
- f. Mixing and Transportation
- g. Mixture Volumetrics
- h. Moisture Content of Mixtures
- i. Placing and Finishing
- j. Joints

k. Compaction

l. Surface Smoothness

3.9.2 Testing Laboratory

The Contractor shall have access to a fully equipped asphalt laboratory. The laboratory shall meet the requirements as required in ASTM D 3666. Laboratory facilities shall be kept clean and all equipment shall be maintained in proper working condition. The Contracting Officer shall be permitted unrestricted access to inspect the Contractor's laboratory facility, to witness quality control activities, and to perform any check testing desired. The Contracting Officer will advise the Contractor in writing of any noted deficiencies concerning the laboratory facility, equipment, supplies, or testing personnel and procedures. When, in the opinion of the Contracting Officer, the deficiencies are serious enough to adversely affect test results, the incorporation of the materials into the work shall be suspended immediately and will not be permitted to resume until the deficiencies are corrected.

3.9.3 Quality Control Testing

The Contractor shall perform all quality control tests applicable to these specifications and as set forth in the Quality Control Program. The testing program shall include, but shall not be limited to, tests for the control of asphalt content, aggregate gradation, aggregate moisture, temperatures, moisture content of mixture, laboratory air voids, Marshall stability and flow, in-place density, thickness, grade conformance and surface smoothness. A Quality Control Testing Plan shall be developed as part of the Quality Control Program.

3.9.3.1 Asphalt Content

A minimum of one test to determine asphalt content will be performed per 500 metric tons of asphaltic concrete produced.

3.9.3.2 Aggregate Gradation

Aggregate gradations shall be determined for each 250 metric tons of asphaltic concrete produced from mechanical analysis of recovered aggregate in accordance with ASTM D 5444. For batch plants, aggregates shall be tested in accordance with ASTM C 136 using actual batch weights to determine the combined aggregate gradation of the mixture.

3.9.3.3 Aggregate Moisture

The moisture content of aggregate used for production shall be determined a minimum of once per shift in accordance with ASTM C 566.

3.9.3.4 Temperatures

At least one measurement of asphaltic concrete temperature shall be taken in each hour, in which paving operations are being conducted. Additional tests at additional locations, to determine the temperature at the dryer,

the asphalt cement in the storage tank, the asphalt mixture at the plant, and the asphalt mixture at the job site, may be required as directed by the Contracting Officer.

3.9.3.5 Moisture Content of Mixture

The moisture content of the mixture shall be determined at least once per shift in accordance with ASTM D 1461 or an approved alternate procedure.

3.9.3.6 Laboratory Air Voids, Marshall Stability and Flow

Mixture samples shall be taken at least once per 1000 metric tons and compacted into specimens, using 50 blows per side with the Marshall hammer as described in ASTM D 1559. After compaction, the laboratory air voids of each specimen shall be determined, as well as the Marshall stability and flow.

3.9.3.7 In-Place Density

At least three cores will be recovered and tested for every 1000 square meters of pavement, or one day's production, whichever is smaller. Additional tests may be taken as required by the Contracting Officer. The Contractor may conduct any additional necessary testing to ensure the specified density is achieved. A nuclear gauge may be used to monitor pavement density in accordance with ASTM D 2950. Record sampling will be by use of cores as indicated above.

3.9.3.8 Thickness

At least three cores will be recovered and tested for every 1000 square meters of pavement, or one day's production, whichever is smaller. Additional tests may be taken as required by the Contracting Officer.

3.9.3.9 Grade Conformance and Surface Smoothness

The Contractor shall conduct the necessary checks to ensure the grade and smoothness requirements are met in accordance with paragraph GRADE AND SURFACE SMOOTHNESS REQUIREMENTS.

3.9.3.10 Additional Testing

Any additional testing, which the Contractor deems necessary to control the process, may be performed at the Contractor's option.

3.9.3.11 QC Monitoring

The Contractor shall submit all QC test results to the Contracting Officer on a daily basis as the tests are performed. The Contracting Officer reserves the right to monitor any of the Contractor's quality control testing and to perform duplicate testing as a check to the Contractor's quality control testing. At the completion of asphalt work the Contractor shall submit a certification of compliance indicating that the work is in compliance with this section.

3.9.4 Action Required

3.9.4.1 Asphalt Content

If there is a failure to meet the specified asphalt content production will cease and the Contracting Officer will be immediately notified. No additional paving will occur until adjustments to the plant and test results confirm that the specified asphalt is being supplied.

3.9.4.2 Aggregate Gradation

When the amount passing any sieve is outside the specification limits, the aggregate shall be immediately resampled and retested. If there is another failure on any sieve, the fact shall immediately be reported to the Contracting Officer, and immediate steps shall be taken to rectify the situation.

3.9.4.3 Aggregate Moisture Content

When the moisture content of the aggregates is outside specification requirements the aggregates shall be immediately resampled and retested. If there is another failure, the fact shall immediately be reported to the Contracting Officer, and immediate steps shall be taken to rectify the situation.

3.9.4.4 Temperature

When the temperature of the bituminous mixture is outside specification requirements the mixture shall be immediately resampled and retested. If there is another failure, the fact shall immediately be reported to the Contracting Officer, and immediate steps shall be taken to rectify the situation. In no case will overheated or carbonized mixtures be allowed.

3.9.4.5 Asphalt Properties

If there is a failure in any of the asphalt properties production will cease and the Contracting Officer will be immediately notified. No additional paving will occur until adjustments to the plant and test results confirm that the specified properties are being achieved.

3.9.4.6 Density

When test results indicate lack of compaction additional specimens will be obtained as directed by the Contracting Officer. Based on the test results the Contractor will remove and replace the affected areas of pavement.

3.9.4.7 Thickness

When test results indicate that the finished pavement is 6 mm less than the thickness shown on the drawings, additional samples will be taken to determine the extent of defective thickness. The area determined will be removed and replaced or may be overlaid. The overlay will be a minimum of 25 mm thick and will be placed to duplicate slopes and drainages of the original pavement. No skin patching will be allowed.

3.9.5 Sampling

When directed by the Contracting Officer, the Contractor shall sample and test any material which appears inconsistent with similar material being produced, unless such material is voluntarily removed and replaced or deficiencies corrected by the Contractor. All sampling shall be in accordance with standard procedures specified.

3.9.6 Reports

All results of tests conducted shall be reported as required. During periods requiring protection from weather, reports of pertinent temperatures or other relevant values shall be made daily. These requirements do not relieve the contractor of the obligation to report certain failures immediately as required in preceding paragraphs. Such reports of failures and the action taken shall be confirmed in writing in the routine reports. The Contracting Officer has the right to examine all Contractor Quality Control records.

3.10 Waybills and Delivery Tickets

Copies of waybills or delivery tickets shall be submitted to the Contracting Officer's Representative, during the progress of the work. The Contractor shall furnish the Contracting Officer's Representative scale tickets for each load of material weighed; these tickets shall include tare weight, identification mark of each vehicle weighed, plus date, time, and location of the loading. Tickets shall be furnished at the point and time individual loads arrive at the work site. A master log of all vehicle loading shall be furnished for each day of loading operation. The Contractor shall file with the Contracting Officer's Representative the master log of loadings, certified waybills and/or certified tickets, within 24 hours of material delivery. Prior to the final payment, the Contractor shall furnish written certification that the material recorded on the submitted waybills and/or certified tickets was actually used in the construction covered by the contract.

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SECTION 02748

BITUMINOUS TACK AND PRIME COATS

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM D 140	(2001) Sampling Bituminous Materials
ASTM D 977	(1998) Emulsified Asphalt
ASTM D 2027	(1997) Cutback Asphalt (Medium-Curing Type)
ASTM D 2995	(1998) Determining Application Rate of Bituminous Distributors

1.2 WAYBILLS AND DELIVERY TICKETS

Before the final statement is allowed, the Contractor shall file with the Contracting Officer certified waybills and certified delivery tickets for all bituminous materials used in the construction of the pavement covered by the contract. The Contractor shall not remove bituminous material from storage until the initial outage and temperature measurements have been taken. The delivery or storage units will not be released until the final outage has been taken by the Contracting Officer; nor shall the Contractor release the car or storage tank taken until the final outage has been taken by the Contracting Officer.

1.3 SUBMITTALS

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

SD-06 Test Reports

Sampling and Testing.

Sampling and testing shall be performed by an approved commercial testing

laboratory or by facilities furnished by the Contractor. Copies of all test results for bituminous materials shall be submitted within 24 hours of completion of tests. Certified copies of the manufacturer's test reports indicating compliance with applicable specified requirements shall be submitted not less than 30 days before the material is required in the work.

SD-07 Certificates

Waybills and Delivery Tickets.

Waybills and delivery tickets shall be submitted during progress of the work.

1.4 PLANT, EQUIPMENT, MACHINES AND TOOLS

1.4.1 General Requirements

Plant, equipment, machines and tools used in the work shall be subject to approval and shall be maintained in a satisfactory working condition at all times. The equipment shall be adequate and shall have the capability of producing the results specified.

1.4.2 Bituminous Distributor

The distributor shall have pneumatic tires of such size and number to prevent rutting, shoving or otherwise damaging the base surface or other layers in the pavement structure. The distributor shall be designed and equipped to spray the bituminous material in a uniform double or triple lap at the specified temperature, at readily determined and controlled rates with an allowable variation from the specified rate of not more than plus or minus 5 percent, and at variable widths. Distributor equipment shall include a separate power unit for the bitumen pump, full-circulation spray bars, tachometer, pressure gauges, volume-measuring devices, adequate heaters for heating of materials to the proper application temperature, a thermometer for reading the temperature of tank contents, and a hand hose attachment suitable for applying bituminous material manually to areas inaccessible to the distributor. The distributor shall be equipped to circulate and agitate the bituminous material during the heating process.

1.4.3 Power Brooms and Power Blowers

Power brooms and power blowers shall be suitable for cleaning the surfaces to which the bituminous coat is to be applied.

1.4.4 Storage Tanks

Tanks shall be capable of heating the bituminous material, under effective and positive control at all times to the required temperature. Heating shall be accomplished by steam coils, hot oil, or electricity. An armored thermometer shall be affixed to the tank so that the temperature of the bituminous material may be read at all times.

1.5 WEATHER LIMITATIONS

Bituminous coat shall be applied only when the surface to receive the bituminous coat is dry. Bituminous coat shall be applied only when the atmospheric temperature in the shade is 10 degrees C or above and when the temperature has not been below 2 degrees C for the 12 hours prior to application.

PART 2 PRODUCTS

2.1 TACK COAT

Emulsified asphalt shall conform to ASTM D 977, Type SS-1h.

2.2 PRIME COAT

Cutback asphalt shall conform to ASTM D 2027, Grade MC-70.

PART 3 EXECUTION

3.1 PREPARATION OF SURFACE

Immediately before applying the bituminous coat, all loose material, dirt, clay, or other objectionable material shall be removed from the surface to be treated. **Arterials, detour and replacement roads shall receive prime and/or tack coat prior to application of bituminous coat.** To assure a uniform spread of the bituminous coat, the portion of the subgrade, subbase, or base course prepared for treatment, if excessively dry, shall be lightly sprinkled with water immediately before the application as directed by the Contracting Officer. For previously constructed pavement, the contact surface shall be dry and clean at the time of treatment. Prior to application of the tack coat, an inspection of the area to be treated shall be made by the Contracting Officer to determine fitness of the area to receive the bituminous coating.

3.2 APPLICATION RATE

The exact quantities within the range specified, which may be varied to suit field conditions, will be determined by the Contracting Officer based on trials made by Contractor.

3.2.1 Tack Coat

Bituminous material for the tack coat shall be applied in quantities of not less than 0.20 liter nor more than 0.70 liter per square meter of pavement surface.

3.2.2 Prime Coat

Bituminous material for the prime coat shall be applied in quantities of not less than 0.70 liter nor more than 1.80 liters per square meter of pavement surface.

3.3 APPLICATION TEMPERATURE

3.3.1 Viscosity Relationship

Asphalt application temperature shall provide an application viscosity between 20 and 120 square mm/sec, kinematic. The temperature viscosity relation shall be furnished to the Contracting Officer.

3.3.2 Temperature Ranges

The viscosity requirements shall determine the application temperature to be used. The following is a normal range of application temperatures:

Bituminous Material -----	Application Temperature -----
MC-70	120-220 degrees C
SS-1h	70-160 degrees C

3.4 APPLICATION

Following preparation and subsequent inspection of the surface, the bituminous coat shall be applied at the specified rate with uniform distribution over the surface to be treated. All areas and spots missed by the distributor shall be properly treated with the hand spray. Until the succeeding layer of pavement is placed, the surface shall be maintained by protecting the surface against damage and by repairing deficient areas at no additional cost to the Government. If required, clean dry sand shall be spread to effectively blot up any excess bituminous material. No smoking, fires, or flames other than those from the heaters that are a part of the equipment shall be permitted within 8 meters of heating, distributing, and transferring operations of bituminous material other than bituminous emulsions. All traffic, except for paving equipment used in constructing the surfacing, shall be prevented from using the underlying material, whether primed or not, until the surfacing is completed. The bituminous coat shall conform to all requirements as described herein. Waybills and delivery tickets are to be submitted during progress of the work. To obtain uniform application of the prime coat on the surface treated at the junction of previous and subsequent applications, building paper shall be spread on the surface for a sufficient distance back from the ends of each application to start and stop the prime coat on the paper. Immediately after application, the building paper shall be removed and destroyed.

3.5 CURING PERIOD

Following application of the bituminous material and prior to application of the succeeding layer of pavement, the bituminous coat shall be allowed to cure and to obtain evaporation of any volatiles or moisture. Prime coat shall be allowed to cure without being disturbed for a period of at least 48 hours or longer, as may be necessary to attain penetration into the treated course.

3.6 FIELD QUALITY CONTROL

Samples of the bituminous material shall be tested for compliance with the applicable specified requirements. A sample shall be obtained and tested

by the Contractor for every 1900 metric tons of bituminous material used.

3.7 SAMPLING AND TESTING

Sampling and testing shall be performed by an approved commercial testing laboratory or by facilities furnished by the Contractor. No work requiring testing will be permitted until the facilities have been inspected and approved.

3.7.1 Sampling

The samples of bituminous material, unless otherwise specified, shall be in accordance with ASTM D 140. Sources from which bituminous materials are to be obtained shall be selected and notification furnished to the Contracting Officer within 15 days after the award of the contract.

3.7.2 Calibration Test

The Contractor shall furnish all equipment, materials, and labor necessary to calibrate the bituminous distributor. Calibration shall be made with the approved job material and prior to applying the bituminous coat material to the prepared surface. Calibration of the bituminous distributor shall be in accordance with ASTM D 2995.

3.7.3 Trial Applications

Before providing the complete bituminous coat, three lengths of at least 30 meters for the full width of the distributor bar shall be applied to evaluate the amount of bituminous material that can be satisfactorily applied.

3.7.3.1 Tack Coat Trial Application Rate

Unless otherwise authorized, the trial application rate of bituminous tack coat materials shall be applied in the amount of 0.20 liters per square meter. Other trial applications shall be made using various amounts of material as may be deemed necessary.

3.7.3.2 Prime Coat Trial Application Rate

Unless otherwise authorized, the trial application rate of bituminous materials shall be applied in the amount of 1.10 liters per square meter. Other trial applications shall be made using various amounts of material as may be deemed necessary.

3.7.4 Sampling and Testing During Construction

Quality control sampling and testing shall be performed as required in paragraph FIELD QUALITY CONTROL.

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SECTION 02821

FENCING AND RAILING

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM A 116	(2000) Metallic-Coated, Steel Woven Wire Fence Fabric
ASTM A 123/A 123M	(2002) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 153/A 153M	(2001a) Zinc Coating (Hot Dip) on Iron and Steel Hardware
ASTM A 392	(1996) Zinc-Coated Steel Chain-Link Fence Fabric
ASTM A 475	(1998) Zinc-Coated Steel Wire Strand
ASTM A 491	(1996) Aluminum-Coated Steel Chain-Link Fence Fabric
ASTM A 501	(1999) Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
ASTM A 653/A 653M	(2002a) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 780	(2001) Repair of Damaged and Uncoated Areas of Hot-Dipped Galvanized Coatings
ASTM A 824	(2001) Metallic-Coated Steel Marcellled Tension Wire for Use With Chain Link Fence
ASTM B 32	(2000e1) Solder Metal
ASTM B 117	(1997) Operating Salt Spray (Fog) Apparatus
ASTM C 94/C 94M	(2000e2) Ready-Mixed Concrete
ASTM C 270	(2002) Mortar for Unit Masonry

ASTM C 476	(1999) Grout for Masonry
ASTM F 626	(1996a) Fence Fittings
ASTM F 883	(1997) Padlocks
ASTM F 900	(2000) Industrial and Commercial Swing Gates
ASTM F 1043	(2000) Strength and Protective Coatings on Metal Industrial Chain-Link Fence Framework
ASTM F 1083	(1997) Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures
ASTM F 1184	(1994; R 2000) Industrial and Commercial Horizontal Slide Gates

UNDERWRITERS LABORATORIES (UL)

UL 467	(1993; Rev thru Aug 2001) Grounding and Bonding Equipment
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1.2 SUBMITTALS

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

SD-02 Shop Drawings

Post and Cable Railing System.

Chain Link Metal Fence and Gates.

Detail drawings indicating material thickness, type, grade, and class; dimensions; and construction details. Drawings shall include catalog cuts, erection details, manufacturer's descriptive data and installation instructions, and templates. Detail drawings for the following items: Post and Cable railing system, chain link metal fences and gates.

Ornamental Metal Fencing System.

Manufacturer's literature on ornamental metal fencing system shall be submitted prior to installation.

SD-07 Certificates

Chain Link Fence.

Statement, signed by an official authorized to certify on behalf of the manufacturer, attesting that the chain link fence and component materials meet the specified requirements.

PART 2 PRODUCTS

2.1 FENCE FABRIC

Fence fabric shall conform to the following:

2.1.1 Chain Link Fence Fabric

ASTM A 392, Class 2, zinc-coated steel wire with minimum coating weight of 610 grams of zinc per square meter of coated surface, or ASTM A 491, Type I, aluminum-coated steel wire. Fabric shall be fabricated of 9 gauge wire woven in 50 mm mesh. In the event the plans or drawings indicate 11 gauge wire, the Contractor shall use 9 gauge wire as specified herein. Fabric height shall be 1.83 meters. Fabric shall be twisted and barbed on the top selvage and knuckled on the bottom selvage.

2.1.2 TORTOISE FENCING

Tortoise fencing shall be temporary and shall consist of a 1.219 meter high, 1/2" galvanized mesh, or equivalent, with steel tee posts driven into the ground, or with steel tee posts set in excavated holes with mortar and grout as necessary, installed where shown on the drawings or required by the Contracting Officer. Mortar and grout to set steel tee posts in holes as necessary shall conform to ASTM C 270 Type M and ASTM C 476.

2.1.3 Woven Wire and Wire Netting

Woven wire shall conform to ASTM A 116 No. 12-1/2 close mesh fence; size as indicated. Wire netting shall conform to ASTM A 116 heavy grade; size as indicated.

2.2 GATES

ASTM F 900 and/or ASTM F 1184. Gate shall be the type and swing shown. Gate frames shall conform to strength and coating requirements of ASTM F 1083 for Group IA, steel pipe, with external coating Type A, nominal pipe size (NPS) 1-1/2. Gate frames shall conform to strength and coating requirements of ASTM F 1043, for Group IC, steel pipe with external coating Type A or Type B, nominal pipe size (NPS) 1-1/2. Gate fabric shall be as specified for chain link fabric. Gate leaves more than 2.44 m wide shall have either intermediate members and diagonal truss rods or shall have tubular members as necessary to provide rigid construction, free from sag or twist. Gate leaves less than 2.44 m wide shall have truss rods or intermediate braces. Gate fabric shall be attached to the gate frame by method standard with the manufacturer except that welding will not be permitted. Latches, hinges, stops, keepers, rollers, and other hardware items shall be furnished as required for the operation of the gate. Latches shall be arranged for padlocking so that the padlock will be accessible from both sides of the gate. Stops shall be provided for holding the gates in the open position.

2.3 METAL POSTS FOR CHAIN LINK FENCE, TORTOISE FENCE, AND POST AND CABLE RAILING

2.3.1 METAL POSTS FOR CHAIN LINK FENCE

ASTM F 1083, zinc-coated. Group IA, with external coating Type A steel pipe. Group IC steel pipe, zinc-coated with external coating Type A or Type B and Group II, formed steel sections, shall meet the strength and coating requirements of ASTM F 1043. Group III, ASTM F 1043 steel H-section may be used for line posts in lieu of line post shapes specified for the other classes. Sizes shall be as shown on the drawings. Line posts and terminal (corner, gate, and pull) posts selected shall be of the same designation throughout the fence. Gate post shall be for the gate type specified subject to the limitation specified in ASTM F 900.

2.3.2 Metal Posts for Post and Cable Railing

Posts for Post and Cable Railing shall be per ASTM A 501 and shall be hot-dip galvanized after drilling holes, welding, and other fabrication as shown on the drawings. Galvanizing shall be in accordance with ASTM A 123/A 123M, as applicable. Welded, cut, damaged, and deformed areas of galvanizing metal shall be neatly coated with Grade 50B solder conforming to ASTM B 32.

2.3.3 Metal Tee Posts For Tortoise Fencing

Steel tee posts shall be similar to those found commercially available, adjusted to the height of the tortoise fence fabric.

2.4 BRACES AND RAILS

ASTM F 1083, zinc-coated, Group IA, steel pipe, size NPS 1-1/4. Group IC steel pipe, zinc-coated, shall meet the strength and coating requirements of ASTM F 1043. Group II, formed steel sections, size 42 mm, conforming to ASTM F 1043, may be used as braces and rails if Group II line posts are furnished.

2.5 WIRE

2.5.1 Tension Wire

Tension wire shall be Type I or Type II, Class 2 coating, in accordance with ASTM A 824.

2.6 CABLES FOR POST AND CABLE RAILING

Cables shall be prestretched, galvanized wire rope of the size indicated, ungreased. Wire rope shall conform to ASTM A 475, high strength grade with Class A coating. Fittings and accessories shall be hot-dip galvanized.

2.7 ACCESSORIES

Fence fittings and accessories shall be per ASTM F 626 and as shown on the

drawings. Ferrous accessories shall be zinc or aluminum coated. Truss rods shall be furnished for each terminal post. Truss rods shall be provided with turnbuckles or other equivalent provisions for adjustment. Tie wire for attaching fabric to rails, braces, and posts shall be 9 gauge steel wire and match the coating of the fence fabric. Miscellaneous hardware coatings shall conform to ASTM A 153/A 153M unless modified. For the Post and Cable Railing system the turnbuckles, eyebolts, anchors, u-bolt clips, nuts and washers shall be galvanized or zinc plated.

2.8 CONCRETE

ASTM C 94/C 94M, using 19 mm maximum size aggregate, and having minimum compressive strength of 21 MPa at 28 days. Grout shall consist of one part portland cement to three parts clean, well-graded sand and the minimum amount of water to produce a workable mix.

2.9 PADLOCKS

Padlocks shall conform to ASTM F 883, Type PO1 Grade 2, Size 44 mm (1-3/4 inch). Padlocks shall be a combination commercial type Padlock Master #175 or equivalent.

2.10 GROUND RODS

Rods made of copper-clad steel shall conform to UL 467. Ground rods shall be not less than 19.1 mm (3/4 inch) in diameter and 3.048 m (10 feet) in length.

2.11 Ornamental Metal Fencing System

2.11.1 Material, General

The ornamental metal fencing system shall be similar or equivalent to AEGIS II, Classic 2-Rail. The materials for fence framework (including but not limited to pickets, rails, and posts) shall be manufactured from coil steel having a minimum yield strength of 350 Mpa. The steel shall be galvanized to meet the requirements of ASTM A 653/A 653M with a minimum zinc coating weight of 277 grams per square meter (coating Designation G-90), hot-dip process. Galvanized framework shall be subject to a six stage pretreatment/wash (with zinc phosphate) followed by "Permacoat" or equivalent, an electrostatic spray application of a two-coat powder system.

The base coat is a thermosetting epoxy powder coating (gray color) with a minimum thickness of 1 mm. The top coat is a "No-mar" TGIC or similar polyester powder coat finish with a minimum thickness of 1 mm. The color shall be desert sand. Coated galvanized framework shall have a salt spray resistance of 3,500 hours using ASTM B 117 without loss of adhesion.

2.11.1.1 Pickets, rails, posts

Fence pickets shall be 2.54 cm square x 16 gauge tubing. The cross-sectional shape of the rails shall conform to the "Forerunner" or similar or equivalent with outside cross-section dimensions of 44.45 mm square and a minimum thickness of 14 gauge. Post spacing shall be 2.44 m on center with 63.5 mm square posts. Picket holes in the rail shall be

spaced 126 mm on center. Picket retaining rods shall be 3.18 mm diameter galvanized steel. Posts shall be a minimum of 63.5 mm square x 12 gauge. Rubber grommets shall be supplied to seal all picket-to-rail intersections.

PART 3 EXECUTION

3.1 INSTALLATION

Fence shall be installed to the lines and grades indicated. The area on either side of the fence line shall be cleared to the extent indicated. Line posts shall be spaced equidistant at intervals not exceeding 3 m. Terminal (corner, gate, and pull) posts shall be set at abrupt changes in vertical and horizontal alignment. Fabric shall be continuous between terminal posts; however, runs between terminal posts shall not exceed 152.4 m. Any damage to galvanized surfaces, including welding, shall be repaired with paint containing zinc dust in accordance with ASTM A 780.

3.2 EXCAVATION

Post holes shall be cleared of loose material. Waste material shall be spread where directed. The ground surface irregularities along the fence line shall be eliminated to the extent necessary to maintain a 50 mm clearance between the bottom of the fabric and finish grade.

3.3 POST INSTALLATION, CHAIN LINK METAL FENCE AND GATES

3.3.1 Posts for Chain Link Fence

Posts shall be set plumb and in alignment. Except where solid rock is encountered, posts shall be set in concrete to the depth indicated on the drawings. Where solid rock is encountered with no overburden, posts shall be set to a minimum depth of 457 mm in rock. Where solid rock is covered with an overburden of soil or loose rock, posts shall be set to the minimum depth indicated on the drawing unless a penetration of 457 mm in solid rock is achieved before reaching the indicated depth, in which case depth of penetration shall terminate. All portions of posts set in rock shall be grouted. Portions of posts not set in rock shall be set in concrete from the rock to ground level. Posts set in concrete shall be set in holes not less than the diameter shown on the drawings. Diameters of holes in solid rock shall be at least 25 mm greater than the largest cross section of the post. Concrete and grout shall be thoroughly consolidated around each post, shall be free of voids and finished to form a dome. Concrete and grout shall be allowed to cure for 72 hours prior to attachment of any item to the posts. Group II line posts may be mechanically driven, for temporary fence construction only, if rock is not encountered. Driven posts shall be set to a minimum depth of 914 mm and shall be protected with drive caps when being set.

3.4 RAILS

3.4.1 Top Rail

Top rail shall be supported at each post to form a continuous brace between terminal posts. Where required, sections of top rail shall be joined using

sleeves or couplings that will allow expansion or contraction of the rail.

3.4.2 Bottom Rail

The bottom rail shall be bolted to double rail ends and double rail ends shall be securely fastened to the posts. Bolts shall be peened to prevent easy removal. Bottom rail shall be installed before chain link fabric.

3.5 BRACES AND TRUSS RODS

Braces and truss rods shall be installed as indicated and in conformance with the standard practice for the fence furnished. Horizontal (compression) braces and diagonal truss (tension) rods shall be installed on fences over 1.83 m in height. A center brace or 2 diagonal truss rods shall be installed on 3.66 m fences. Braces and truss rods shall extend from terminal posts to line posts. Diagonal braces shall form an angle of approximately 40 to 50 degrees with the horizontal. No bracing is required on fences 1.83 m high or less if a top rail is installed.

3.6 TENSION WIRES

Tension wires shall be installed along the top and bottom of the fence line and attached to the terminal posts of each stretch of the fence. Top tension wires shall be installed within the top 102 mm of the installed fabric. Bottom tension wire shall be installed within the bottom 152 mm of the installed fabric. Tension wire shall be pulled taut and shall be free of sag.

3.7 CHAIN LINK FABRIC

Chain link fabric shall be installed on the side of the post indicated. Fabric shall be attached to terminal posts with stretcher bars and tension bands. Bands shall be spaced at approximately 381 mm intervals. The fabric shall be installed and pulled taut to provide a smooth and uniform appearance free from sag, without permanently distorting the fabric diamond or reducing the fabric height. Fabric shall be fastened to line posts at approximately 381 mm intervals and fastened to all rails and tension wires at approximately 610 mm intervals. Fabric shall be cut by untwisting and removing pickets. Splicing shall be accomplished by weaving a single picket into the ends of the rolls to be joined. The bottom of the installed fabric shall be 50 mm plus or minus 13 mm above the ground.

3.8 GATE INSTALLATION

Gates shall be installed at the locations shown. Hinged gates shall be mounted to swing as indicated. Latches, stops, and keepers shall be installed as required. Contractor shall provide a padlock for each of the chain link fence gate assemblies.

3.9 GROUNDING

Fences crossed by power lines of 600 volts or more shall be grounded at or near the point of crossing and at distances not exceeding 45 m on each side of crossing. Ground conductor shall consist of No. 8 AWG solid copper

wire. Grounding electrodes shall be 19 mm by 3.05 m long copper-clad steel rod. Electrodes shall be driven into the earth so that the top of the electrode is at least 152 mm below the grade. Where driving is impracticable, electrodes shall be buried a minimum of 305 mm deep and radially from the fence. The top of the electrode shall be not less than 0.6 m or more than 2.4 m from the fence. Ground conductor shall be clamped to the fence and electrodes with bronze grounding clamps to create electrical continuity between fence posts, fence fabric, and ground rods. After installation the total resistance of fence to ground shall not be greater than 25 ohms.

3.10 POST AND CABLE RAILING SYSTEM INSTALLATION

3.10.1 Posts for Post and Cable Railing

Posts for Post and Cable Railing shall be installed as shown on the drawings. All posts for the post and cable railing installation shall be true vertical or plumb and not normal to the top of the channel walls.

3.10.2 Cables for Post and Cable Railing

Cables for the post and cable railing shall be installed as shown in the drawings. Cables shall be pulled taut and shall be free of sag. Cables shall be parallel to the top of the channel wall.

3.10.3 After Installation

The Contractor shall examine and certify the operation of all post and cable railing not sooner than 30 days after installation.

3.11 TORTOISE FENCING INSTALLATION

Installation of the tortoise fence, temporary, shall be in accordance with the manufacturer recommendations. Shop drawings submittal (including steel tee post selection) of the tortoise fence is required and shall be approved by the Contracting Officer prior to installation. Steel tee posts for the tortoise fencing shall be driven plumb in the ground or as necessary shall be set plumb in holes formed in the ground and grouted into place. The grout shall be thoroughly consolidated around each steel tee post so as to be free of voids and finished to form a dome. The 1/2" galvanized mesh shall have the bottom portion buried 12" deep or bent over 12" with rocks/dirt placed on same. The Contractor shall maintain the tortoise fence throughout the life of the project. The tortoise fencing shall be removed in its entirety at the end of the contract, and the post holes backfilled to surrounding ground height. The Contractor may bury the bottom portion of the tortoise fence fabric into the ground as shown on the drawings or as an option may bend the fabric laying it on the ground and covering same with earth.

3.12 ORNAMENTAL METAL FENCES AND GATES

3.12.1 GENERAL INSTALLATION FOR ORNAMENTAL METAL FENCES AND GATES

All new installation shall be laid out by the Contractor in accordance with

the drawings. Ornamental metal fences and gates shall be installed to the lines and grades indicated. The area on either side of the ornamental metal fence line shall be cleared to the extent indicated. Line or fence posts shall be spaced equidistant at intervals not exceeding 2.44 meters (8.0 feet) on center as per drawings. Terminal (corner, and gate) posts shall be set at abrupt changes in vertical and horizontal alignment. Metal cross members and vertical pickets shall be continuous installation between posts. Any damage to galvanized surfaces, including welding, cutting or deformed area of galvanizing metal shall be repaired with paint containing zinc dust in accordance with ASTM A 780 or shall be neatly coated with Grade 50B solder conforming to ASTM B 32. Earthwork shall be accomplished per Section 02300, EARTHWORK. Concrete shall be conform to applicable portions of Section 03301, CAST-IN-PLACE STRUCTURAL CONCRETE.

3.12.2 EXCAVATION FOR ORNAMENTAL METAL FENCES AND GATES

Ornamental metal fence and gate post holes excavated in soil and or rock shall be cleared of loose material. Waste material shall be spread where directed. The ground surface irregularities along the metal fence line shall be eliminated to the extent necessary to maintain a 150 mm clearance between the bottom of the metal pickets and finish grade.

3.12.3 INSTALLATION FOR ORNAMENTAL METAL FENCE POST

3.12.3.1 Posts for Ornamental Metal Fences and Gates in Soil and or Rock

Posts shall be set plumb and in alignment. Except where solid rock is encountered, posts shall be set in concrete to the depth indicated on the drawings. Where solid rock is encountered with no overburden, posts shall be set to a minimum depth of 900 mm (36 inches) in rock. Where solid rock is covered with an overburden of soil or loose rock, posts shall be set to the minimum depth indicated on the drawing unless a penetration of 900 mm (36 inches) in solid rock is achieved before reaching the indicated depth, in which case depth of penetration shall terminate. All portions of posts set in rock shall be grouted. Portions of posts not set in rock shall be set in concrete from the rock to ground level. Posts set in concrete shall be set in holes not less than the diameter shown on the drawings. Diameters of holes in solid rock shall be at least 25 mm (1 inch) greater than the largest cross section of the post, for the square tube it is the largest diagonal distance. Concrete and grout shall be thoroughly consolidated around each post, shall be free of voids and finished to form a dome. Concrete and grout shall be allowed to cure for 72 hours prior to attachment of any item to the posts.

3.12.3.2 Posts for Ornamental Metal Fences and Gates in Concrete Wall

Posts shall be set plumb and in alignment. Posts shall be set in concrete wall to the depth indicated on the drawings. All portions of posts set in concrete wall shall be grouted. Posts set in concrete shall be set in holes not less than the diameter shown on the drawings. Diameters of holes in concrete wall shall be lined with a steel sleeve installed prior to concrete placement, and the steel sleeve shall be at least 25 mm (1 inch) greater than the largest cross section of the post, for the square tube it is the largest diagonal distance. Concrete and grout shall be thoroughly

consolidated around each post, shall be free of voids and finished to form a dome. Concrete and grout shall be allowed to cure for 72 hours prior to attachment of any item to the posts.

3.12.4 CROSS MEMBERS

3.12.4.1 Top Cross Member

Top rail shall be supported at each post by welding as shown in the drawings.

3.12.4.2 Bottom Cross Member

The bottom cross member shall be supported at each post by welding as shown in the drawings.

3.12.5 VERTICAL METAL PICKETS

Vertical metal pickets shall be installed as shown on the drawings. The bottom of the vertical metal pickets shall be 150 mm (6 inches) above the ground.

3.12.6 ORNAMENTAL METAL FENCE GATE INSTALLATION

Ornamental metal fence gates shall be installed at the locations shown. Hinged gates shall be mounted to swing as indicated. Latches, stops, and keepers shall be installed as required. Padlocks shall be attached to gates or gate posts with chains. Hinge pins, and hardware shall be welded or otherwise secured to prevent removal.

3.12.7 GROUNDING FOR ORNAMENTAL METAL FENCES AND GATES

Except as indicated below, ornamental metal fences that are electrically continuous with metal posts extending at least 600 mm into the ground require no additional grounding. Other fences shall be grounded on each side of every gate. Fences shall be grounded by means of ground rods every 300 to 450 m of length when fences are located in isolated places, and every 150 to 225 m when in proximity (30 m or less) to public roads, highways, and buildings. The connection to ground shall be made from the post where it is of metal and is electrically continuous with the fencing.

- a) Metal fences crossed by overhead powerlines in excess of 600 volts shall be grounded. Metal fence systems crossed by powerlines of 600 volts or more shall be grounded at or near the point of crossing and at distances not exceeding 45 m on each side of crossing. Ground conductor shall consist of No. 8 AWG solid copper wire. Grounding electrodes shall be 19 mm (3/4 inch) by 3.05 m (10 foot) long copper-clad steel rod. Electrodes shall be driven into the earth so that the top of the electrode is at least 152 mm (6 inches) below the grade. Where driving is impracticable, electrodes shall be buried a minimum of 305 mm deep and radially from the fence. The top of the electrode shall be not less than 0.6 m or more than 2.4 m from the fence. Ground conductor shall be clamped to the fence or railing and electrodes with bronze grounding clamps to create electrical continuity

between fence posts, fence fabric, and ground rods.

3.12.8 OPERATION FOR ORNAMENTAL METAL FENCES AND GATES

The Contractor shall examine and certify the operation of all ornamental metal fences and gates not sooner than 30 days after installation.

-- End of Section --

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DIVISION 03 - CONCRETE

SECTION 03101

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SECTION 03101

FORMWORK FOR CONCRETE

PART 1 GENERAL

1.1 REFERENCES

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

ACI INTERNATIONAL (ACI)

ACI 347R (2001) Guide to Formwork for Concrete

ASTM INTERNATIONAL (ASTM)

ASTM C 31 (2000e1) Making and Curing Concrete Test Specimens in the Field

ASTM C 39/C 39M (2001) Compressive Strength of Cylindrical Concrete Specimens

ASTM C 1077 (2002) Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation

U.S. DEPARTMENT OF COMMERCE (DOC)

PS1 (1995) Construction and Industrial Plywood

1.2 DESIGN REQUIREMENTS

The design, engineering, and construction of the formwork shall be the responsibility of the Contractor. The formwork shall be designed for anticipated live load and dead load, lateral pressure, and allowable stresses in accordance with Chapter 1 of ACI Standard 347. Forms shall have sufficient strength to withstand the pressure resulting from placement and vibration of the concrete and shall have sufficient rigidity to maintain specified tolerances. However, for surfaces with an ACI Class A surface designation, the allowable deflection for facing material between studs, for studs between walers and walers between bracing shall be limited to 0.0025 times the span. The formwork shall be designed as a complete system with consideration given to the effects of cementitious materials and mixture additives such as fly ash, cement type, plasticizers, accelerators, retarders, air entrainment, and others. The adequacy of formwork design and construction shall be monitored prior to and during concrete placement as part of the Contractor's approved Quality Control Plan.

1.3 SUBMITTALS

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

SD-02 Shop Drawings

Shop Drawings.

Drawings and design computations for all formwork required shall be submitted at least 30 days either before fabrication on site or before delivery of prefabricated forms.

SD-03 Product Data

Materials.

Manufacturer's literature shall be submitted for plywood, concrete form hard board, form accessories, prefabricated forms, form coating.

SD-07 Certificates

Shop Drawings; G, RE.

If reshoring is permitted, the method, including location, order, and time of erection and removal shall also be submitted for review and approval.

Inspection.

The Contractor shall submit field inspection reports for concrete forms and embedded items.

Formwork Not Supporting the Weight of Concrete; G, RE.

If forms are to be removed in less than 24 hours on formwork not supporting the weight of concrete, the evaluation and results of the control cylinder tests shall be submitted to and approved before the forms are removed.

1.4 SHOP DRAWINGS

The shop drawings and data submitted shall include the type, size, quantity, and strength of all materials of which the forms are made, the plan for jointing of facing panels, details affecting the appearance, and the assumed design values and loading conditions.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Forms and Form Liners

Forms and form liners shall be fabricated with facing materials that will produce a finish meeting the specified construction tolerance requirements and the following surface classifications as defined in ACI 347R, and as adjusted in Section 03301 CAST-IN-PLACE STRUCTURAL CONCRETE.

2.1.1.1 Class "A" Finish

This class of finish shall apply to all concrete which will be exposed to flowing water during the structure's life. The form facing material shall be composed of new, well-matched tongue-and-groove lumber or new plywood panels conforming to PS1, Grade B-B concrete form, Class I.

2.1.1.2 Class "B" Finish

This class of finish shall apply to all surfaces except those specified to receive Class A or Class D. The form facing material shall be composed of tongue-and-groove or shiplap lumber, plywood conforming to PS1, Grade B-B concrete form, tempered concrete form hard board or steel. Steel lining on wood sheathing will not be permitted.

2.1.1.3 Class "D" Finish

This class of finish shall apply to concrete faces against which earthfill will be placed. The form facing may be of wood or steel.

2.1.2 Form Coating

Form coating shall be commercial formulation that will not bond with, stain, cause deterioration, or any other damage to concrete surfaces. The coating shall not impair subsequent treatment of concrete surfaces depending upon bond or adhesion nor impede the wetting of surfaces to be cured with water or curing compounds. If special form liners are to be used, the Contractor shall follow the recommendation of the form coating manufacturer.

2.2 ACCESSORIES

Ties and other similar form accessories to be partially or wholly embedded in the concrete shall be of a commercially manufactured type. After the ends or end fasteners have been removed, the embedded portion of metal ties shall terminate not less than 50 mm from any concrete surface either exposed to view or exposed to water. Plastic snap ties may be used in locations where the surface will not be exposed to view. Form ties shall be constructed so that the ends or end fasteners can be removed without spalling the concrete.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Form Construction

Shop drawings, including design computations, for all formwork required shall be submitted at least 30 days either before fabrication on site or before delivery of prefabricated forms. Forms shall be constructed true to the structural design and required alignment. The form surface and joints shall be mortar tight and supported to achieve safe performance during construction, concrete placement, and form removal. The Contractor shall continuously monitor the alignment and stability of the forms during all phases to assure the finished product will meet the required surface class or classes specified in paragraph FORMS AND FORM LINERS and tolerances specified in paragraph DESIGN REQUIREMENTS. Failure of any supporting surface either due to surface texture, deflection or form collapse shall be the responsibility of the Contractor as will the replacement or correction of unsatisfactory surfaces. When forms for continuous surfaces are placed in successive units, care shall be taken to fit the forms over the completed surface to obtain accurate alignment of the surface and to prevent leakage of mortar. Forms shall not be re-used if there is any evidence of defects which would impair the quality of the resulting concrete surface. All surfaces of used forms shall be cleaned of mortar and any other foreign material before reuse.

3.1.2 Chamfering

All exposed joints, edges and external corners shall be chamfered by molding placed in the forms unless the drawings specifically state that chamfering is to be omitted or as otherwise specified. Chamfered joints shall not be permitted where earth or rockfill is placed in contact with concrete surfaces. Chamfered joints shall be terminated 300 mm outside the limit of the earth or rockfill so that the end of the chamfers will be clearly visible.

3.1.3 Coating

Forms for exposed or painted surfaces shall be coated with form oil or a form-release agent before the form or reinforcement is placed in final position. The coating shall be used as recommended in the manufacturer's instructions. Forms for unexposed surfaces may be wet with water in lieu of coating immediately before placing concrete, except that, in cold weather when freezing temperatures are anticipated, coating shall be mandatory. Surplus coating on form surfaces and coating on reinforcing steel and construction joints shall be removed before placing concrete.

3.2 FORM REMOVAL

Forms shall not be removed without approval. The minimal time required for concrete to reach a strength adequate for removal of formwork without risking the safety of workers or the quality of the concrete depends on a number of factors including, but not limited to, ambient temperature, concrete lift heights, type and amount of concrete admixture, and type and amount of cementitious material in the concrete. It is the responsibility of the Contractor to consider all applicable factors and leave the forms in place until it is safe to remove them. In any case forms shall not be removed unless the minimum time and minimum compressive strength requirements below are met, except as otherwise directed or specifically authorized. When conditions are such as to justify the requirement, forms

will be required to remain in place for a longer period. All removal shall be accomplished in a manner which will prevent damage to the concrete and ensure the complete safety of the structure. Where forms support more than one element, the forms shall not be removed until the form removal criteria are met by all supported elements. Form removal shall be scheduled so that all necessary repairs can be performed as specified in Section 03301 CAST-IN-PLACE STRUCTURAL CONCRETE, paragraph FORMED SURFACES. Evidence that concrete has gained sufficient strength to permit removal of forms shall be determined by tests on control cylinders. All control cylinders shall be stored in the structure or as near the structure as possible so they receive the same curing conditions and protection methods as given those portions of the structure they represent. Control cylinders shall be removed from the molds at an age of no more than 24 hours. All control cylinders shall be prepared and tested in accordance with ASTM C 31 and ASTM C 39/C 39M at the expense of the Contractor by an independent laboratory that complies with ASTM C 1077 and shall be tested within 4 hours after removal from the site.

3.2.1 Formwork Not Supporting the Weight of Concrete

Formwork for walls, columns, side of beams, gravity structures, and other vertical type formwork not supporting the weight of concrete shall not be removed in less than 24 hours after concrete placement is completed.

3.2.2 Formwork Supporting Weight of Concrete

Formwork supporting weight of concrete and shoring shall not be removed until structural members have acquired sufficient strength to safely support their own weight and any construction or other superimposed loads to which the supported concrete may be subjected. As a minimum, forms shall be left in place until control concrete test cylinders indicate evidence the concrete has attained at least 70 percent of the compressive strength required for the structure in accordance with the quality and location requirements of Section 03301 CAST-IN-PLACE STRUCTURAL CONCRETE, paragraph REQUIRED AVERAGE COMPRESSIVE STRENGTH.

3.3 INSPECTION

Forms and embedded items shall be inspected in sufficient time prior to each concrete placement by the Contractor in order to certify to the Contracting Officer that they are ready to receive concrete. The results of each inspection shall be reported in writing.

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SECTION 03361

SOIL CEMENT (SC)
FOR SLOPE PROTECTION

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM C 33	(2002a) Concrete Aggregates
ASTM C 70	(1994; R 2001) Surface Moisture in Fine Aggregate
ASTM C 117	(1995) Materials Finer Than 75 micrometer (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 136	(2001) Sieve Analysis of Fine and Coarse Aggregates
ASTM C 150	(2002a) Portland Cement
ASTM C 171	(1997a) Sheet Materials for Curing Concrete
ASTM C 174/C 174M	(1997) Measuring Thickness of Concrete Elements Using Drilled Concrete Cores
ASTM C 566	(1997) Total Evaporable Moisture Content of Aggregate by Drying
ASTM C 618	(2001) Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
ASTM C 1040	(1993; R 2000) Density of Unhardened and Hardened Concrete in Place by Nuclear Methods
ASTM C 1064/C 1064M	(2001) Temperature of Freshly Mixed Portland Cement Concrete
ASTM D 558	(1996) Moisture-Density Relations of Soil-Cement Mixtures

ASTM D 1557	(2000) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu.m.))
ASTM D 1633	(2000) Compressive Strength of Molded Soil-Cement Cylinders
ASTM D 4318	(2000) Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM E 329	(2002) Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE CRD-C 143	(1962) Specifications for Meters for Automatic Indication of Moisture in Fine Aggregate
COE CRD-C 318	(1979) Cloth, Burlap, Jute (or Kenaf)
COE CRD-C 400	(1963) Requirements for Water for Use in Mixing or Curing Concrete

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

NIST HB 44	(2002) NIST Handbook 44: Specifications, Tolerances, and other Technical Requirements for Weighing and Measuring Devices
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NATIONAL READY-MIXED CONCRETE ASSOCIATION (NRMCA)

NRMCA CPMB 100	(1996) Concrete Plant Standards
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1.2 GOVERNMENT TESTING

1.2.1 Preconstruction Testing by the Government

At least 45 days in advance of the time when construction of the test section is expected to occur, the Contractor shall notify the Contracting Officer of the source, brand name, type, and quantity of all materials (other than aggregates) to be used in the manufacture of the soil cement. The Contractor shall assist the Contracting Officer in obtaining samples of each material. Testing as determined appropriate will be performed by and at the expense of the Government. Cement or fly ash is to be obtained from one source for each material.

1.2.2 Testing During Construction by the Government

1.2.2.1 General

The Government will sample and test cementitious materials, stockpiled aggregates, and soil cement during construction as considered appropriate to determine compliance with the specifications. The Contractor shall provide equipment and labor as may be necessary for procurement of representative test samples. Compression test specimens of soil cement will be made and tested by the Government. Density of the compacted soil cement will be checked by the Government as considered appropriate.

1.2.2.2 Aggregate Testing

Testing performed by the Government will not relieve the Contractor of his responsibility for testing under paragraph TESTS AND INSPECTIONS. During construction, aggregates will be sampled for acceptance testing for each specified aggregate stockpile, to determine compliance with specification provisions. The Contractor shall provide necessary equipment and labor for the ready procurement of representative samples under Government supervision. The Government will test such samples at its expense using the specified COE CRD-C and ASTM methods.

1.2.2.3 Cementitious Materials

Cement or pozzolan will be sampled at the mill, shipping point, or site of the work by the Government. Sampling and testing as determined appropriate will be performed by and at the expense of the Government. If tests prove that a material which has been delivered is unsatisfactory, it shall be promptly removed from the site of the work. Cementitious materials that have not been used within 6 months after being tested will be retested by the Government at the expense of the Contractor when directed by the Contracting Officer. Samples of representative materials shall be delivered to the laboratory listed below by the Contractor at his expense.

US Army Engineer Waterways Experiment Station
Concrete and Materials Branch, Building 6000
Geotechnical and Structures Laboratory
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

1.2.2.4 Cement Sources

Samples of cement for quality-assurance testing will be taken at the project site or cement-producing plant by the Contracting Officer, as determined appropriate, for testing at the expense of the Government. A copy of the mill tests from the cement manufacturer shall be furnished for each lot. Cement that has not been used within 6 months after testing will be retested at the expense of the Contractor, and will be rejected if test results are not satisfactory. No cement shall be used until notice has been given by the Contracting Officer that test results are satisfactory. In the event of failure, the cement may be resampled and tested at the request of the Contractor and at the Contractor's expense. The cost of testing cement excess to project requirements will also be at the Contractor's expense and will be deducted from payments due the Contractor at a rate of \$1750 per test.

1.2.2.5 Pozzolan Sources

Samples of pozzolan for check testing will be taken at the project site by the Contracting Officer (as needed) for testing at the expense of the Government. A copy of the test results from the pozzolan manufacturer shall be furnished for each lot. Pozzolan that has not been used within 6 months after testing will be retested at the expense of the Contractor, and will be rejected if test results are not satisfactory. No pozzolan shall be used until notice has been given by the Contracting Officer that test results are satisfactory. In the event of failure, the pozzolan may be resampled and tested at the Contractor's expense. The cost of testing excess pozzolan in excess of project requirements will be at the Contractor's expense at a rate of \$1650 per test. The amount will be deducted from payment to the Contractor.

1.3 CONSTRUCTION TOLERANCES

Construction tolerances shall be in accordance with paragraph TOLERANCE FOR SLOPE PROTECTION.

1.3.1 TOLERANCE FOR SLOPE PROTECTION

a. **Surface Smoothness** - After the completion of the final rolling of soil cement, the compacted surface shall be tested with a 3.05 m straightedge. Measurements will be made transverse and longitudinal to the soil cement surface at equal distances not to exceed 10 meters. The compacted surfaces from both transverse and longitudinal directions shall show no deviation in excess of 25 mm.

b. **Thickness** - **The thickness of compacted lifts of soil cement shall be within zero to 25 mm of that specified. Deficiency in the thickness will be evaluated as described in paragraph THICKNESS EVALUATION.**

1.4 SUBMITTALS

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

SD-01 Preconstruction Submittals

Aggregate Source.

Proposed source(s) of aggregate to be used in the production of soil cement shall be submitted prior to stockpiling.

Aggregate Stockpile.

Proposed size and number of soil cement aggregate stockpiles shall be submitted 45 days prior to construction of the test section.

Mixture Proportioning; G, RE.

Laboratory test results to determine soil cement mix proportions, in conformance with paragraph MIX DESIGN, shall be submitted 10 days prior to construction of the test section.

Mixers.

Details and data on the soil cement mixing plant including manufacturer's literature on the cementitious material and aggregate feed equipment, water controls, pug mill mixers (plant type and capacity), and layout plan showing that the equipment meets all specified requirements, shall be submitted 30 days prior to plant assembly for review and approval by the Contracting Officer for conformance with the requirements of paragraph MIXERS.

Transporting Equipment.

Spreading Equipment.

Compaction Equipment.

A listing of the equipment, including manufacturer's literature, proposed for transporting, handling, depositing, spreading, and compacting the soil cement shall be submitted for review and approval by the Contracting Officer 45 days prior to construction of the test section.

Nuclear Density Gauge.

A description of the nuclear density gauge apparatus proposed for use including manufacturer's literature and the latest manufacturer's calibration results of the nuclear density gauge shall be submitted for review by the Contracting Officer 30 days prior to use.

Placement Plan, G, RE.

Details and placement methods of the soil cement including mixing plant layout, equipment, transporting, spreading, compacting, forming, grade control, curing and testing shall be submitted 45 days prior to construction of the test section.

SD-02 Shop Drawings

Batch Plant.

Details and data on the concrete plant shall be submitted 60 days prior to plant assembly for review by the Contracting Officer for conformance with the requirements of paragraph BATCH PLANT. Final acceptance of any piece of plant is subject to satisfactory performance during operations.

Soil Cement Production; G, RE.

Descriptions and details for all methods and operations proposed for soil cement operation including daily and weekly production rates, shall be

submitted for review and approval for conformance with specifications.

Curing; G, RE.

The curing media and methods to be used to keep soil cement surfaces continually moist until subsequent layers of soil cement are placed shall be submitted for review and approval to the Contracting Officer 5 days before soil cement placement begins for conformance with paragraph CURING AND PROTECTION.

Placing During Cold Weather.

When soil cement is to be placed under cold-weather conditions, a description of the materials and methods proposed for protection of the soil cement meeting the requirements of paragraph COLD-WEATHER PROTECTION, shall be furnished to the Contracting Officer for review 5 days in advance of anticipated need date.

Placing During Hot Weather.

When soil cement is to be placed under hot-weather conditions, a description of the materials and methods proposed for protection of the soil cement meeting the requirements of paragraph HOT-WEATHER PROTECTION, shall be furnished to the Contracting Officer for review 5 days in advance of anticipated need date.

SD-03 Product Data

Waybills and Delivery Tickets.

Copies of waybills or delivery tickets for cementitious material during the progress of the work shall be submitted for review. Before the final payment is allowed, waybills and certified delivery tickets shall be furnished for all cementitious material used in the construction.

SD-07 Certificates

Nuclear Density Gauge Operators; G, RE.

Copies of permits and licenses for gauge operation; copies of certification of training for all operators shall be submitted for review and approval by the Contracting Officer.

Cementitious Materials; G, RE.

Cementitious materials including cement and pozzolan, will be accepted on the basis of the manufacturer's certification of compliance, accompanied by mill test reports that materials meet the requirements of the specification under which they are furnished. No cementitious materials shall be used until notice of acceptance has been given by the Contracting Officer. Cementitious materials will be subject to check testing from samples obtained at the source, at transfer points, or at the project site, as scheduled by the Contracting Officer, and such sampling will be by or under the supervision of the Government at its expense.

1.5 MATERIAL DELIVERY, STORAGE, AND HANDLING

1.5.1 Cementitious Materials

1.5.1.1 Transportation

When bulk cement or pozzolan is not unloaded from primary carriers directly into weather-tight hoppers at the batching plant, transportation from the railhead, mill, or intermediate storage to the batching plant shall be accomplished in adequately designed weather-tight trucks, conveyors, or other means that will protect the material from exposure to moisture.

1.5.1.2 Storage

Cementitious materials shall be furnished in bulk. Immediately upon receipt at the site of the work, all cementitious materials shall be stored in a dry, weather-tight, and properly ventilated structure. All storage facilities shall permit easy access for inspection and identification. Sufficient materials shall be in storage to sustain continuous operation of the mixing plant while the soil cement is being placed. In order that cement may not become unduly aged after delivery, the Contractor shall use any cement that has been stored at the site for 60 days or more before using cement of lesser age.

1.5.2 Aggregate

1.5.2.1 Storage

Aggregate shall be stored adjacent to the mixing plant and shall remain in free-draining storage for at least 24 hours immediately prior to use. Sufficient aggregate shall be maintained at the site at all times to permit continuous placement.

1.5.2.2 Handling

Aggregate shall be handled in a manner to prevent segregation or degradation. Vehicles used for stockpiling or moving aggregate shall be kept clean of foreign materials.

1.5.3 Waybills and Delivery Tickets

Copies of waybills or delivery tickets for cementitious material during the progress of the work shall be submitted for review and approval. Before the final payment is allowed, waybills and certified delivery tickets shall be furnished for all cementitious material used in the construction.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Cementitious Materials

2.1.1.1 Portland Cement

Portland cement shall conform to ASTM C 150, Type V, low alkali.

2.1.1.2 Pozzolan

Pozzolan shall conform to ASTM C 618, Class F, with loss on ignition limited to 6 percent.

2.1.1.3 Temperature of Cementitious Materials

The temperature of the cementitious materials as delivered to the site shall not exceed 65 degrees C.

2.1.2 Water

Water for mixing and curing soil cement shall be free from injurious amounts of oil, acid, salt, alkali, organic matter, or other deleterious substances and shall comply with COE CRD-C 400.

2.1.3 Aggregate

The aggregate used in the soil cement mixture shall not contain any material retained on a 37.5-mm sieve, nor any deleterious material. Aggregate shall be obtained from sources specified herein and stockpiled at the job site. Prior to using the aggregate stockpile, it shall be analyzed by laboratory tests in order to determine the job mix as set forth in paragraph MIX DESIGN.

2.1.3.1 Aggregate Source

Soil cement aggregates may be furnished from any source capable of meeting the grading requirements stated in paragraph GRADATION. Aggregates may be obtained from commercial sources, required excavation, or from borrow areas approved by the Contracting Officer. It is the responsibility of the Contractor to blend and/or process aggregates, or to import suitable materials from other sources approved by the Contracting Officer so that aggregate used in construction of soil cement conforms to the gradation requirement. The Contractor shall make all arrangements and secure all necessary permits for the procurement, furnishing, and transporting the soil cement aggregate.

2.1.3.2 Gradation

Aggregate for use in soil cement construction, when tested in accordance with ASTM C 136 and ASTM C 117, shall conform to the following gradation and be free of any deleterious material.

<u>Standard Sieve Size</u>	<u>Percent Passing by Weight</u> ^{1, 2}
37.5 mm	100
4.75 mm	50-90
75 mm	5-15

NOTE:

1. The maximum plasticity index shall be limited to 3 when determined in accordance with ASTM D 4318.
2. Clay and silt lumps larger than 12.5-mm shall be unacceptable, and screening will be required whenever this type of material is encountered.

Blending of aggregate for soil cement by combining aggregates from separate stockpiles shall be performed by utilization of separate storage feed bins at the plant to the satisfaction of the Contracting Officer.

2.1.4 CURING MATERIALS

2.1.4.1 Burlap

Burlap shall conform to COE CRD-C 318.

2.1.4.2 Sheeting

Waterproof sheeting shall be white waterproof paper or white opaque polyethylene film conforming to ASTM C 171.

2.2 MIXTURE PROPORTIONING

2.2.1 Composition

Soil cement shall be composed of cementitious materials, water, and aggregates. The cementitious material shall be portland cement, or portland cement in combination with pozzolan.

2.2.2 Proportions

Soil cement mixture proportions shall be based on laboratory test results submitted by the Contractor. Laboratory trials shall be performed by the Contractor and shall be in accordance with paragraph MIX DESIGN. The Contractor, as directed by the Government, shall incorporate the use of a pozzolan in the soil cement mixture and shall be proportioned to a maximum of fifteen (15) percent, by weight, of the total weight of cement.

2.2.3 Proportioning Responsibility

During the course of the work, the proportions will be changed as necessary by the Contracting Officer. Adjustments will be made to the batch weights, including cement, pozzolan, and water, to maintain the necessary consistency to prevent segregation within the soil cement and allow full compaction as determined. Frequent changes to the batch weights shall be considered usual and can be expected to occur frequently during the course of each day's placement depending on such variables as humidity, wind velocity, temperature, and cloud cover. Such changes will be as directed. The Contractor will be responsible for adjusting the added water to compensate for changes in aggregate moisture content.

2.2.4 Consistency

The Contracting Officer will determine at the placement site on a continuing basis the proper consistency necessary for adequate hauling,

spreading, and compacting and will direct all necessary changes to achieve the proper soil cement consistency. Changes will be directed based on visual examination of the soil cement during the spreading and compaction process.

2.2.5 Mix Design

2.2.5.1 General

The Contractor will perform laboratory mix trials of stockpiles of aggregate in order for the Contracting Officer to determine the job-mix proportions. The number of mix trials will correspond to the proposed number of aggregate stockpiles. Cement contents to be used for each laboratory trials will be at 6, 8, 10, and 12% of the total dry aggregate. Prior to performing the laboratory testing, all materials including the type of cement, pozzolan, and source of aggregate shall be initially approved by the Contracting Officer. A new mix design will be required any time the Contractor requests a change in material, or proportioning of materials, from that given in the mix design.

2.2.5.2 Sampling of Stockpiles

The Contractor shall use equipment, approved by the Contracting Officer, capable to excavate a face for the full height of the stockpile at a minimum of six (6) different sampling locations around the perimeter of the stockpile. The same equipment shall then be used to channel the excavated face at each location from the bottom to the top in one operation. Material obtained shall be dumped on the ground in piles. The Contractor will then sample each of the sample piles by channeling it with a hand shovel at least four (4) locations around the perimeter. All samples obtained from the sample piles will then be combined into one composite sample for test purposes.

2.2.5.3 Testing Requirements

A series of tests, including sieve analyses, atterberg limits, and a mix design shall be conducted and submitted for each aggregate stockpile. Stockpile(s) shall not exceed 10,000 cubic meters.

2.2.5.4 Evaluation and Acceptance of Stockpile

During the determination of the job mix proportions of the soil cement for each approved stockpile, no material shall be used nor be added to the stockpile(s) being evaluated. Following the submittal of the laboratory test results, the Contractor shall allow the Contracting Officer at least seven (10) days to evaluate the results. After the evaluation period, the Government shall then provide the final job-mix proportions to the Contractor.

2.2.5.5 Determination of Moisture-Density

The Contractor shall perform optimum moisture-maximum density relationships in accordance with ASTM D 558, Method B.

2.2.5.6 Determination of Compressive Strength

Following the determination of optimum moisture and maximum density, the Contractor shall prepare two (2) compressive strength test specimens for each of the cement contents specified at age of 1, 7, and 28 days. Specimens shall be tested in accordance with ASTM D 1633, Method A. The compression test specimens prepared for each of the cement percentages shall have approximately the following moisture contents: 4 percent below optimum, 2 percent below optimum, optimum moisture, and 2 percent above optimum.

2.2.6 Stockpiling of Material

Whether obtained from a borrow source, required excavation, or from off-site sources, aggregates shall not be transported directly to the mixing plant. The aggregates shall be stockpiled on firm ground drained and leveled, free of debris, trash, organic materials, and other objectionable or deleterious material. Stockpiles shall be constructed in layers not exceeding 1 meter in thickness. Ramps formed for the construction of stockpiles shall be of the same material as that being stockpiled, and will be considered a part of the stockpile. Soil aggregates taken from the stockpile shall be removed in such a manner that aggregate from several layers of the stockpile are combined in each layer and the gradation of the mixed-layer aggregate obtained is representative of that used in the mix design tests.

2.2.7 BEDDING MORTAR

2.2.7.1 General

Bedding mortar is to be used for achieving bond between soil cement lifts as indicated in paragraph JOINTS. No surfaces to receive a bedding mortar shall be covered with soil cement until the prepared surface has been inspected and approved by the Contracting Officer's Representative. In no case will the bedding mortar be allowed to dry from the sun and wind.

2.2.7.2 Bedding Mortar Mix

The bedding mortar mix design will be developed by the Contractor and will conform to the following requirements.

Aggregate for bedding mortar shall conform to the requirements of ASTM C 33 for washed concrete sand.

Parameter

Slump	200-250 mm
Cement Content	250-500 kg/m ³
Minimum Compressive Strength	20 MPa (28 days)

PART 3 EXECUTION

3.1 EQUIPMENT

3.1.1 Capacity

The mixing plant, placing, compaction, and cleanup systems shall have a capacity of at least 100 cubic meters per hour.

3.1.2 Mixing Plant

The mixing plant shall be a weigh-batch type or continuous type.

3.1.2.1 Location

The mixing plant shall be located at the site of the work, subject to the approval of the Contracting Officer.

3.1.2.2 Bins and Silos

Separate bins, compartments, or silos shall be provided for each of the cementitious materials. The compartments shall be of ample size and so constructed that the various materials will be maintained separately under all working conditions. All compartments containing bulk cement or pozzolan shall be separated from each other by a free-draining air space. The cement and pozzolan bins shall be equipped with filters which allow air passage but preclude the venting of cement or pozzolan into the atmosphere.

All filling ports shall be clearly marked with a permanent sign stating the contents.

3.1.2.3 Batch Plant

The batch plant requirements should meet the following requirements.

- a. Batchers - Aggregate shall be weighed in separate weigh batchers with individual scales or may be batched cumulatively. Bulk cement and other cementitious materials shall each be weighed on a separate scale in a separate weigh batcher. Water shall be measured by weight or by volume. It shall not be weighed or measured cumulatively with another ingredient.
- b. Water Batchers - A suitable water-measuring and batching device shall be provided that will be capable of measuring and batching the mixing water within the specified tolerances for each batch. The mechanism for delivering water to the mixers shall be free from leakage when the valves are closed. The filling and discharge valves for the water batcher shall be so interlocked that the discharge valve cannot be opened before the filling valve is fully closed. When a water meter is used, a suitable strainer shall be provided ahead of the metering device.
- c. Moisture Control - The plant shall be capable of ready adjustment to compensate for the varying moisture content of the aggregates and to change the masses of the materials being batched. A moisture meter complying with the provisions of COE CRD-C 143 shall be provided for measurement of moisture in the soil aggregate. The sensing element shall be arranged so that the measurement is made near the batcher

charging gate of the aggregate hopper or in the aggregate batcher.

d. Scales - Adequate facilities shall be provided for the accurate measurement and control of each of the materials entering the soil cement. The weighing equipment and controls shall conform to the applicable requirements of NIST HB 44, except that the accuracy shall be within 0.2 percent of the scale capacity. The Contractor shall provide standard test weights and any other auxiliary equipment required for checking the operating performance of each scale or other measuring device. Tests shall be made at the frequency required in paragraph TESTS AND INSPECTIONS and in the presence of a Government inspector. Each weighing unit shall include a visible indicator that shall indicate the scale load at all stages of the weighing operation and shall show the scale in balance at zero load. The weighing equipment shall be arranged so that the concrete plant operator can conveniently observe the indicators.

e. Operation and Accuracy - The weighing operation of each material shall begin automatically when actuated by one or more starter switches and shall end when the designated amount of each material has been reached. These requirements can be met by providing a semiautomatic or automatic batching system as defined by the NRMCA CPMB 100. The weigh batchers shall be so constructed and arranged that the sequence and timing of batcher discharge gates can be controlled to produce a ribboning and mixing of the aggregates, water, and cementitious materials as the materials pass through the charging hopper into the mixer. The plant shall include provisions to facilitate the inspection of all operations at all times. Delivery of materials from the batching equipment shall be within the following limits of accuracy:

MATERIAL	PERCENT OF REQUIRED MASS
Cementitious materials	0 to +2
Water	<u>+1</u>
Aggregate.....	<u>+2</u>

When water is measured by volume, it shall meet the same tolerance percent as stated in the chart.

- f. Interlocks - Batchers and mixers shall be interlocked so that:
- (1) The charging device of each batcher cannot be actuated until all scales have returned to zero balance within plus or minus 0.2 percent of the scale capacity and each volumetric device has reset to start or has signaled empty.
 - (2) The charging device of each batcher cannot be actuated if the discharge device is open.
 - (3) The discharge device of each batcher cannot be actuated if the charging device is open.
 - (4) The discharge device of each batcher cannot be actuated until

the indicated material is within the allowable tolerances.

(5) The mixers cannot be discharged until the required mixing time has elapsed.

g. Recorder - An accurate recorder or recorders shall be provided and shall conform to the following detailed requirements:

(1) The recorder shall produce a graphical or digital record on a single visible chart or tape of the weight or volume of each material in the batchers at the conclusion of the batching cycle. The record shall be produced prior to delivery of the materials to the mixer. After the batchers have been discharged, the recorder shall show the return to empty condition.

(2) A graphical recording or digital printout unit shall be completely housed in a single cabinet that shall be capable of being locked.

(3) The chart or tape shall be so marked that each batch may be permanently identified and so that variations in batch weights of each type of batch can be readily observed. The chart or tape shall be easily interpreted in increments not exceeding 0.5 percent of each batch weight.

(4) The chart or tape shall show time of day at intervals of not more than 15 minutes.

(5) The recorder chart or tape shall become the property of the Government.

(6) The recorder shall be placed in a position convenient for observation by the mixing plant operator and the Government inspector.

(7) The recorded weights or volumes when compared to the weights or volumes actually batched shall be accurate within plus or minus 2 percent.

h. Batch Counters - The plant shall include devices for automatically counting the total number of batches of all concrete batched and the number of batches of each preset mixture.

i. Batch Plant Trial Operation - Not less than 7 days prior to commencement of placing the test section, a test of the batching and mixing plant shall be made in the presence of a representative of the Contracting Officer to check operational adequacy. The number of full-scale soil cement batches required to be produced in trial runs shall be as directed, will not exceed 20, and shall be proportioned as directed by the Contracting Officer. All soil cement produced in these tests shall be wasted or used for purposes other than inclusion in structures covered by this specification. All deficiencies found in plant operation shall be corrected to the satisfaction of the Contracting Officer prior to the start of soil cement placing

operations. The Contractor shall notify the Contracting Officer of the trial operation not less than 7 days prior to the start of the trial operation.

j. Protection - The weighing, indicating, recording, and control equipment shall be protected against exposure to dust, moisture, and vibration so that there is no interference with proper operation of the equipment.

3.1.2.4 Continuous Mixing Plant

A continuous mixing plant shall be capable of producing soil cement of the same quality and uniformity as would be produced in a conventional batch plant and shall be capable of producing a uniform continuous product (at both maximum and minimum production rates) that is mixed so that complete intermingling of all ingredients occurs without balling, segregation, and wet or dry portions.

a. Operation and Accuracy - An electronic control system shall be provided. The control system shall have the capability of changing mixtures instantaneously, measuring the moisture in the combined aggregate entering the mixer, producing any of the mixtures at a variable rate, and tracking a mixture change to a hopper or a conveyor system. The control panel shall display for each ingredient the designed formula values and the instantaneous percentage values and shall record the instantaneous values at a preset time interval or on demand with a multiple copy printer/recorder. The recorder shall note formula changes and shall print total quantities of each ingredient and total amounts produced on command. There shall be weighing devices (belt scale or other) for continuous weighing of individual ingredients and total ingredients. The plant control shall not require manual devices to adjust the material flow. The plant shall be capable of total manual control operation for a single product at a limited production for short-time durations in the event of loss of electronic control. The electronic control system shall incorporate modular replaceable components to reduce down time in the event of control system malfunction. An inventory shall be maintained of such replaceable components. The accuracy of the plant dispensing systems shall be within the following limits:

Pozzolan	0 to +2 percent
Cement	0 to +2 percent
Water	+1 percent
Aggregate.....	+2 percent

The continuous feeders for each of the ingredients shall be calibrated as per the manufacturer's specifications. Devices and tools shall be maintained at the plant location to check the feeder's calibration at the Contracting Officer's request. A technician shall be provided that is skilled in calibration of the feed devices and the maintenance and repair of the plant control system. The technician shall be available within 30 minutes notice during all scheduled plant operations. The technician could be one or more of the Contractor's personnel.

b. Cement, Pozzolan, and Aggregate Feed - Cement, pozzolan, and aggregate shall be uniformly, continuously, and simultaneously fed (at the proper ratios and quantity for the mixture required) into the mixer by belt, auger, vane feeder, or other acceptable method. The feed bins or silos for each ingredient shall be kept sufficiently full and shall be of sufficient size to ensure a uniform flow at a constant rate for a specific mixture. The feed bins shall have a low-level indicator that both warns the operator and can shut the plant down if insufficient material is available for a uniform and continuous flow.

c. Water Dispenser - The liquid-dispensing device shall be capable of metering and dispensing within the specified requirements. The liquid valves shall be free from leakage in the closed position. The dispensers shall have attachments and/or be installed in such a manner that will permit convenient checking of their accuracy. Plumbing shall be leak-free and properly valved to prevent backflow and siphoning. The dispenser shall be interlocked with the electronic plant control and shall warn the operator and shut down the plant if insufficient liquid is available.

d. Continuous Mixer - The continuous mixer shall have proper introduction of ingredients as specified by the manufacturer and shall not be charged in excess of the manufacturer's recommended capacity. Mixer shall be capable of combining the materials into a uniform homogeneous mixture and of discharging this mixture without segregation. The mixer shall operate at the blade speed designated by the manufacturer and shall be capable of changing retention time of the ingredients in the mixer. This should be accomplished by manually resetting the mixer blade angles. Mixing time (ingredient retention time in the mixer) shall be predicated upon the uniformity, homogeneity, and consistency of the resultant mixture. The mixer shall be maintained in satisfactory operating condition and mixer blades shall be kept free of hardened soil cement. Should mixer at any time produce unsatisfactory results, its use shall be promptly discontinued until it is repaired. Suitable facilities shall be provided for obtaining representative samples of soil cement for testing. All necessary platforms, shelters, tools, labor, and equipment shall be provided for obtaining samples.

e. Segregation - A means shall be used to reduce and minimize segregation and waste which would otherwise result from the continuous stream of soil cement being fed into the batch haul devices (dump trucks, etc.). The equipment shall retain the soil cement between tracks or other means of transport to prevent the need for stopping the mixer. These devices could include, but not be limited to, a discharge hopper having a capacity of at least 20 metric ton. The hopper shall be equipped with dump gates to assure rapid and complete discharge without segregation.

f. Trial operation - Not less than 7 days prior to commencement of placing the test section, a test of the plant shall be made in the presence of a representative of the Contracting Officer to check operational adequacy. The number of cubic meters required to be produced in trial runs shall be as directed, but will not exceed 100

cubic meters and shall be proportioned as directed by the Contracting Officer. All soil cement produced in these tests shall be wasted or used for purposes other than inclusion in structures covered by this specification. All deficiencies found in plant operation shall be corrected to the satisfaction of the Contracting Officer prior to the start of soil cement placing operations. The Contractor shall notify the Contracting Officer of the trial operation not less than 7 days prior to the start of the trial operation.

g. Protection - The weighing, indicating, recording, and control equipment shall be protected against exposure to dust, moisture, and vibration so that there is no interference with proper operation of the equipment.

3.1.3 Mixers

Mixers shall be stationary mixers or pugmill mixers. Mixers may be batch or continuous mixing. Each mixer shall combine the materials into a uniform mixture and discharge this mixture without segregation. Mixers shall not be charged in excess of the capacity recommended by the manufacturer on the nameplate. Excessive overmixing requiring additions of water will not be permitted. The mixers shall be maintained in satisfactory operating condition. Mixer blades or paddles shall be replaced when worn down more than 10 percent of their depth when compared with the manufacturer's dimension for new blades. Should any mixer at any time produce unsatisfactory results, its use shall be promptly discontinued until it is repaired or replaced.

3.1.3.1 Pugmill Mixers

A batch or continuous mixing twin-shaft pugmill mixer shall be capable of producing soil cement of the same quality and uniformity as would be produced in a conventional plant that meets all the requirements of these specification. All pugmill mixers shall meet the requirements of paragraph CONTINUOUS MIXING PLANT.

3.1.4 Transporting Equipment

The transporting equipment shall conform to the following requirements.

The concrete mixtures (soil cement and bedding mortar) shall be transported from the plant mixer(s) to placement as rapidly and as continuously as practical by methods which limit segregation, contamination, and surface drying. The soil cement shall be hauled from the mixing plant to the placing site in dump trucks equipped with protective covers.

3.1.5 Spreading Equipment

The spreading equipment shall conform to the following requirements:

The primary spreading procedure shall be accomplished by dozer. Graders or other equipment not specified may be used to facilitate the soil cement spreading process only when approved. The equipment shall be maintained in good operating condition. The equipment shall not leak or drip oil,

grease, or other visible contaminants onto the soil cement surface. All equipment used for spreading that leaves the surface of the structure for maintenance or repairs or, for any other reason, must be cleaned of all contaminants by an approved method before returning to the structure surface. Under no conditions shall a dozer or other tracked vehicle be operated on other than fresh uncompacted soil cement except to facilitate startup operations for each lift and by approved procedures.

3.1.6 Compaction Equipment

The compaction equipment shall conform to the following requirements.

3.1.6.1 Primary Rollers

Self-propelled vibratory rollers shall be used for primary rolling. They shall transmit a dynamic impact to the surface through a smooth steel drum by means of revolving weights, eccentric shafts, or other equivalent methods. The compactor shall have a minimum gross mass of 9,000 kg and shall produce a minimum dynamic force of 60,000 N/m of drum width. The operating frequency shall be variable in the approximate range of 1,700 to 3,000 cycles per minute. The amplitude shall be adjustable between 0.4 and 1.0 mm. The roller shall be capable of full compaction in both forward and reverse directions. The roller shall be operated at speeds not exceeding 0.7 m/s. Within the range of the operating capability of the equipment, the Contracting Officer may direct or approve variations to the frequency, amplitude, and speed of operation which result in the specified density at the fastest production rate.

3.1.6.2 Small Vibratory Rollers

Small vibratory rollers shall be used to compact the soil cement where the larger vibratory rollers specified above cannot maneuver. The rollers shall compact the soil cement to the required density and shall be so demonstrated during construction of the test section. Small vibratory rollers cannot compact the soil cement to the same density and thickness as the primary rollers; therefore, when small rollers are used, total lift thickness of the soil cement layer or lift shall be reduced to not over 150 mm uncompacted thickness to permit adequate compaction. Rollers shall have independent speed and vibration controls and shall be capable of a wide range of speed adjustments.

3.1.6.3 Tampers (Rammers)

The tampers shall compact the soil cement to the required density and shall be so demonstrated during construction of the test section. Tampers cannot compact the soil cement to the same density and thickness as the primary rollers; therefore, when tampers are used, thickness of each soil cement layer that is to be compacted shall be reduced to not more than 150 mm uncompacted thickness to assure adequate compaction.

3.1.7 Other Motorized Equipment

All other equipment necessary for the successful completion of soil cement production, but not previously discussed within these specifications (or

determined to be necessary during the course of the work), shall be approved prior to actual use. Such equipment shall not result in any damage to the soil cement, shall be maintained in good operating condition, and shall be operated by skilled Contractor-provided personnel.

3.1.8 Nuclear Density Gauge

Tests to determine the density of the compacted soil cement shall be made by the Contractor using a single-probe nuclear density gauge supplied by the Contractor. The nuclear density gauge shall meet the applicable requirements of ASTM C 1040. The gauge shall be capable of taking readings along a horizontal path between the probes at 50-mm increments from 50 mm from the surface to 200 mm below the surface. The gauge and operator shall be made available to the Government until completion of all soil cement production at no additional cost. The Contractor shall obtain all permits and certifications for the equipment and the operators.

3.1.9 Calibration

Nuclear gauge shall have been factory calibrated within 6 months of soil cement placement. The Contractor shall construct, at no additional costs to the Government, one (1) calibration test block using soil cement materials and proportions representative of those to be used during construction. The block shall be fabricated before the test section construction begins. The blocks size shall be a minimum of 450 mm by 450 mm by the maximum thickness of one lift, plus 50 mm. The blocks shall be compacted between 98 and 100 percent of the maximum wet density, which will be determined by the Contractor in accordance with ASTM D 558. The moisture content of the soil-cement used to fabricate the blocks may be increased just enough to facilitate compaction of the mixture, as long as the proportions of the dry materials remain constant and the required density is achieved. The blocks shall be measured and weighed to determine the actual density (unit weight) and shall be used to check the calibration of the nuclear density gauge. After drilling a hole in the block to accommodate the nuclear density gauge probe, three full depth nuclear density gauge tests shall be performed in the direct transmission mode and the results averaged. This average nuclear density gauge reading shall be compared with the measured unit weight of the block and the difference used as a correction factor for all readings taken that day. All measuring and weighing of the test block and all calibration checking of the density gauge shall be performed in the presence of a representative of the Contracting Officer. Calibration checks of the density gauge shall be made at the beginning of construction every day. Gauge calibration constants shall be adjusted for performance on the block at least 7 days prior to the evaluation of test sections. The Contractor shall remedy any inconsistencies in gauge performance prior to the start of soil cement placement. The block shall be used each day before placing begins to calibrate the full-depth readings of the nuclear density gauges used by the Contractor and the Government. The calibration block shall be available for use by the Government as needed.

3.1.10 Nuclear Density Gauge Operators

Prior to operations with the Nuclear Density Gauge, copies of permits and

licenses for gauge operation and copies of certification of training for all operators shall be submitted for review and approval by the Contracting Officer.

3.2 SUBGRADE PREPARATION

Previously constructed underlying material shall be conditioned as specified in Section 02300 EARTHWORK. The existing subgrade, other than specified fills, shall be scarified, conditioned to optimum moisture content, and compacted to at least 95 percent of maximum density in accordance with ASTM D 1557 for a depth of least 150 mm. In all cases prior to placing soil cement, deficiencies in the underlying material shall be corrected, and the surface shall be cleaned and moistened, as directed. The surface of the underlying material will be approved by the Contracting Officer.

3.3 PREPARATION FOR PLACING

Placement Plan - Details and placement methods of the soil cement including mixing plant layout, equipment, transporting, spreading, compacting, forming, grade control, curing and testing shall be submitted 45 days prior to construction of the test section.

3.3.1 Placing Schedule

Before starting soil cement production, a detailed schedule shall be submitted indicating intended daily and weekly production rates that, when followed, will meet the beginning and ending specified soil cement production dates. After initiation of soil cement production, the Contractor's schedule shall be updated and adjusted on a weekly basis for the duration of the soil cement placement. If it becomes apparent for any reason that the Contractor is not pursuing a schedule that will meet the specified soil cement production dates, actions necessary to increase the production rate shall be taken so that production is once again on schedule, within 5 calendar days after written notice. Also, if not back on schedule by the end of the 5 days calendar period, the Government reserves the right at this time to direct the Contractor, at no additional cost to the Government, to increase the amount and size of crews and equipment.

3.3.2 Aggregate Production Schedule

Aggregate production and stockpiling shall begin and shall be producing acceptable material by not later than 45 days in advance of the time when placement of the soil cement test section is expected to begin. At least 25 percent of the soil aggregates necessary for the completed soil cement construction shall be manufactured and stockpiled prior to start of placement of soil cement.

3.3.3 Test Section

3.3.3.1 General

Prior to placement of any soil cement, the Contractor shall construct a

test section. The purpose of the test section is to demonstrate the suitability of the Contractor's equipment, methods, and personnel. The test section shall be at least 3 lifts in height and be at least 15 meters long and 3 meters wide. The site of the test section shall be approved. After evaluation and assessment of the test section by the Contracting Officer, the Contractor shall dispose of the test section in an approved manner. Under no circumstances shall the test section be incorporated into or become a part of the permanent soil cement structure. The test section shall demonstrate sustained plant production rates, and batching, mixing, transporting, spreading, and compaction procedures. The date of the test section construction shall be provided at least 7 days in advance.

3.3.3.2 Test Section Requirements

The Contractor shall demonstrate the joint preparation, placement procedure for bedding mortar, rolling method for both fresh and cold construction joints, start-up and finishing procedures, testing methods, and plant operations. Variable amplitudes of the roller shall be used as approved in different areas to identify the optimum amplitude. Variations in mixture proportions other than water shall be made if directed. The test section shall be placed in portions as directed by the Government. Additionally, at least three (3) nuclear gauge readings at the last lift of the test section shall be provided from points selected by the Government. The Contractor shall vary the water content, as necessary, to arrive at the appropriate content, subject to the approval of the Contracting Officer's Representative. The mixing plant shall be operated and calibrated prior to placing the test section. The Contractor shall use the same equipment, materials, and construction techniques on the test section as will be used in all subsequent work. Sub-grade preparation, soil-cement production, placing, compacting, curing, construction of joints, and all testing shall be in accordance with applicable provisions of this section of the specification.

3.3.3.3 Evaluation of Test Section

The Contractor shall not begin soil cement operations for the permanent structure until testing and evaluations by the Government have been completed, and it has been demonstrated to the satisfaction of the Contracting Officer that all specification requirements were met. Following completion of test section construction, 10 calendar days shall be allowed for testing and evaluations. If the Contractor does not meet requirements as specified, an additional test section or sections shall be constructed at no additional cost to the Government. The Contractor shall provide six (6) 152.4-mm diameter cores for full depth to the Government from points selected in the test section by the Government 7 days after completion of the test section.

3.3.4 Weather

If unusual adverse weather, such as heavy rain, severe cold, high winds, etc., occurs or is forecast to occur during placement, the placement operation shall be suspended until conditions improve.

3.3.4.1 Placing During Cold Weather

In cold-weather placement the soil cement shall not be placed when the ambient air temperature drops below 0 degrees C. If the ambient air temperature does drop below 0 degrees C, the surface of any recently placed (within the previous 72 hours) and exposed soil cement surface shall not remain exposed for more than 4 hours. Surfaces that will be exposed for longer times shall be protected as specified in paragraph COLD-WEATHER PROTECTION as a measure to maintain soil cement temperatures above 0 degrees C until after the ambient air temperature rises to above 0 degrees C and is expected to remain above 0 degrees C until the end of the curing and protection period, or until covered by another lift.

3.3.4.2 Placing During Rain

Soil cement shall not be placed during rainfall of 2.5 mm/hr or more. During periods of lesser rainfall, placement of soil cement may continue if, in the opinion of the Contracting Officer, no damage to the soil cement is occurring. Work shall commence only after excess free surface water and contaminated paste or soil cement have been removed and the surface has gained sufficient strength (no less than 4 hours after the soil cement placement was suspended) to prevent rutting, pumping, intermixing of rainwater with the soil cement, or other damage to the soil cement. When the soil cement surface has been contaminated or damaged in any manner, the soil cement surface shall be washed to break up and remove laitance and/or mud-like coatings from the surface. All waste shall be removed and disposed of in an approved manner.

3.3.4.3 Placing During Hot Weather

During periods of hot weather when the maximum daily air temperature is likely to exceed 30 degrees C, the following precautions shall be taken. The temperature of the soil cement shall be controlled so that it does not exceed 30 degrees C when placed. Placement shall be suspended as soon as the soil cement temperature exceeds 30 degrees C. Measures that can be taken to prevent temperatures exceeding 30 degrees C include, but are not limited to, chilling mixing water, use of a canopy to shade the soil cement placement areas, placing during nighttime and early morning hours, or restricting placements to cloudy days. Use of any of these systems shall not be reason for extension of completion dates specified in these specifications.

3.3.5 Surface Preparation

3.3.5.1 Cleaning

Lift surfaces shall be cleaned prior to placing any additional soil cement thereon. Surface treatment shall be in accordance with the requirement of paragraph JOINTS. No surfaces to receive bedding mortar shall be covered with soil cement until the prepared surfaces have been approved by a Contracting Officer's Representative. All surfaces upon which soil cement or any bedding mortar is placed shall be moist (but contain no visible free water). Prior to placing soil cement, all surfaces shall be clean and free of loose, unkeyed, or deteriorated rock; all mud and silt accumulations; vegetation; laitance; puddles or ponds of free surface water; coatings; and

any other detrimental materials. High-pressure water jetting, and/or wet sandblasting, followed by mild high-volume, low-pressure washing, shall be used on all hardened surfaces (cold joints) as necessary for the removal of laitance, coatings, stains, or other difficult-to-remove contaminants. High-volume low-pressure water washing and/or water jetting may be used for removal of loose materials. Adequate equipment with operators shall be on hand at the site to clean all surfaces in conformance with these specifications without disrupting in any way the soil cement production as scheduled.

3.3.5.2 High-Volume Low-Pressure Washing

Washing of loose materials can be accomplished with high-volume low-pressure water washing and/or air water jetting using equipment of similar design to that used in large-scale foundation cleanups. The air-water jets shall have 40-mm nozzles, a water supply of at least 2 L/s, and compressed air at the jet of 550 to 850 kPa. The low-pressure water jets shall have 25-mm nozzles available and a capacity of at least 13 L/s for truck-mounted devices.

3.3.5.3 High-Pressure Water Jet

A stream of water under a pressure of not less than 10.3 MPa shall be used for cleaning all cold joint surfaces, or surfaces with laitance, mortar coatings, stains, or other difficult-to-remove contaminants. There shall be no undercutting of coarse-size aggregates. Aggregate particles that are undercut shall be removed.

3.3.5.4 Wet Sandblasting

This method may be used when the soil cement has reached sufficient strength to prevent undercutting of coarse aggregate particles. Wet sandblasting shall be continued until all accumulated laitance, coatings, stain, or other difficult-to-remove contaminants are removed. Wet sandblasting may be used in lieu of or in combination with the high-pressure water jet.

3.4 PLACING

3.4.1 Procedures

The soil-cement mixture shall be placed and distributed in such a manner as to produce a reasonably smooth, uniform surface in layers of such uncompacted thickness that when compacted each layer shall not exceed 150 mm in thickness. Soil cement shall be placed in an up and down fashion along the slope face. The Contractor is encouraged to place and compact each successive layer as rapidly as possible after the preceding layer is completed and meet the density requirement. Placing of mixture shall be as nearly continuous as possible, with an absolute minimum of stops and starts; speed of placing shall be controlled, to permit proper rolling. Placing shall be discontinued during rain except for light mists which do not cause intermixing of cement and water slurry on the surface. Placing shall be done in a pattern so that curing water from previous placements will not pose a runoff problem on the fresh surface. The Contractor shall

use care to minimize the production of cold joints.

3.4.2 Bedding Mortar

3.4.2.1 General

The bedding mortar shall be applied to the existing surface following any required cleanup. The bedding mortar shall be applied not more than 20 minutes ahead of soil cement placement, unless otherwise approved. The bedding mortar shall be used between soil cement lifts where cold joints occur and other horizontal contact surfaces. The bedding mortar shall have an average thickness after application of between 6 and 13 mm and shall cover 100 percent of the lift area. Placing temperature of the mortar shall not exceed 30 degree C when measured in accordance with ASTM C 1064/C 1064M.

3.4.2.2 Time Interval Between Mixing and Placing

Bedding mortar shall be placed within 30 minutes after discharge into nonagitating equipment. When mortar is truck-mixed or when a truck mixer or agitator is used for transporting mortar mixed by a concrete plant mixer, the mortar shall be delivered to the site, and discharge shall be completed within 1.5 hours after batching.

3.4.3 Lift Thickness

The lift thickness after final compaction by the vibratory roller shall be 150 mm.

3.4.4 Depositing, and Spreading

After the soil cement has been deposited, the soil cement shall be spread by dozers into gently sloping layers, that will, after final compaction of the layers by the vibratory roller, result in the specified lift thickness.

In no case shall the soil cement or bedding mortar be allowed to dry. Under no conditions shall a dozer or other tracked vehicle be operated on other than fresh uncompacted soil cement except at the start of each lift placement to facilitate startup operations, and then only by an approved procedure. No soil cement shall be placed on a previous lift which has not met specification. Unacceptable material shall be removed.

3.5 COMPACTION

After spreading and working with the dozer(s), the top surface of each lift shall be compacted with a self-propelled vibratory roller operating in the vibratory mode as are required to obtain the minimum compaction specified. A round trip over the same material shall count as two passes (i.e., from point A to point B and return to point A by the same route is two passes). Rolling shall begin within 10 minutes of spreading and, except for fresh joints, rolling shall be completed within 45 minutes of start of mixing, except during hot or dry weather conditions, as described in paragraph Placing During Hot Weather. In hot or dry weather, rolling shall begin within 5 minutes of spreading, and except for joints, rolling shall be completed within 30 minutes of start of mixing. Delays in rolling freshly

laid mixture will not be permitted. Rollers shall not be operated in the vibratory mode when not moving. The frequency and amplitude of vibration shall be varied, as needed or directed, within the range specified in paragraph EQUIPMENT. Surfaces of roller drums shall be kept clean at all times. At no time shall water be added during compaction operations to the uncompacted soil-cement mixture. If in the opinion of the Contracting Officer, the surface of a layer of soil-cement has been rutted or compacted unduly by hauling equipment so as to reduce the effectiveness of compaction by the specified rollers, the Contractor will be required to scarify such surfaces as directed prior to compacting with the specified rollers. At the start of compaction, the mixture shall be in a uniform, loose condition throughout its full depth. Compaction of each layer shall be done in such a manner as to produce a dense surface.

3.5.1 Required Compaction Density

Each layer shall be compacted to a density of at least 98 percent maximum density in accordance with ASTM D 558, Method B. The specified moisture content shall be maintained uniformly throughout the layer of material being compacted.

3.5.2 Density Determination of Compacted Soil Cement

Density shall be measured using a nuclear density meter in accordance with ASTM C 1040. Soil cement density value determinations shall be made throughout the course of soil cement placement to assure that the soil cement is compacted to the minimum density specified and detect segregation and/or voids throughout the soil cement.

3.6 JOINTS

Joints shall be perpendicular to the finished grade of the soil cement. Joints shall be straight and continuous from edge to edge. Transverse construction joints shall be made to ensure continuity in smoothness and grade between old and new sections of soil cement, as specified hereinafter. All joints shall have the same texture and full-depth density. Regardless of age, contact surfaces of previously constructed lifts that have become coated with dust, sand, or other objectionable material shall be cleaned by brushing or cut back with approved power saw, as directed.

3.6.1 Lift Joint

The entire soil cement shall be placed with sufficient continuity so that it hardens and acts as one monolithic structure without discontinuous joints or potential planes of separation. All lift joints shall be kept clean, uncontaminated, free from ponded water, and continuously moist until placement of the succeeding soil cement.

3.6.1.1 Lift Placed Within 4 Hours

Regular lift-joint treatment and maintenance applies to subsequent lifts placed within 4 hours of the previous lift and shall include:

- a. Maintaining 100 percent of each compacted lift-joint surface continuously moist by application of water.
- b. If necessary, removing all loose contaminants or deteriorated soil cement by low pressure washing and vacuuming, air-jetting, or by the methods and procedures in paragraph SURFACE PREPARATION.
- c. During periods of hot weather as defined in paragraph Placing During Hot Weather, the time period for regular lift joint treatment shall be reduced to 2 hours. After 2 hours, the requirements of paragraph Lift Placed Within 4-8 Hours shall apply.

3.6.1.2 Lift Placed Within 4-8 Hours

When placement of the overlying lift does not occur within 4 hours the surface prior to placement shall be treated by air-water cutting.

- a. The air pressure used in the jet shall be 620 to 760 kPa (90 to 110 psi), and the water pressure shall be just sufficient to bring the water into effective influence of the air pressure. After cutting, the surface shall be washed and rinsed until the wash water is no longer cloudy. Surfaces shall be inspected and approved by the Contracting Officer.
- b. During periods of hot weather as defined in paragraph Placing During Hot Weather, the time period shall be reduced to 4 hours. After 4 hours the requirements of paragraph Lift Placed More Than 8 Hours shall apply.

3.6.1.3 Lift Placed More Than 8 Hours

When placement of the overlying lift does not occur within 8 hours the surface prior to placement shall be treated by air-water cutting as indicated in paragraph Lift Placed Within 4-8 Hours and/or by the methods and procedures in paragraph SURFACE PREPARATION. Following this initial preparation the cold-joint surface shall be kept continuously moist until the application of a bedding mortar. During periods of hot weather as defined in paragraph Placing During Hot Weather, the time period shall be reduced to 4-hours.

3.6.2 Construction Joints

When a transverse construction joint is required, the roller shall pass over the end of the freshly placed soil cement. In these cases, the previously placed materials shall be cut to full depth of the lift, and the excess material removed. Transverse joints may also be formed by using bulkheads and forms to provide a full-depth vertical face. This vertical face shall be dampened before the placement of the fresh lift begins. When necessary, the fresh mixture shall be hand finished at the joints. Additional rolling shall be used to assure that specified full-depth density and surface finish is attained.

3.6.3 Longitudinal Joints

Any construction joints in which the edge of the initial strip has exceeded the time requirements given in paragraph JOINTS shall be considered "cold joints" and shall be trimmed by cutting back into the complete lift to form a full-depth vertical face and the excess material removed. This vertical face shall be dampened before the placement of the fresh lane begins.

3.7 CURING AND PROTECTION

3.7.1 Curing

Temporarily exposed surfaces of soil cement that will be in contact with succeeding layers of soil cement shall be kept continuously moist by moist curing method described hereinafter until placement of the subsequent layer. Curing of permanently exposed surfaces shall begin immediately after compaction and shall continue for at least 14 days. Soil cement shall be cured and protected from premature drying, extremes in temperature, rapid temperature change, freezing, mechanical damage and exposure to rain or flowing water. The Contractor shall have all equipment needed for adequate curing and protection on hand and ready to install before actual placement begins. The curing medium and method, or the combination of mediums and methods used, shall be approved by the Contracting Officer. The soil cement shall be protected from the damaging effects of rain for 12 hours and flowing water for 14 days.

3.7.1.1 Moist Curing

Soil cement will be moist cured by maintaining all surfaces continuously, not periodically, wet for the duration of the entire curing period. Water for curing shall comply with the requirements of paragraph: WATER. If water is used which stains or discolors soil cement surfaces which are to be permanently exposed, the surfaces shall be cleaned to the satisfaction of the Contracting Officer. Horizontal surfaces may be cured by covering with a minimum uniform thickness of 150 mm of continuously saturated sand. Temporarily exposed surfaces may not be cured by saturated sand.

3.7.1.2 Truck Applications

Water trucks shall be used, as necessary, to keep surfaces moist at all times until a sprinkler system, wet burlap covering, or final curing method is implemented. The water truck shall be supplemented, as necessary, by mists from hand-held hoses. The truck operator shall be positioned so he is capable of seeing the spray at all times. The spray shall be capable of easy direction, either by attachment to the front of the truck so it can be directed by steering the truck or by other approved means. All spray nozzles both on the trucks and the hand held hoses shall be of a type that produces a true fog spray without any concentrated streams of water. The mist shall not be applied in a channelized or pressurized manner that in any way erodes the surface of the soil cement. It shall also be applied at a rate which does not cause ponding at the surface. Trucks shall not be allowed to drop visible oil or other contaminants on the surface. If trucks must leave the surface, the tires shall be washed free of dirt or other foreign material before returning to the surface. Water truck wheel loads shall not exceed 2,000 kg and shall be such that no cracking or other damage to the soil cement is caused.

3.7.1.3 Sprinkler System

An approved sprinkler system consisting of pipe lines and rotating or other approved type of sprinklers may be used. Sprinklers shall deliver a fine mist of water and shall not cause any erosion to the surface of the soil cement. The sprinkler system shall cover all portions of the soil cement surface, and keep the surface wet at all times.

3.7.1.4 Burlap

Burlap covers shall consist of two or more layers of burlap having a combined weight of 4,736 gram per square meter in a dry condition. Burlap shall be either new or shall have been used only for curing soil cement or conventional portland cement concrete. Burlap strips shall have a length after shrinkage of at least 300 mm greater than necessary to cover the entire width and edges of the soil cement. Mats shall overlap each other at least 150 mm. Mats shall be thoroughly wetted before placing and shall be kept continuously wet and in intimate contact with the surface and edges of the area for the entire specified curing period.

3.7.1.5 Impervious Sheet Curing

The sheets shall comply with the requirements of ASTM C 171, except that the polyethylene film, if used, shall be white opaque. All surfaces shall be thoroughly wetted and be completely covered with waterproof paper or polyethylene film. Covering shall be laid with light-colored side up. Covering shall be taped to form a continuous cover with completely closed joints. The sheet shall be weighted to prevent displacement so that it remains in contact with concrete during the specified length of curing. Coverings shall be folded down over exposed edges of slabs and secured by approved means. Sheets shall be immediately repaired or, replaced if tears or holes appear during the curing period.

3.7.2 Protection from Rain or Water Flow

If, prior to completion of compaction, the soil-cement mixture is wetted by rain or flowing water such that average moisture content exceeds the optimum moisture content specified by the mix design, at the time of final compaction, the entire layer affected, as determined by the Contracting Officer, shall be removed and shall be replaced in accordance with these specifications at the expense of the Contractor.

3.8 FINISHING SURFACE

After compaction to the required lines and grades as shown in the drawings, soil cement final surfaces shall be smooth and uniform and shall be free of surface pitting, voids or indentations, pockmarks, check cracking, segregation or rock pockets, aggregate drag marks, areas loosened by construction operations, and areas where fines have been washed away during curing process that are greater than 12.5 mm in depth. All holes left in the soil cement as a result of nuclear density testing in the upstream slope face and in the last lift of the spillway shall be filled by the Contractor with a cement grout, as directed.

3.9 DISPOSAL OF UNSATISFACTORY MATERIALS

Any soil cement that is removed for the required correction of defective areas, waste material, and debris shall be disposed of as directed.

3.10 TESTS AND INSPECTIONS

3.10.1 General

The Contractor shall perform the inspection and tests as described below, and based upon the results of these inspections and tests, he shall take the action required and submit reports as required. When, in the opinion of the Contracting Officer, the soil cement operation is out of control, soil cement placement shall cease. The laboratory performing the tests shall conform to ASTM E 329. Any test results requested by the Government for review shall be provided to the Government immediately, and all results of every test by the Contractor shall be furnished to the Government on a daily basis, not later than the day after the test or inspection is made.

3.10.2 Testing and Inspection Requirements

3.10.2.1 Calibration of Mixing Plant

a. Batch-Mixing Plants: Accuracy of the batching equipment shall be checked for each type of cementitious material and aggregate at the beginning of operations and at least once for every 10 shifts in the presence of the Contracting Officer. Such checks shall also be made whenever there are variations in properties of the fresh soil cement which could be the result of batching errors. Standard test weights accurate to plus or minus 0.1 percent shall be provided for checking plant scales.

b. Continuous-Mixing Plants: Accuracy of proportioning of the continuous-mixing plant shall be checked for each cementitious material every day at the beginning of operations and for soil aggregate at the beginning of construction and after every 10 shifts. The accuracy of proportioning shall be checked by simultaneously securing timed samples of the cementitious materials and the soil aggregate as they are fed to the mixer and weighing each as appropriate.

c. Mixing Time: Mixing time of the pug mill shall be checked at the direction of the Government. Unless otherwise required, determination of mixing time shall be by weight method using the following formula:

$$\text{Mixing time in seconds} = \frac{\text{pug mill dead capacity in kg}}{\text{pug mill output in kg per second}}$$

3.10.2.2 Aggregate Moisture Tests

a. Frequency of Tests - There shall be at least two tests for moisture content tests in accordance with ASTM C 566 or ASTM C 70 during each shift of mixing plant operation. The times for the tests shall be selected randomly within each shift. Additional tests shall be made

whenever excessive variation in workability is reported by the placing foreman.

b. Corrective Action for Moisture Tests - When moisture content determinations indicate a change in water entering the mix with the aggregates, the placement foreman shall be notified to check if a corresponding adjustment in water added at the mixer is necessary to obtain adequate compaction and meet consistency requirements at the placement site.

3.10.2.3 Batched Aggregate

a. Grading - Before starting work, at least one sample of aggregate shall be tested in accordance with ASTM C 136 and ASTM C 117. The aggregate shall not be used unless results verify that the aggregate complies with the specified gradation and tolerances. After the initial test, a minimum of one analysis shall be performed for each 400 cubic meters or portion thereof of soil cement material placed each shift. The location at which samples are taken may be selected by the Contractor as the most advantageous for production control. However, the Contractor shall be responsible for delivering the aggregate to the mixer within specification limits. Each time the Contractor performs a moisture-density relation, an additional gradation analysis in conformance with ASTM C 136 shall be performed, corresponding to the material used in the moisture-density relation.

b. Corrective Action for Grading - When deficiencies in grading are found, the rate of testing shall be increased as directed. When two consecutive tests show the aggregate to be deficient in grading, the mixing operation shall be stopped until acceptable material is furnished for delivery to the mixer.

3.10.2.4 Scales

a. Weighing Accuracy - The accuracy of the scales shall be checked by test weights at least once a month for conformance with the applicable requirements of paragraphs BATCH PLANT and CONTINUOUS MIXING PLANT. Such tests shall also be made as directed whenever there are variations in properties of the fresh soil cement that could result from batching errors.

b. Batching and Recording Accuracy - Once a week the accuracy of each batching and recording device shall be checked during a weighing operation by noting and recording the required weight, recorded weight, and the actual weight batched. The Contractor shall confirm that the calibration devices described in paragraph BATCH PLANT for checking the accuracy of dispensing units are operating properly. If a continuous mixing plant is provided, the accuracy and operation of all feeding and dispensing units shall be checked before the start of operation each day.

c. Scales Corrective Action - When the weighing accuracy or batching accuracy does not comply with specification requirements, the plant shall not be operated until necessary adjustments or repairs have been

made. Discrepancies in recording accuracies shall be corrected immediately.

3.10.2.5 Mixing Plant Control

The measurement of all constituent materials including cementitious materials, soil aggregate, and water shall be continuously controlled. The aggregate weight and amount of added water shall be adjusted as necessary to compensate for free moisture in the aggregates. A report shall be prepared indicating type and source of cement used, type and source of pozzolan used, and aggregate source, during plant operation.

3.10.2.6 Field Density

a. Testing and Checking - Density shall be determined for each 250 square meters of completed lift, with a calibrated nuclear density gauge in accordance with ASTM C 1040. Additional tests shall be made, as directed, particularly during start-up and when problems with attaining the required density occur. Field density tests shall be performed as soon as possible, but within 30 minutes, after the completion of vibratory rolling. Each test shall include readings taken at incremental depths of 50 mm to depth of 100 mm. Only the deepest reading shall be used to evaluate the density. Both wet and dry densities shall be reported, and all individual readings shall be reported; however, only the wet density shall be used for evaluation.

b. Action Required - Whenever the nuclear gauge indicates density less than the specified density, a retest shall be made. If the retest indicates unacceptable density, the Contracting Officer's Representative shall be notified, additional rolling shall be immediately provided, and a determination shall be made as to whether the lower density resulted from insufficient passes of the roller or a change in the mix properties. If the mix properties have changed, adjustments such as increasing or decreasing the moisture content shall be made at the batch plant. If the problem persists, the Contracting Officer may adjust the proportions of aggregates, cement, and/or pozzolan. If the lower density is the result of incomplete rolling, the operator shall be notified and the Contracting Officer may require removal of the incompletely compacted material at no cost to the Government.

3.10.2.7 Moisture Tests of Mix

a. Testing and Checking - Moisture content of the soil cement mix shall be determined each time a density reading is taken with a calibrated nuclear gauge. The nuclear gauge shall be set to backscatter mode when determining moisture content. The calibration of the nuclear gauge shall be verified to oven dry materials at least once per five (5) shifts.

b. Corrective Action - The placing foreman shall continuously monitor the apparent effectiveness of compaction equipment from a visual standpoint, and shall notify the mixing plant whenever the mix becomes too dry or too wet. Whenever moisture content tests indicate a change

from what has been established as the optimum batching and placing moisture for maximum density and efficiency of compaction equipment, an adjustment shall be made in the mix water added at the mixing plant and the adjustment shall be noted.

3.10.2.8 Coring Specimen

Cores shall be drilled by the Contractor from points in the soil cement to determine thickness within 7 days after placement. A minimum of two cores per days placement will be taken from locations selected in a random fashion by the Contracting Officer. Cores shall be 150 mm diameter and shall be obtained for the full depth of soil cement placement. All cores shall become the property of the Government and may be tested for strength determination or other properties as considered appropriate. Refilling of core holes shall be performed with portland cement mortar, using materials and procedures directed.

3.10.2.9 THICKNESS EVALUATION

The thickness of the soil cement will be determined by the Government on the basis of measurements made on cores drilled by the Contractor from locations outlined in paragraph CONTRACTOR QUALITY CONTROL. Measurements of individual cores will be performed in accordance with ASTM C 174/C 174M.

When the measurement of any core indicates that the soil cement is deficient in thickness by 25 mm or more, additional cores shall be drilled by the Contractor at 8 m intervals, on all sides of the deficient core until the cores indicate that the deficiency in thickness is less than 25 mm. If after the measurement of the additional cores still indicate a deficiency in thickness of 25 mm or more, the areas represented by those cores shall be removed and replaced with soil cement of the specified thickness at no additional cost to the Government. If the Contractor believes that the cores and measurement taken are not sufficient to indicate fairly the actual thickness of the soil cement, additional cores shall be taken and will be measured provided the Contractor shall bear the extra cost of drilling the cores.

3.10.2.10 Inspection Before Placing

Construction joints and other horizontal surfaces shall be inspected by the Contractor in sufficient time prior to the next lift placement to certify to the Contracting Officer that they are ready to receive soil cement. The results of each inspection shall be reported in writing. The inspection of the lift surfaces of the soil cement will be a continuing activity and shall be accomplished in accordance with paragraphs SURFACE PREPARATION and JOINTS.

3.10.2.11 Inspection During Placing

a. Inspection - The Contractor shall provide full time supervision of all placing operations to insure that the correct quality of soil cement or bedding mortar are performed in accordance with the contract.

During placing operations, the quality control staff shall measure and record soil cement temperatures in accordance with ASTM C 1064/C 1064M, ambient temperature hourly, record weather conditions, time of

placement, volume placed, and method of placement.

b. Cold-Weather Placing - At least once during each shift, an inspection shall be made of all areas subject to cold-weather protection. Deficiencies shall be noted. During removal of protection, the soil cement temperature and ambient temperature shall be measured at least hourly.

c. Hot-Weather Placing - When the maximum daily air is likely to exceed 30 degrees C, the Contractor shall take and record the temperature of the mixture at 30-minute intervals during hot-weather placement. The surface of the subgrade or soil cement shall be inspected to assure that it is sprinkled with water immediately before the next layer of soil cement is placed and any deficiencies noted.

d. Corrective Action - The placing foreman shall not permit soil cement placing to begin until he has verified that necessary equipment are all in working order and with competent operators. Placing shall not be continued if any lift of soil cement is not fully compacted.

e. Temperature Protection - The Contracting Officer shall be notified whenever the soil cement temperature during the period of protection or protection removal fails to comply with the specifications, and immediate steps shall be taken to correct the situation. Regardless of the ambient temperature, when the temperature of the soil cement mixture exceeds 32 degrees C, mixing and placing shall be stopped and the Contracting Officer notified.

3.10.2.12 Compressive Strength Tests

At least two compressive strength tests shall be conducted for each 500 cubic meter of soil cement placed. A "test" is defined as the average of two companion soil cement specimens. Samples shall be taken from the wet batched mix. Tests shall determine the one (1) day and seven (7) day compressive strengths in accordance with ASTM D 1633, Method A except that curing of specimens in the mold will be required only for the length of time necessary to satisfactorily remove the specimens from the mold without damage to the specimens.

3.10.2.13 Curing Inspection

a. Moist Curing Inspections - At least twice each shift, and twice per day on nonwork days an inspection shall be made of all areas subject to moist curing. The surface moisture condition shall be noted and recorded.

b. Moist Curing Corrective Action - When a daily inspection report lists an area of inadequate curing, immediate corrective action shall be taken, and the required curing period for those areas shall be extended by one day.

3.10.2.14 Cold-Weather and Hot-Weather Protection

At least once each shift and once per day on nonwork days an inspection

shall be made of all areas subject to cold-weather or hot-weather protection. Any deficiencies shall be noted, corrected, and reported.

3.10.2.15 Cold-Weather and Hot-Weather Protection Corrective Action

When a daily inspection report lists deficiencies, the deficiency shall be corrected immediately and the period of protection extended for one day.

3.10.3 Reports

All results of tests conducted at the project site shall be reported daily and shall be delivered to a designated representative of the Contracting Officer. During periods of cold weather protection, reports of pertinent temperatures shall be made daily. These requirements do not relieve the Contractor of the obligation to report certain failures immediately as required in preceding paragraphs. Such reports of failure and the action taken shall be confirmed in writing in the routine reports. The Contracting Officer has the right to examine all Contractor quality control records at any time.

3.10.4 Waybills and Delivery Tickets

Copies of waybills or delivery tickets shall be submitted to the Contracting Officer's Representative, during the progress of the work. The Contractor shall furnish the Contracting Officer's Representative scale tickets for each load of material weighed; these tickets shall include tare weight, identification mark of each vehicle weighed, plus date, time, and location of the loading. Tickets shall be furnished at the point and time individual loads arrive at the work site. A master log of all vehicle loading shall be furnished for each day of loading operation. The Contractor shall file with the Contracting Officer's Representative the master log of loadings, certified waybills and/or certified tickets, within 24 hours of material delivery. Prior to the final payment, the Contractor shall furnish written certification that the material recorded on the submitted waybills and/or certified tickets was actually used in the construction covered by the contract.

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SECTION 05502

MISCELLANEOUS METAL

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI B16.11 (1996) Forged Steel Fittings, Socket Welded and Threaded

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C105 (1993) Polyethylene Encasement for Ductile-Iron Pipe Systems

AWWA C600 (1999) Installation of Ductile-Iron Water Mains and Their Appurtenances

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M (2002) Structural Welding Code - Steel

ASME INTERNATIONAL (ASME)

ASME B16.3 (1998) Malleable Iron Threaded Fittings

ASME B18.2.1 (1996) Square and Hex Bolts and Screws, Inch Series

ASME B18.2.2 (1987; R 1999) Square and Hex Nuts

ASTM INTERNATIONAL (ASTM)

ASTM A 36/A 36M (2001) Carbon Structural Steel

ASTM A 48/A 48M (2000) Gray Iron Castings

ASTM A 53/A 53M (2002) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

ASTM A 123/A 123M (2002) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

ASTM A 126	(1995; R 2001) Gray Iron Castings for Valves, Flanges, and Pipe Fittings
ASTM A 320/A 320M	(2002) Alloy/Steel Bolting Materials for Low-Temperature Service
ASTM A 467/A 467M	(2001) Machine and Coil Chain
ASTM A 500	(2001a) Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A 653	(2002a) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 865	(1997) Threaded Couplings, Steel, Black or Zinc-Coated (Galvanized) Welded or Seamless, for Use in Steel Pipe Joints
ASTM A 924/A 924M	(1999) General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
ASTM B 32	(2000e1) Solder Metal
ASTM F 844	(2000) Washers, Steel, Plain (Flat), Unhardened for General Use
ASTM F 883	(1997) Padlocks

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

CID A-A-1923	(Rev A) Shield, Expansion (Lag, Machine and Externally Threaded Wedge Bolt Anchors)
CID A-A-60005	Frames, Covers, Gratings, Steps, Sump and Catch Basin, Manhole

DEPARTMENT OF PUBLIC WORKS, CLARK COUNTY, NEVADA (DPWCC)

DPWCC	UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS' CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA NEVADA
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STATE OF NEVADA DEPARTMENT OF TRANSPORTATION (NDOT)

NDOT	NEVADA DEPARTMENT OF TRANSPORTATION STANDARD PLANS FOR ROAD AND BRIDGE CONSTRUCTION
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1.2 SUBMITTALS

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

SD-02 Shop Drawings

Miscellaneous Metal Items.

Detail drawings indicating material thickness, type, grade, and class; dimensions; and construction details. Drawings shall include catalog cuts, erection details, manufacturer's descriptive data and installation instructions, and templates. Detail drawings for the following items: Pipe Access Gates for Invert Access Ramps and Chain Safety Gates installation.

SD-11 Closeout Submittals

Satisfactory Installation.

A statement signed by the principal officer of the contracting firm stating that the installation is satisfactory and in accordance with the contract drawings and specifications, and the manufacturer's prescribed procedures and techniques, upon completion of the project and before final acceptance.

1.3 GENERAL REQUIREMENTS

The Contractor shall verify all measurements and shall take all field measurements necessary before fabrication. Welding to or on structural steel shall be in accordance with AWS D1.1/D1.1M. Items specified to be galvanized, when practicable and not indicated otherwise, shall be hot-dip galvanized after fabrication. Galvanizing shall be in accordance with ASTM A 123/A 123M, ASTM A 653, or ASTM A 924/A 924M, as applicable. Exposed fastenings shall be compatible materials, shall generally match in color and finish, and shall harmonize with the material to which fastenings are applied. Materials and parts necessary to complete each item, even though such work is not definitely shown or specified, shall be included. Poor matching of holes for fasteners shall be cause for rejection. Fastenings shall be concealed where practicable. Thickness of metal and details of assembly and supports shall provide strength and stiffness. Joints exposed to the weather shall be formed to exclude water.

1.4 DISSIMILAR MATERIALS

Where dissimilar metals are in contact, or where aluminum is in contact with concrete, mortar, masonry, wet or pressure-treated wood, or absorptive materials subject to wetting, the surfaces shall be protected with a coat of bituminous paint or asphalt varnish.

1.5 WORKMANSHIP

Miscellaneous metalwork shall be well formed to shape and size, with sharp lines and angles and true curves. Drilling and punching shall produce

clean true lines and surfaces. Welding shall be continuous along the entire area of contact except where tack welding is permitted. Exposed connections of work in place shall not be tack welded. Exposed welds shall be ground smooth. Exposed surfaces of work in place shall have a smooth finish, and unless otherwise approved, exposed riveting shall be flush. Where tight fits are required, joints shall be milled. Corner joints shall be coped or mitered, well formed, and in true alignment. Work shall be accurately set to established lines and elevations and securely fastened in place. Installation shall be in accordance with manufacturer's installation instructions and approved drawings, cuts, and details.

1.6 ANCHORAGE

Anchorage shall be provided where necessary for fastening miscellaneous metal items securely in place. Anchorage not otherwise specified or indicated shall include slotted inserts made to engage with the anchors, expansion shields, and power-driven fasteners when approved for concrete; toggle bolts and through bolts for masonry; machine and carriage bolts for steel; and lag bolts and screws for wood.

1.7 SHOP PAINTING

Surfaces of ferrous metal except galvanized surfaces, shall be cleaned and shop coated with the manufacturer's standard protective coating unless otherwise specified. Surfaces of items to be embedded in concrete shall not be painted. Items to be finish painted shall be prepared according to manufacturer's recommendations or as specified.

1.8 UTILITY SYSTEM SLEEVES

This section also covers utility system sleeves crossing under flood control channels. All work shall conform to the specifications and drawings (including VTN drawings) provided herein. All work shall also conform to the Las Vegas Valley Water District Standard Plates, Drawings, Specifications and the "Uniform Design and Construction Standards for Water Distribution Systems," UDACS, latest edition, and to Southwest Gas standards as applicable. The Contractor shall have a copy of the manufacturer's recommendations for each material or procedure to be utilized available at the construction site at all times.

1.8.1 Sleeves sized 150 mm (6 Inches) or Larger

Sleeves shall be of the materials and dimensions as shown on the drawings.

1.8.2 Excavation, Trenching, and Backfilling

Excavation, trenching, and backfilling shall be in accordance with the applicable provisions of Section 02316 EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS, except as modified herein.

1.9 HANDLING

Pipe and accessories shall be handled to ensure delivery to the trench in sound, undamaged condition, including no injury to the pipe coating or

lining. If the coating or lining of any pipe or fitting is damaged, the repair shall be made by the Contractor in a satisfactory manner, at no additional cost to the Government. Pipe shall be carried into position and not dragged. Use of pinch bars and tongs for aligning or turning pipe will be permitted only on the bare ends of the pipe. The interior of pipe and accessories shall be thoroughly cleaned of foreign matter before being lowered into the trench and shall be kept clean during laying operations by plugging or other approved method. Before installation, the pipe shall be inspected for defects. Material found to be defective before or after laying shall be replaced with sound material without additional expense to the Government. Rubber gaskets that are not to be installed immediately shall be stored in a cool and dark place.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 General

Materials indicated on the drawings or required in the work and not covered elsewhere by detailed requirements shall conform to the requirements of this section. In all cases not specifically covered in these specifications, the Contractor shall furnish approved highest grade commercial materials or products which are suitable for intended use of the item.

2.1.2 Structural Shapes and Plates

Steel bars, shapes and plates shall conform to ASTM A 36/A 36M. Galvanized coatings where required, shall conform to ASTM A 123/A 123M.

2.1.3 Steel Pipes

Steel pipe shall be zinc-coated steel pipe conforming to the requirements of ASTM A 53/A 53M, Standard Weight, Schedule 40, nominal size unless noted otherwise.

2.1.3.1 Pipe Access Gate and Appurtenances

Pipe access gate and appurtenances shall be fabricated as shown on the drawings. Pipe access gates shall be fabricated in the shop from standard weight steel pipe conforming to ASTM A 53/A 53M or structural tubing conforming to ASTM A 500, Grade A or B of equivalent strength. Pipe access gates shall be 38 mm nominal size and all pipe access gate components (including nuts and washers) shall be hot-dip galvanized after fabrication.

Welded, cut, damaged, and deformed areas of galvanizing metal shall be neatly coated with Grade 50B solder conforming to ASTM B 32. Pipe collars shall be hot-dip galvanized steel.

2.1.3.2 PIPE BOLLARDS

Pipe bollards shall be fabricated with heavy duty steel pipe conforming to ASTM A 53/A 53M, Type E or S, weight STD, galvanized after fabrication as shown on the drawings.

2.1.3.3 Pipe Caps

Pipe caps shall conform to ASME B16.3.

2.1.3.4 Pipe, Steel, for Utility Sleeve

Pipe, steel, for future utilities sleeves shall be steel pipe conforming to ASTM A 53/A 53M, Class B, and to the dimensions and diameters shown on the drawings. Unless specified otherwise, the minimum thickness shall be 6 mm.

When installed underground, steel pipe shall be encased with 0.15 mm thick polyethylene in accordance with AWWA C105.

2.1.3.5 Pipe, Steel, Fittings

Pipe, steel, fittings, shall conform to ASTM A 865 or ANSI B16.11 as necessary.

2.1.4 Corrosion-Resisting Steel Bolts and Anchor Bolts

Corrosion-resisting steel bolts and anchor bolts shall conform to the applicable requirements of ASTM A 320/A 320M, Grade B8.

2.1.5 Bolts

Bolts shall conform to ASME B18.2.1. Bolts and anchor bolts shall conform to the applicable requirements of ASTM A 320/A 320M, Grade B8.

2.1.6 Nuts

Nuts shall conform to ASME B18.2.2. Nuts shall be galvanized.

2.1.7 Expansion Anchors

Expansion anchors shall conform to the applicable requirements of CID A-A-1923. Anchors shall be multiple unit with inside thread.

2.1.8 Concrete, Mortar and Grout

Concrete, mortar and grout shall conform to the requirements of Section 03301 CAST-IN-PLACE STRUCTURAL CONCRETE.

2.1.9 Chain Safety Gate

Safety chains shall be galvanized welded steel, proof coil chain tested in accordance with ASTM A 467/A 467M, Class CS. Safety chains shall be straight link style, 5 mm diameter, minimum 39 links per meter (12 links per foot) and with bolt type snap hooks on one end. Eye bolts for attachment of chains shall be galvanized 10 mm bolt with 19 mm eye, anchored as indicated. The safety chain shall accommodate a eye bolt snap as indicated on the drawings.

2.1.10 Wall ladder Rungs (Galvanized)

Wall ladder rungs shall be galvanized steel. Steel bars, shapes and plates shall conform to ASTM A 36/A 36M. Galvanized coatings shall conform to ASTM A 123/A 123M.

2.1.11 Washers

Washers shall conform to ASTM F 844. Washers shall be galvanized.

2.1.12 Cover Plate

Cover plates shall conform to CID A-A-60005 or commercially available items meeting Contracting Officer approval. Sharp edges and burrs shall be removed from plates.

2.1.13 Manhole Frames and Covers

Locking manhole frames and covers shall be ductile iron Pont-A-Mousson Paris S or approved equal. Wrench for lock nut shall be provided to the Contracting Officer by the Contractor. Other frames and covers are to be Gray Iron Castings, Type A-1497 as manufactured by Alhambra Foundry Co. Ltd. or approved equal. Castings for manhole frames and covers shall conform to ASTM A 48/A 48M, Class 30. Frame and cover shall be machined to fit. Lids shall be imprinted with the words "Clark County Public Works Storm Drain".

2.1.14 Steel Chain Gate

Chain safety gate shall be manufactured from 6 mm diameter carbon steel coil in accordance with ASTM A 467/A 467M.

2.1.15 Steel Gratings

Steel gratings shall be fabricated of steel conforming to ASTM A 36/A 36M per dimensions shown on drawings. Galvanizing shall conform to paragraph ZINC COATING.

2.2 MISCELLANEOUS

Miscellaneous plates and shapes for items that do not form a part of the structural steel framework, such as lintels, sill angles, miscellaneous mountings, and frames, shall be provided to complete the work.

2.3 TRENCH COVERS, FRAMES, AND LINERS

Trench covers shall be designed to meet the indicated load requirements. Trench frames and anchors shall be all welded steel construction designed to match cover. Covers shall have flush drop handles formed of 6 mm round stock, and shall be raised-tread, or steel floor plate. Trench liners shall be cast iron with integral frame for cover.

2.4 Cast Iron for Frames and Drainage Gates

Cast iron for frames and drainage gates shall conform to ASTM A 126, Class B.

2.5 PADLOCKS

Padlocks shall conform to ASTM F 883, Type P01 Grade 2. Padlocks shall be a combination commercial type Padlock Master #175 or equivalent.

PART 3 EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

All items shall be installed at the locations shown and according to the manufacturer's recommendations. Items listed below require additional procedures as specified. Contractor shall submit detailed drawings of miscellaneous metal items. Detail drawings shall indicate material thickness, type, grade, and class; dimensions; and construction details. Drawings shall include catalog cuts, erection details, manufacturer's descriptive data and installation instructions, and templates. **Detail drawings for the following items: Pipe Guards / Bollards, Pipe Access Gates for Invert Access Ramps, and Chain Safety Gates installation.** Items installed in roads under jurisdiction of the State of Nevada Department of Transportation shall be in accordance with NDOT requirements.

3.1.1 WORKMANSHIP

Miscellaneous metalwork shall be well formed to shape and size, with sharp lines and angles and true curves. Drilling and punching shall produce clean true lines and surfaces. Welding shall be continuous along the entire area of contact except where tack welding is permitted. Steel with welds will not be accepted, except where welding is definitely specified or called for on the drawings. All bolts, nuts, and screws shall be tight. Work shall be accurately set to established lines and elevations and securely fastened in place. Anchorage shall be provided where necessary for fastening miscellaneous metal and wood items securely in place. Anchorage not otherwise specified or indicated shall include slotted inserts made to engage with the anchors, expansion shields, and power-driven fasteners when approved for concrete; machine and carriage bolts for steel; and lag bolts and screws for wood.

3.1.2 FINISHING

In general, tolerances for machine-finished surfaces designated by nondecimal dimensions shall be within 0.4 mm. Sufficient machining stock shall be allowed on placing pads to insure true surfaces of solid material. Finished contacts of bearing surfaces shall be true and exact to secure full contact. All drilled holes for bolts shall be accurately located and drilled from templates.

3.1.3 ZINC COATING (GALVANIZING)

Zinc coatings shall be applied in a manner and of a thickness and quality conforming to ASTM A 123/A 123M. All exposed ferrous metalwork, except cast-iron and corrosion resistant steel and items to be completely embedded in concrete, shall be galvanized unless other protective coatings are specified. Metalwork shall be galvanized after fabrication. In the event

that any portion of galvanized metalwork is abraded or otherwise damaged to the extent that the base metal is exposed, such damaged or abraded portions shall be neatly covered with Grade 50B solder conforming to the requirements of ASTM B 32.

3.1.4 WELDING

Welding shall conform to the provisions of AWS D1.1/D1.1M. Welders who have not been certified within two years of the date of commencement of work under this contract will not be allowed to perform the work.

3.1.5 BOLTED CONNECTIONS

Bolt holes shall be reamed normal to the member and shall be truly cylindrical throughout. Unless otherwise specified, holes for bolts shall not be more than 1.60 mm larger than the diameter of the bolt. Cutting bolt holes with a torch will not be permitted without the prior written approval of the Contracting Officer. Materials and parts necessary to complete each item, even though such work is not definitely shown or specified, shall be included. Poor matching of holes for fasteners shall be cause for rejection. Fastenings shall be concealed where practicable.

3.1.6 EXCAVATION

Excavation for concrete-embedded items shall be of the dimensions indicated on the drawings. Holes shall be cleared of loose materials prior to placement of concrete.

3.2 INSTALLATION OF PIPE GUARDS / BOLLARDS

Pipe guards / bollards constructed of zinc-coated steel pipe shall be set vertically in concrete encasements/piers in accordance with the drawings. Concrete for encasements and pipe fill where indicated shall be as specified in SECTION 03301 CAST-IN-PLACE STRUCTURAL CONCRETE FOR CIVIL WORKS having a compressive strength of 21 MPa.

3.3 PIPE ACCESS GATE

Pipe access gates that restrict vehicle access into the channel invert shall be installed at the top of each of the invert access ramps as shown on the drawing for the Pipe Access Gate. Locations of the invert access ramps are indicated on the drawings. The pipe access gates shall be installed in such a fashion that they work freely. The Contractor shall examine the operation of all pipe access gates not sooner than 30 days after installation for ease of operation. Any pipe access gates that cannot be operated by one person will be repaired (including any required structural modifications) by the Contractor at no additional cost to the Government, and requirements for repair shall conform to the requirement for installation above. Contractor shall provide a padlock for each of the pipe access gate assemblies.

3.4 Mounting of Safety Chains for Chain Safety Gates

Safety chains shall be mounted 900 mm and 610 mm above the floor.

3.5 PAINTING

Painting of pipe guards / bollards, and pipe access gates shall be in accordance with the requirements of the DPWCC, UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS' CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA NEVADA, SECTIONS 614 AND SECTION 714.

3.6 Manhole and Channel Wall Ladder Rungs (Galvanized)

Manhole and channel wall ladder rungs and steps shall be installed in place during the structure construction process.

3.7 Steel Sleeves for Utilities

Steel sleeves for utilities shall be placed to the alignment and grades indicated and in accordance with this Section, and in accordance with SECTION 02316 EXCAVATION, TRENCHING AND BACKFILLING FOR UTILITIES SYSTEMS, and in accordance with the drawings.

3.7.1 INSTALLATION

3.7.1.1 Excavation, Trenching for Pipe Sleeves

Excavation, trenching for pipe sleeves shall be in accordance with the applicable provisions of Section 02316 EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS.

3.7.1.2 Cutting of Pipe Sleeve Material

Cutting of pipe sleeve material shall be done in a neat and workmanlike manner without damage to the pipe sleeve. Unless otherwise recommended by the manufacturer and authorized by the Contracting Officer, cutting shall be done with an approved type mechanical cutter. Wheel cutter shall be used when practicable.

3.7.1.3 Joints for Steel Pipe Sleeves

The maximum allowable deflection for the steel pipe sleeve joints shall be as given in AWWA C600 as it is anticipated that ductile-iron water mains will be installed in some of these pipe sleeves. Deflection in excess of the above limitations will not be allowed, nor will allowance be provided for special bends or angular deflections.

3.7.1.4 Placing and Laying Pipe Sleeves

Pipe sleeve and accessories shall be carefully lowered into the trench by means of derrick, ropes, belt slings, or other authorized equipment. Steel or PVC pipe sleeve materials shall not be dropped or dumped into the trench. Abrasion of the pipe sleeve coating when present shall be avoided.

Except where necessary in making connections with other lines or as authorized by the Contracting Officer, pipe sleeves with bells shall be laid with the bells facing in the direction of laying. The full length of each section of pipe sleeve shall rest solidly upon the pipe bed, with

recesses excavated to accommodate bells, couplings, and joints. Pipe sleeves that has the grade or joint disturbed after laying shall be taken up and relaid. Pipe sleeves shall not be laid in water or when trench conditions are unsuitable for the work. Water shall be kept out of the trench until joints are complete and ends plugged as necessary. When work is not in progress, open ends of pipe sleeve, and fittings shall be securely closed so that no trench water, earth, or other substance will enter the pipe sleeves or fittings. Where any part of the coating or lining is damaged, the repair shall be made by and at the Contractor's expense in a satisfactory manner. Pipe sleeve ends left for future connections and/or work shall be plugged, or capped, and anchored, as shown.

A) Piping Sleeve Connections

The connections shall be made by using specials and fittings to suit the actual conditions.

3.7.2 Backfilling of Pipe Sleeves

Backfilling shall be in accordance with the applicable provisions of Section 02316 EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS, except as modified herein.

3.7.3 CLEANUP

Upon completion of the installation of pipe sleeves and appurtenances, all debris and surplus materials resulting from the work shall be removed.

3.7.4 Satisfactory Installation

The contractor shall submit a Satisfactory Installation statement signed by the principal officer of the contracting firm stating that the installation of the pipe sleeves is satisfactory and in accordance with the contract drawings and specifications, and the manufacturer's prescribed procedures and techniques, upon completion of the project and before final acceptance.

-- End of Section --

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SECTION 09900

PAINTING

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)

ACGIH Limit Values (1999) Threshold Limit Values for Chemical Substances and Physical Agents Biological Exposure Indices

FEDERAL SPECIFICATIONS (FS)

FS TT-E-2784 (Rev A) Enamel (Acrylic-Emulsion, Exterior Gloss and Semigloss) (Metric)

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC SP 1 (1982) Solvent Cleaning

1.2 SUBMITTALS

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

SD-01 Preconstruction Submittals

Paint.

The names, quantity represented, and intended use for the proprietary brands of materials proposed to be substituted for the specified materials.

Color.

The color of paint proposed to be used after consulting Contracting Officer.

SD-04 Samples

Paint.

While the material is at the site or source of supply, and at a time agreeable to the Contractor and the Contracting Officer, a 1 liter sample of each color and batch, except for quantities of 200 liters or less, shall be taken by random selection from the sealed containers by the Contractor in the presence of a representative of the Contracting Officer. The contents of the containers to be sampled shall be thoroughly mixed to ensure that the sample is representative. Samples shall be identified by designated name, specification number, manufacturer name and address, batch number, project contract number, intended use, and quantity involved.

SD-06 Test Reports

Paint.

A statement as to the quantity represented and the intended use, plus the following test report for batches in excess of 200 L:

- a. A test report showing that the proposed batch to be used meets specified requirements:
- b. A test report showing that a previous batch of the same formulation as the batch to be used met specified requirements, plus, on the proposed batch to be used, a report of test results for properties of weight per liter, viscosity, fineness of grind, drying time, color, and gloss.

SD-08 Manufacturer's Instructions

Mixing and Thinning.

Application.

Manufacturer's current printed product description, material safety data sheets (MSDS) and technical data sheets for each coating system. Detailed mixing, thinning and application instructions, minimum and maximum application temperature, and curing and drying times between coats for epoxy, moisture-curing polyurethane, and liquid glaze coatings. Detailed application instructions for textured coatings shall be provided.

1.3 PACKAGING, LABELING, AND STORING

Paints shall be in sealed containers that legibly show the designated name, formula or specification number, batch number, color, quantity, date of manufacture, manufacturer's formulation number, manufacturer's directions including any warnings and special precautions, and name of manufacturer. Pigmented paints shall be furnished in containers not larger than 20 liters.

Paints and thinner shall be stored in accordance with the manufacturer's written directions and as a minimum stored off the ground, under cover, with sufficient ventilation to prevent the buildup of flammable vapors and at temperatures between 4 and 35 degrees C. Paints shall be stored on the project site or segregated at the source of supply sufficiently in advance

of need to allow 30 days for testing.

1.4 APPROVAL OF MATERIALS

When samples are tested, approval of materials will be based on tests of the samples; otherwise, materials will be approved based on test reports furnished with them. If materials are approved based on test reports furnished, samples will be retained by the Government for testing should the materials appear defective during or after application. In addition to any other remedies under the contract the cost of retesting defective materials will be at the Contractor's expense.

1.5 ENVIRONMENTAL CONDITIONS

Unless otherwise recommended by the paint manufacturer, the ambient temperature shall be between 7 and 35 degrees C when applying coatings other than water-thinned, epoxy, and moisture-curing polyurethane coatings. Water-thinned coatings shall be applied only when ambient temperature is between 10 and 32 degrees C. Epoxy, and moisture-curing polyurethane coatings shall be applied only within the minimum and maximum temperatures recommended by the coating manufacturer. Moisture-curing polyurethane shall not be applied when the relative humidity is below 30 percent.

1.6 SAFETY AND HEALTH

Work shall comply with applicable Federal, State, and local laws and regulations, and with the ACCIDENT PREVENTION PLAN, including the Activity Hazard Analysis as specified in the CONTRACT CLAUSES. The Activity Hazard Analysis shall include analyses of the potential impact of painting operations on painting personnel and on others involved in and adjacent to the work zone.

1.6.1 Worker Exposures

Exposure of workers to hazardous chemical substances shall not exceed limits established by ACGIH Limit Values, or as required by a more stringent applicable regulation.

1.6.2 Toxic Compounds

Toxic products having ineffective physiological warning properties, such as no or low odor or irritation levels, shall not be used unless approved by the Contracting Officer.

1.6.3 Training

Workers having access to an affected work area shall be informed of the contents of the applicable material data safety sheets (MDSS) and shall be informed of potential health and safety hazard and protective controls associated with materials used on the project. An affected work area is one which may receive mists and odors from the painting operations. Workers involved in preparation, painting and clean-up shall be trained in the safe handling and application, and the exposure limit, for each material which the worker will use in the project. Personnel having a need

to use respirators and masks shall be instructed in the use and maintenance of such equipment.

1.6.4 Coordination

Work shall be coordinated to minimize exposure of building occupants, other Contractor personnel, and visitors to mists and odors from preparation, painting and clean-up operations.

1.6.5 REGULATORY REQUIREMENTS

1.6.5.1 Environmental Protection

In addition to requirements specified elsewhere for environmental protection, provide coating materials that conform to the restrictions of the local Air Pollution Control District and regional jurisdiction. Notify Contracting Officer of any paint specified herein which fails to conform.

1.6.5.2 Lead Content

Do not use coatings having a lead content over 0.06 percent by weight of nonvolatile content.

1.6.5.3 Chromate Content

Do not use coatings containing zinc-chromate or strontium-chromate.

1.6.5.4 Asbestos Content

Materials shall not contain asbestos.

1.6.5.5 Mercury Content

Materials shall not contain mercury or mercury compounds.

1.6.5.6 Human Carcinogens

Materials shall not contain ACGIH Limit Values confirmed human carcinogens (A1) or suspected human carcinogens (A2).

1.7 COLOR SELECTION

Colors of finish coats shall be as indicated or specified. Where not indicated or specified, colors shall be selected by the Contracting Officer. Manufacturers' names and color identification are used for the purpose of color identification only. Named products are acceptable for use only if they conform to specified requirements. Products of other manufacturers are acceptable if the colors approximate colors indicated and the product conforms to specified requirements.

Tint each coat progressively darker to enable confirmation of the number of coats.

PART 2 PRODUCTS

2.1 PAINT

The term "paint" as used herein includes emulsions, enamels, paints, stains, varnishes, sealers, cement-emulsion filler, and other coatings, whether used as prime, intermediate, or finish coat. Additional requirements are as follows:

2.1.1 Colors and Tints

Color samples for concrete channel wall stain and for pipe safety railing paint shall be submitted to the Contracting Officer and approved colors shall be determined by Contracting Officer after coordination with The Howard Hughes Corporation.

2.1.1.1 Exterior Paint on Concrete

Exterior paint on concrete shall conform to FS TT-E-2784 Type III, **semi-gloss**, except the color shall be non-fading black, non-fading yellow, and reflective white.

2.1.1.2 Exterior Paint on Non-Ferrous Metallic Surfaces

Exterior paint on non-ferrous metallic surfaces shall conform to FS TT-E-2784 Type III, **semi-gloss, non-fading. Non-ferrous metallic surfaces include galvanized, aluminum and aluminum-alloy, lead, copper metal surfaces such as posts for post & cable rails.**

2.1.1.3 Exterior Paint for Streets

Exterior paint on asphalt pavements and concrete pavements for street markings shall be in accordance with requirements of TRAFFIC NOTES in drawing D1A entitled UPPER BLUE DIAMOND DIVERSION CHANNEL GENERAL AND CONSTRUCTION NOTES.

PART 3 EXECUTION

3.1 PAINTING CONCRETE SURFACES

3.1.1 Preparation of Concrete Surfaces

Concrete surfaces shall be thoroughly cleaned of all curing compound, efflorescence, dirt, oil or other deleterious material by approved methods.

3.1.2 Application

Painting shall be done in a neat workmanlike manner and may be applied by brush, spray, roller or any combination of these methods. Painting of stripes shall be accomplished with stencils and brush or spray application. Color for stripes shall be yellow.

3.2 PAINTING NON-FERROUS METALLIC SURFACES

3.2.1 Preparation of Nonferrous Metallic Surfaces

Galvanized, aluminum and aluminum-alloy, lead, copper, and other nonferrous metal surfaces shall be solvent-cleaned or detergent-washed in accordance with SSPC SP 1.

3.2.2 Mixing and Thinning

When thinning is approved as necessary to suit surface, temperature, weather conditions, or application methods, paints may be thinned in accordance with the manufacturer's directions. When thinning is allowed, paints shall be thinned immediately prior to application with not more than 0.125 L of suitable thinner per liter. The use of thinner shall not relieve the Contractor from obtaining complete hiding, full film thickness, or required gloss. Thinning shall not cause the paint to exceed limits on volatile organic compounds. Paints of different manufacturers shall not be mixed.

3.2.3 Application

Painting practices shall comply with applicable federal, state and local laws enacted to insure compliance with Federal Clean Air Standards. Unless otherwise specified or recommended by the paint manufacturer, paint may be applied by brush, roller, or spray. At the time of application, paint shall show no signs of deterioration. Uniform suspension of pigments shall be maintained during application. Each coat of paint shall be applied so dry film shall be of uniform thickness and free from runs, drops, ridges, waves, pinholes or other voids, laps, brush marks, and variations in color, texture, and finish. Hiding shall be complete. Rollers for applying paints and enamels shall be of a type designed for the coating to be applied and the surface to be coated. Special attention shall be given to insure that all edges, corners, crevices, welds, and rivets receive a film thickness equal to that of adjacent painted surfaces. Paints, except water-thinned types, shall be applied only to surfaces that are completely free of moisture as determined by sight or touch.

3.3 Street and Pavement Markings

Street and pavement markings shall be in accordance with the "D" sheet drawings.

-- End of Section --

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