AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE	PAGE	OF PAGES
N/A	1	

2. AMENDMENT/MODIFICATION NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO. *(If applicable)*
0001	19 AUG 2002		DACW09-02-B-0009

6. ISSUED BY CODE

U.S. ARMY ENGINEER DISTRICT, LOS ANGELES
P.O. BOX 532711
LOS ANGELES, CALIFORNIA 90053-2325

7. ADMINISTERED BY *(If other than Item 6)* CODE

8. NAME AND ADDRESS OF CONTRACTOR *(No., street, county, State and ZIP Code)*

CODE FACILITY CODE

(√) 9A. AMENDMENT OF SOLICITATION NO.

X DACW09-02-B-0009

9B. DATED *(SEE ITEM 11)*
29 AUG 2002 (Bid Opening Date)

10A. MODIFICATION OF CONTRACTS/ORDER NO.

10B. DATED *(SEE ITEM 13)*

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.)*

UPPER FLAMINGO DIVERSION CHANNEL (Flamingo Detention Basin to El Camino Road), LAS VEGAS WASH AND TRIBUTARIES (TROPICANA AND FLAMINGO WASHES), CLARK COUNTY, NEVADA

CONTINUED ON NEXT SHEET.

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

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

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UPPER FLAMINGO DIVERSION CHANNEL, LAS VEGAS WASH AND TRIBUTARIES (TROPICANA AND FLAMINGO WASHES), CLARK COUNTY, NEVADA (Continued)

BLOCK 14 – Continued

REPLACE the following Specification Sections in the Original Solicitation with the enclosed Specification Sections for clarification purposes:

Section 00010
Section 00850
Section 01200
Section 01270
Section 01330
Section 01330b Submittal Register
Section 01355
Section 02300
Section 02380
Section 02500
Section 02630
Section 02722
Section 02741
Section 02821
Section 03301
Section 05502

Remove Section 02710 from the Original Solicitation.

Replace and Add the following drawings –

T01_1.cal	**196/1109**	**TITLE SHEET, VICINITY MAP. PROJECT LOCATION MAP, AND CONTRACTOR'S STAGING AREA**
T02_1.cal	**196/1110**	**INDEX TO CONTRACT DRAWINGS ABBREVIATIONS, AND SYMBOLS**
T03_1.cal	**196/1111**	**SURVEY CONTROL MAP**
T04_1.cal	**196/1112**	**WORK LIMITS, STA. 71+40.000 TO STA. 58+00.000**
T05_1.cal	**196/1113**	**WORK LIMITS, STA. 58+00.000 TO STA. 39+00.000**
T06_1.cal	**196/1114**	**TABLE OF COORDINATE POINT NUMBERS, R/W**
T07_1.cal	**196/1115**	**TABLE OF COORDINATE POINT NUMBERS, TCE**
C01_1.cal	**196/1116**	**PLAN AND PROFILE, STA. 71+55.214 TO STA. 68+00.000**
C02_1.cal	**196/1117**	**PLAN AND PROFILE, STA. 68+00.000 TO STA. 65+00.000**
C03_1.cal	**196/1118**	**PLAN AND PROFILE, STA. 65+00.000 TO STA. 62+60.000**
C04_1.cal	**196/1119**	**PLAN AND PROFILE, STA. 62+60.000 TO STA. 60+20.000**
C05_1.cal	**196/1120**	**PLAN AND PROFILE, STA. 60+20.000 TO STA. 58+00.000**
C06_1.cal	**196/1121**	**PLAN AND PROFILE, STA. 58+00.000 TO STA. 55+60.000**
C07_1.cal	**196/1122**	**PLAN AND PROFILE, STA. 55+60.000 TO STA. 52+40.000**
C08_1.cal	**196/1123**	**PLAN AND PROFILE, STA. 52+40.000 TO STA. 49+60.000**
C09_1.cal	**196/1124**	**PLAN AND PROFILE, STA. 49+60.000 TO STA. 47+00.000**
C10_1.cal	**196/1125**	**PLAN AND PROFILE, STA. 47+00.000 TO STA. 44+00.000**
C11_1.cal	**196/1126**	**PLAN AND PROFILE, STA. 44+00.000 TO STA. 41+00.000**
C12_1.cal	**196/1127**	**PLAN AND PROFILE, STA. 41+00.000 TO STA. 39+00.000**
C13_1.cal	**196/1128**	**PLAN AND PROFILE, RAINBOW LATERAL**
C14_1.cal	**196/1129**	**PLAN AND PROFILE, BUFFALO LATERAL**
C15_1.cal	**196/1130**	**SIDE DRAINS PROFILES**
C17_1.cal	**196/1132**	**CONCRETE OVERFLOW STRUCTURES STA. 43+30.000 AND STA. 43+17.000**
C18_1.cal	**196/1133**	**CONCRETE OVERFLOW STRUCTURES STA. 41+30.640 AND STA. 40+26.850**
c19_1.cal	**196/1134**	**CROSS SECTIONS, STA.**
C20_1.cal	**196/1135**	**CROSS SECTIONS, STA. 67+80.000 TO STA. 62+40.000**
C21_1.cal	**196/1136**	**CROSS SECTIONS, STA. 62+00.000 TO STA. 49+64.000**
C22_1.cal	**196/1137**	**CROSS SECTIONS, STA. 48+00.000 TO STA. 46+30.000**

UPPER FLAMINGO DIVERSION CHANNEL, LAS VEGAS WASH AND TRIBUTARIES (TROPICANA AND FLAMINGO WASHES), CLARK COUNTY, NEVADA (Continued)

BLOCK 14 – Continued

Replace and Add the following drawings – CONTINUED

C23_1.cal	**196/1138**	**CROSS SECTIONS, STA. 45+52.447 TO STA. 44+00.000**
C24_1.cal	**196/1139**	**CROSS SECTIONS, STA. 43+30.000 TO STA. 42+74.370**
C25_1.cal	**196/1140**	**CROSS SECTIONS, STA. 42+30.842 TO STA. 41+48.645**
C26_1.cal	**196/1141**	**CROSS SECTIONS, STA. 41+07.959 TO STA. 39+48.645**
C27_1.cal	**196/1142**	**GRADING PLAN, STA. 49+20.000 TO STA. 42+00.000**
S01_1.cal	**196/1144**	**GENERAL STRUCTURAL NOTES AND DETAILS**
S02_1.cal	**196/1145**	**TYPICAL WALL SECTIONS AND DETAILS**
S04_1.cal	**196/1147**	**RAINBOW CONFLUENCE STRUCTURE, PLAN, SECTIONS AND DETAILS**
S05_1.cal	**196/1148**	**RAINBOW CONFLUENCE STRUCTURE, SECTIONS AND DETAILS**
S06_1.cal	**196/1149**	**BUFFAL0 CONFLUENCE STRUCTURE, PLAN, SECTIONS AND DETAILS**
S07_1.cal	**196/1150**	**BUFFALO CONFLUENCE STRUCTURE, SECTIONS AND DETAILS**
S08_1.cal	**196/1151**	**MANHOLE AND MISCELLANEOUS DETAILS**
S09_1.cal	**196/1152**	**INVERT ACCESS RAMP PLAN, PROFILE AND SECTIONS, STA. 66+80.000 TO STA. 66+20.692**
S10_1.cal	**196/1153**	**INVERT ACCESS RAMP PLAN, PROFILE AND SECTIONS, STA. 45+76.000 TO STA. 45+18.894**
S11_1.cal	**196/1154**	**TRANSITION STRUCTURE DETAILS (STA. 70+95.214 TO STA.71+55.213)**
S12_1.cal	**196/1155**	**TRANSITIONING FROM GABION TO TRANSITION STR. CROSS SECTIONS**
S13_1.cal	**196/1156**	**SIDE DRAIN TABULATION AND DETAILS**
S14_1.cal	**196/1157**	**SLOTTED CHAMBER INLET PLAN AND SECTIONS**
S16_1.cal	**196/1159**	**OUTLET STRUCTURE/RESTRICTOR PLATE SECTIONS AND DETAILS**
S17_1.cal	**196/1160**	**UNSYMMETRICAL CHANNEL AND SUPERELEVATION CHANNEL WALL SECTIONS**
S18_1.cal	**196/1161**	**MANHOLE FOR SLOTTED CHAMBER**
S20_1.cal	**196/1163**	**DROP STRUCTURE AT STA. 48+67.994**
S21_1.cal	**196/1164**	**INLET STRUCTURE PLAN AND SECTIONS**
M01_1.cal	**196/1167**	**CHAIN LINK FENCING, AND MAINTENANCE ROAD DETAILS**
M02_1.cal	**196/1168**	**PIPE SAFETY RAILING AND PIPE ACCESS RAMP GATE DETAILS AND SECTIONS**
M03_1.cal	**196/1169**	**CABLE RAILING DETAILS**
G01_1.cal	**196/1173**	**PLAN OF EXPLORATION**
G05_1.cal	**196/1177**	**LOGS OF EXPLORATION**
G06_1.cal	**196/1178**	**LOGS OF EXPLORATION**
D01.CAL	**196/1181**	**LOCAL CONTROL PLAN**
D02.CAL	**196/1182**	**PLAN & PROFILE, RAINBOW/DEWEY STORMDRAIN SYSTEM**
D03.CAL	**196/1183**	**PLAN & PROFILE, 21' CHANNEL**
D04.CAL	**196/1184**	**PLAN & PROFILE, 43' CHANNEL**
D05.CAL	**196/1185**	**PLAN & PROFILE, TENAYA WAY ROAD MODIFICATIONS**
D06.CAL	**196/1186**	**PLAN, TENAYA WAY STORMDRAIN SYSTEM**
D08.CAL	**196/1188**	**LATERAL DETAILS, TENAYA WAY STORMDRAIN SYSTEM**
D10.CAL	**196/1190**	**REMOVAL PLAN, DEWEY DRIVE**
D11.CAL	**196/1191**	**PLAN & PROFILE, STA. 10+00 - STA. 20+00**
D13.CAL	**196/1193**	**DEWEY DRIVE - LANDSCAPING, STREETLIGHT, SIGNAGE & PAVEMENT MARKING PLAN**
D15.CAL	**196/1195**	**DURANGO HIGH SCHOOL AREA CONSTRUCTION PHASING PLAN**
D16.CAL	**196/1196**	**PHASE 1 & 2 DETOUR AT RAINBOW BOULEVARD PLAN**
D17.CAL	**196/1197**	**PHASE 3 (REMOVE DETOUR) AT RAINBOW BOULEVARD PLAN**
D18.CAL	**196/1198**	**RAINBOW BOULEVARD, PHASE 1 DETOUR CONSTRUCTION SIGNING AND STRIPING**

UPPER FLAMINGO DIVERSION CHANNEL, LAS VEGAS WASH AND TRIBUTARIES (TROPICANA AND FLAMINGO WASHES), CLARK COUNTY, NEVADA (Continued)

BLOCK 14 – Continued

Replace and Add the following drawings – CONTINUED

D19.CAL	**196/1199**	**RAINBOW BOULEVARD, PHASE 2 DETOUR CONSTRUCTION SIGNING AND STRIPING**
D20.CAL	**196/1200**	**RAINBOW BOULEVARD, PAVEMENT PARKING/SIGNING PLAN**
D21.CAL	**196/1201**	**DEWEY DRIVE, ROAD CLOSURE DETOUR PLAN**
D22.CAL	**196/1202**	**TIMBER CREEK STREET, ROAD CLOSURE DETOUR PLAN**
D24.CAL	**196/1204**	**PLAN & PROFILE, DURANGO HIGH SCHOOL ACCESS ROAD**
D26.CAL	**196/1206**	**SANITARY SEWER RELOCATION (TENAYA WAY)**
D27.CAL	**196/1207**	**LAS VEGAS WATER DISTRICT - wATERLINE RELOCATION (BUFFALO DRIVE)**
D28.CAL	**196/1208**	**LAS VEGAS WATER DISTRICT - WATERLINE RELOCATION (RAINBOW BLVD.)**
D31.CAL	**196/1211**	**LAS VEGAS WATER DISTRICT - SECTIONS AND DETAILS**

END OF SF-30

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DOCUMENT TABLE OF CONTENTS

DIVISION 00 - DOCUMENTS

SECTION 00010

BID SCHEDULE

-- End of Document Table of Contents --

SECTION 00010

BID SCHEDULE

PART 1 GENERAL

Note : Some of the lump sum payment items reference drawings and plans that utilize english units of measurements.

1.1 **Base Bid**

Item	Description	Quantity	Unit	Unit Price	Amount
0001	TRAFFIC CONTROL, EXCEPT BETWEEN STA. 51+75.702 TO STA. **45+14.894**	1.00	LS	$___.__	$_____.___
0002	DIVERSION AND CONTROL OF WATER, EXCEPT BETWEEN STA. 51+75.702 TO STA. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000**	1.00	LS	$___.__	$_____.___
0003	CLEAR SITE AND REMOVE OBSTRUCTIONS, EXCEPT BETWEEN STA. 51+75.702 TO STA. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000**	1.00	LS	$___.__	$_____.___
0004	EXCAVATION, EXCEPT BETWEEN STA. 51+75.702 TO STA. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000**	200,611	m^3	$___.__	$_____.___
0005	**COMPACTED FILL**, CHANNEL, EXCEPT BETWEEN STA. 51+75.702 TO STA. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000**	144,226	m^3	$___.__	$_____.___
0006	COMPACTED FILL, DISPOSAL SITE	76,592	m^3	$___.__	$_____.___
0007	CONCRETE, **CHANNEL** INVERT SLAB, EXCEPT BETWEEN **STA. 46+51.092 TO STA. 45+76.000 AND BETWEEN STA. 70+20.372 TO STA. 69+80.000**	**2,845**	m^3	$___.__	$_____.___
0008	CONCRETE, **CHANNEL** WALLS, EXCEPT BETWEEN **STA. 46+51.092 TO STA. 45+76.000 AND BETWEEN**	**2,913**	m^3	$___.__	$_____.___

STA. 70+20.372 TO STA. 69+80.000

Item	Description	Quantity	Unit	Unit Price	Amount
0009	CONCRETE OVERFLOW STRUCTURES	1.00	LS	$___.__	$_____.___
0010	**GROUTED RIPRAP, EXCEPT BETWEEN STA. 51+75.702 TO STA. 45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000**	**2,400**	**m^3**	**$___.__**	**$_____.___**
0011	REINFORCING STEEL, EXCEPT BETWEEN **STA. 46+51.092 TO STA. 45+76.000 AND BETWEEN STA. 70+20.372 TO STA. 69+80.000**	408	t	$___.__	$_____.___
0012	AGGREGATE BASE COURSE, EXCEPT BETWEEN STA. 51+75.702 TO STA. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000**	1,807	t	$___.__	$_____.___
0013	ASPHALT CONCRETE PAVEMENT, EXCEPT BETWEEN STA. 51+75.702 TO STA. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000**	1,172	t	$___.__	$_____.___
0014	WEEPHOLE SYSTEM, EXCEPT BETWEEN STA. **46+51.092** TO STA. **45+14.894 AND BETWEEN STA. 70+20.372 TO STA. 69+80.000**	1.00	LS	$___.__	$_____.___
0015	**BOX CONDUIT** @ TORREY PINES DRIVE, STA. 42+52.904 TO STA. 42+95.576	1.00	LS	$___.__	$_____.___
0016	**CHANNEL BOX CONDUIT,** STA. 51+75.702 TO STA. 62+00.000	1.00	LS	$___.__	$_____.___
0017	INVERT ACCESS RAMP, STA. **66+16.692** TO STA. 66+80.000	1.00	LS	$___.__	$_____.___
0018	**BOX CONDUIT** @ TIOGA WAY, STA. 68+14.537 TO STA. **68+51.117**	1.00	LS	$___.__	$_____.___
0019	**CONFLUENCE/INVERT TRANSITION FOR FLAMINGO CHANNEL, STA. 68+51.117 to STA. 69+53.335, AND A PORTION OF BUFFALO LATERAL STA. 10+00.000 to STA. 10+76.563 (Bid Item 0019).**	**1.00**	**LS**	**$___.__**	**$_____.___**
0020	**BOX CONDUIT** @ BUFFALO DRIVE, STA. **70+20.372** TO STA. 70+58.784	1.00	LS	$___.__	$_____.___

Item	Description	Quantity	Unit	Unit Price	Amount
0021	**TRAPEZOIDAL TO RECTANGULAR CHANNEL TRANSITION, STA 70+95.214 TO STA. 71+55.214**	**1.00**	**LS**	**$___.__**	**$_____.___**
0022	BUFFALO LATERAL, STA. **10+76.563** TO STA. **12+10.198**	1.00	LS	$___.__	$_____.___
0023	**SIDE DRAIN, STA. 42+78.750 RT.**	**1.00**	**LS**	**$___.__**	**$_____.___**
0024	SIDE DRAIN, STA. 55+03.050 RT.	1.00	LS	$___.__	$_____.___
0025	SIDE DRAIN, STA. 56+23.050 LT.	1.00	LS	$___.__	$_____.___
0026	SIDE DRAIN, STA. 56+23.050 RT.	1.00	LS	$___.__	$_____.___
0027	SIDE DRAIN, STA. **58+21.761** RT.	1.00	LS	$___.__	$_____.___
0028	SIDE DRAIN, STA. 58+30.000 LT.	1.00	LS	$___.__	$_____.___
0029	SIDE DRAIN, STA. 61+30.000 RT.	1.00	LS	$___.__	$_____.___
0030	SLOTTED CHAMBER, STA. 42+62.879, RT	1.00	LS	$___.__	$_____.___
0031	**21 FOOT CHANNEL**	**1.00**	**LS**	**$___.__**	**$_____.___**
0032	INLET STRUCTURE, SINGLE RCP STA. 55+03.050 RT	1.00	LS	$___.__	$_____.___
0033	**43 FOOT CHANNEL & TENAYA WAY ROAD MODIFICATIONS**	**1.00**	**LS**	**$___.__**	**$_____.___**
0034	INLET STRUCTURE, DOUBLE RCP STA. 56+23.050 LT AND RT	1.00	LS	$___.__	$_____.___
0035	**TIOGA STREET REMOVAL AND RECONSTRUCTION**	**1.00**	**LS**	**$___.__**	**$_____.___**
0036	**TENAYA/DIABLO STORM DRAIN SYSTEM FOR SIDE DRAIN, STA. 58+21.761 RT**	**1.00**	**LS**	**$___.__**	**$_____.___**
0037	**TENAYA/ELDRIDGE STORM DRAIN SYSTEM FOR SIDE DRAIN, STA. 61+30.000 RT**	**1.00**	**LS**	**$___.__**	**$_____.___**
0038	MANHOLES FOR BOX **CONDUITS, CULVERTS, AND LATERALS**, EXCEPT BETWEEN STA. 51+75.702 TO STA. **46+51.092**	1.00	LS	$___.__	$_____.___
0039	**ACCESS ROAD @ DURANGO HIGH SCHOOL**	1.00	LS	$___.__	$_____.___

Item	Description	Quantity	Unit	Unit Price	Amount
0040	ROAD DETOURS @ BUFFALO/**TIOGA**	1.00	LS	$___.__	$_____.___
0041	CHAIN LINK FENCE, EXCEPT BETWEEN STA. 51+75.702 TO STA. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000**	2,926	m	$___.__	$_____.___
0042	PIPE SAFETY RAILING, EXCEPT BETWEEN STA. **46+52.000** TO STA. **45+14.894 AND BETWEEN STA. 70+20.000 TO STA. 70+21.000**	1,154	m	$___.__	$_____.___
0043	**CABLE SAFETY RAILING**, EXCEPT **BETWEEN STA. 70+20.372 TO STA. 69+80.000**	1,752	m	$___.__	$_____.___
0044	DOUBLE SWING GATES, EXCEPT BETWEEN STA. 51+75.702 TO STA. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000**	16	ea	$___.__	$_____.___
0045	SOIL STABILIZER, EXCEPT BETWEEN STA. 51+75.702 TO STA. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000**	6,539	m^3	$___.__	$_____.___
0046	STATION MARKINGS, EXCEPT BETWEEN STA. 51+75.702 TO STA. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000**	1.00	LS	$___.__	$_____.___
0047	AS-BUILT DRAWINGS	1.00	LS	$___.__	$_____.___
0048	DEWEY STREET REMOVAL AND REPLACEMENT, STA. 56+00.000 TO STA. 51+75.702	1.00	LS	$___.__	$_____.___
0049	0.250 M (10 INCH) SEWER @ TENAYA WAY	1.00	LS	$___.__	$_____.___
0050	0.300 M (12 INCH) WATERLINE @ BUFFALO DRIVE	1.00	LS	$___.__	$_____.___
0051	**LADDER SYSTEMS, EXCEPT BETWEEN STA. 51+75.702 TO STA. 45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000**	**1.00**	**LS**	**$___.__**	**$_____.___**

SUBTOTAL ESTIMATED AMOUNT OF BASE BID (Line Items 0001 through 0051) **$_____.____**

1.2 **Optional Bid Items**

Note : Some of the Optional Bid lump sum payment items reference drawings and plans that utilize english units of measurements.

Item	Description	Quantity	Unit	Unit Price	Amount
0052	TRAFFIC CONTROL, STA. 51+75.702 TO STA. **45+14.894**	1.00	LS	$___.__	$_____.___
0053	DIVERSION AND CONTROL OF WATER, STA. 51+75.702 TO STA. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000**	1.00	LS	$___.__	$_____.___
0054	CLEAR SITE AND REMOVE OBSTRUCTIONS, STA. 51+75.702 TO STA. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000**	1.00	LS	$___.__	$_____.___
0055	EXCAVATION, STA. 51+75.702 TO STA. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000**	46,249	m^3	$___.__	$_____.___
0056	**COMPACTED FILL, CHANNEL,** STA. 51+75.702 TO STA. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000**	26,043	m^3	$___.__	$_____.___
0057	CONCRETE, **CHANNEL** INVERT SLAB, STA. 46+51.092 TO STA. **45+14.894 AND BETWEEN STA. 70+20.372 TO STA. 69+80.000**	2,160	m^3	$___.__	$_____.___
0058	CONCRETE, **CHANNEL** WALLS, STA. 46+51.092 TO STA. **45+14.894 AND BETWEEN STA. 70+20.372 TO STA. 69+80.000**	2,400	m^3	$___.__	$_____.___
0059	REINFORCING STEEL, STA. 46+51.092 TO STA. **45+14.894 AND BETWEEN STA. 70+20.372 TO STA. 69+80.000**	120	t	$___.__	$_____.___
0060	AGGREGATE BASE COURSE, STA. 46+51.092 TO STA. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000**	105	t	$___.__	$_____.___

Item	Description	Quantity	Unit	Unit Price	Amount
0061	ASPHALT CONCRETE PAVEMENT, STA. 46+51.092 TO STA. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000**	53	t	$___.__	$_____.___
0062	WEEPHOLE SYSTEM, STA. 46+51.092 TO STA. **45+14.894 AND BETWEEN STA. 70+20.372 TO STA. 69+80.000**	1.00	LS	$___.__	$_____.___
0063	INVERT ACCESS RAMP, STA. **45+14.894 to STA. 45+76.000**	1.00	LS	$___.__	$_____.___
0064	**BOX CONDUIT** @ REDWOOD STREET, STA. 46+51.092 TO STA. 46+87.668	1.00	LS	$___.__	$_____.___
0065	**CHANNEL BOX CONDUIT,** STA. 46+87.668 TO STA. 47+04.000	1.00	LS	$___.__	$_____.___
0066	COVERED CONFLUENCE/INVERT TRANSITION **(SECTION R),** STA. 47+04.000 TO STA. 49+73.000	1.00	LS	$___.__	$_____.___
0067	**CHANNEL BOX CONDUIT (SECTION S),** STA. 49+73.000 TO STA. 49+93.000 **AND PORTION OF RAINBOW LATERAL STA. 9+99.100 to STA. 10+19.983**	1.00	LS	$___.__	$_____.___
0068	**CHANNEL BOX CONDUIT,** STA. 49+93.000 TO STA. 50+37.018	1.00	LS	$___.__	$_____.___
0069	**BOX CONDUIT** @ RAINBOW BLVD., STA. 50+37.018 TO STA. 50+88.000	1.00	LS	$___.__	$_____.___
0070	TRANSITION STRUCTURE, STA. 50+88.000 TO STA. 51+38.000	1.00	LS	$___.__	$_____.___
0071	**CHANNEL BOX CONDUIT,** STA. 51+38.000 TO STA. 51+75.702	1.00	LS	$___.__	$_____.___
0072	RAINBOW LATERAL, STA. **10+19.983** TO STA. 11+38.403	1.00	LS	$___.__	$_____.___
0073	SIDE DRAIN, STA. 46+62.875 **RT**.	1.00	LS	$___.__	$_____.___
0074	**SIDE DRAIN, STA. 48+67.994 RT.**	**1.00**	**LS**	**$___.__**	**$_____.___**
0075	SIDE DRAIN, STA. **50+76.739 RT**.	1.00	LS	$___.__	$_____.___

Item	Description	Quantity	Unit	Unit Price	Amount
0076	SIDE DRAIN, STA. **50+84.247 LT**.	1.00	LS	$___.__	$_____.___
0077	**DROP INLET STRUCTURE FOR SIDE DRAIN, STA. 48+67.994 RT**	**1.00**	**LS**	**$___.__**	**$_____.___**
0078	**RAINBOW/DEWEY STORM DRAIN SYSTEM FOR SIDE DRAIN, STA. 50+76.739 RT**	**1.00**	**LS**	**$___.__**	**$_____.___**
0079	**RAINBOW/DEWEY STORM DRAIN SYSTEM FOR SIDE DRAIN, STA. 50+84.247 LT**	**1.00**	**LS**	**$___.__**	**$_____.___**
0080	ROAD DETOURS @ RAINBOW BLVD.	1.00	LS	$___.__	$_____.___
0081	MANHOLES FOR BOX **CONDUITS, CULVERTS, AND LATERALS** BETWEEN STA. 51+75.702 TO STA. **46+51.092**	1.00	LS	$___.__	$_____.___
0082	**STREET/SIGNAGE MODIFICATIONS, REDWOOD STREET**	**1.00**	**LS**	**$___.__**	**$_____.___**
0083	CHAIN LINK FENCE, STA. 51+75.702 TO STA. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000**	264	m	$___.__	$_____.___
0084	PIPE SAFETY RAILING, BETWEEN STA. 46+52.000 TO STA. **45+14.894 AND BETWEEN STA. 70+20.000 TO STA. 70+21.000**	40	m	$___.__	$_____.___
0085	DEWEY STREET REMOVAL AND REPLACEMENT, STA. 51+75.702 TO STA. 50+59.000	1.00	LS	$___.__	$_____.___
0086	0.250 M (10 INCH) WATERLINE @ RAINBOW BOULEVARD	1.00	LS	$___.__	$_____.___
0087	DOUBLE SWING GATES, STA. 51+75.702 TO STA. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000**	4	ea	$___.__	$_____.___
0088	SOIL STABILIZER, STA. 51+75.702 TO STA. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000**	27,100	m^2	$___.__	$_____.___

Item	Description	Quantity	Unit	Unit Price	Amount
0089	STATION MARKINGS, STA. 51+75.702 TO STA. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000**	1.00	LS	$___.__	$_____.___
0090	**LADDER SYSTEMS, BETWEEN STA. 51+75.702 TO STA. 45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000**	**1.00**	**LS**	$___.__	$_____.___
0091	**BOX CONDUIT @ BUFFALO DRIVE, STA. 70+20.372 TO STA. 70+37.278**	**1.00**	**LS**	$___.__	$_____.___
0092	**GROUTED RIPRAP, BETWEEN STA. 51+75.702 TO STA. 45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000**	**1.00**	**LS**	$___.__	$_____.___
0093	**CABLE SAFETY RAILING, BETWEEN STA. 70+20.372 TO STA. 69+80.000**	**82**	**m**	$___.__	$_____.___
0094	**RESTRICTOR PLATE FOR FLAMINGO DETENTION BASIN OUTLET**	**1.00**	**LS**	$___.__	$_____.___

SUBTOTAL ESTIMATED AMOUNT OF OPTION BID ITEMS $_____._____
(Line Items 0052 through 0094)

TOTAL ESTIMATED AMOUNT $_____._____
(Base Bid and Option Bid Items)

Abbreviations:

m	=	meter
m^3	=	cubic meter
m^2	=	square meter
t	=	metric ton (1000 kilograms)
ea	=	each
LS	=	lump sum
HA	=	hectare

CLAUSES INCORPORATED BY FULL TEXT

1. All extensions of the unit prices shown will be subject to verification by the Government. In case of variation between the unit price and the extension, the unit price will be considered to be the bid.

2. If a modification to a bid based on unit prices is submitted which provides for a lump sum adjustment to the total estimated amount, the application of the lump sum adjustment to each unit price in the Price Schedule must be stated. If it is not stated, the bidder agrees that the lump sum adjustment shall be applied on a pro rata basis to every unit price in the Price Schedule.

3. Prices must be submitted on all individual items of the Price Schedule, otherwise the bid will be considered nonresponsive and will be rejected.

4. For the purpose of initial evaluation of bids, the following will be utilized in resolving arithmetic discrepancies found on the face of the Price Schedule as submitted by the bidder:

a. Obviously misplaced decimal points will be corrected;

b. In case of discrepancy between the unit price and the extended price, the unit price will govern;

c. Apparent errors in extensions of unit prices will be corrected;

d. Apparent errors in addition of lump sum and extended prices will be corrected.

5. For the purpose of bid evaluation, the Government will proceed on the assumption that the bidder intends the bid to be evaluated on the basis of unit prices the totals arrived at by the resolution of arithmetic discrepancies as provided above and the bid will be so reflected on the abstract of bids.

6. The lump sum "LS" line items in the Price Schedule are not "Estimated Quantity" line items and are not subject to the "Variation in Estimated Quantity" contract clause.

7. The Contract Clause 52.232-27, "Prompt Payment for Construction Contracts" requires that the name and address of the contractor official, to whom payment is to be sent, be the same as that in the contract or in a proper Notice of Assignment.

8. Principal Contracting Officer. The Contracting Officer who signs this contract will be the Principal Contracting Officer for this contract. However, any Contracting Officer assigned to the Los Angeles District, contracting within his authority, may take formal action on this contract when the Principal Contracting Officer is unavailable and the action needs to be taken.

9. Amounts and prices shall be indicated in either words or figures, NOT BOTH.

10. Payment of Electronic Funds Transfer (EFT) is the mandatory method of payment. The Contractors attention is directed to Contract Clause NO. 52.232-33 "Mandatory Information for Electronic Funds Transfer" located in Section 00800.

11. The bidder shall distribute his indirect costs (overhead, profit, bond, etc.,) over all items in the Price Schedule. The Government will review all submitted Price Schedules for any unbalancing of the items. Any submitted Price Schedule determined to be unbalanced may be considered nonresponsive and cause the bidder to be ineligible for contract award.

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

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

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

15. Contractor is required to fill in Cage code (Reference Section 00600, entitled "Required Central Contractor Registration" Mar 1998) and DUNS Number (Reference Section 00600, entitled, "Data Universal Numbering System (DUNS) Number" Jun1999) in Block No. 15 on Standard Form 1442, Name and Address Block (Cage Code under Code and DUNS No. under Facility Code respectively).

16. The Government contemplates award on one contract to the responsive, responsible bidder who submits the low bid for the total of all the items in the Price Schedule.

17. Bidders are to submit prices on all line items in the Bid Schedule. The Government contemplates award of one contract to the responsive, responsible bidder who submits the lowest bid for the Base Bid and Optional Bid Items. See Section 00100, Clause 52.217-5, entitled, "Evaluation of Options". Any bidder who submits a bid without all line items for both Base Bid and Optional Bid Items filled out comprehensively and correctly will be deemed nonresponsive and their bid will be rejected. Basis of Bid shall be the entire work complete in accordance with the drawings and specifications for Base Bid Items, and including the work indicated or specified to be provided under any Option Item.

18. Option may be executed at the time of award or within 180 calendar days after award by the Contracting Officer. A firm fixed bid price is required for each option. No provision is made for enomomic price adjustment.

19. Please refer to Section 00100, Submission of Bids for special instructions for Hand-Carried Bids.

CERTIFICATE OF CORPORATE PRINCIPAL

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

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

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

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

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

CERTIFICATION AS TO CORPORATE PRINCIPAL

I, _____, certify that I am the Secretary of the corporation named as principal in the

within contract; that _____, who signed the said contract on behalf of the principal, was the

_____ of the corporation; that I know his signature and that his signature is genuine; and that said contract was duly signed, sealed and attested for in behalf of said corporation by authority of its governing body.

_____
CORPORATE PRINCIPAL

CORPORATE SEAL

_____
SECRETARY

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

-- End of Section --

SECTION 00850

RATES OF WAGES

General Decision Number NV020005

General Decision Number **NV020005**
Superseded General Decision No. NV010005
State: Nevada
Construction Type:
HEAVY
HIGHWAY
County(ies):

CARSON CITY	EUREKA	NYE
CHURCHILL	HUMBOLDT	PERSHING
CLARK	LANDER	STOREY
DOUGLAS	LINCOLN	WASHOE
ELKO	LYON	WHITE PINE
ESMERALDA	MINERAL	

HEAVY AND HIGHWAY CONSTRUCTION PROJECTS (Except construction projects at the NEVADA TEST SITE and TONOPAH TEST RANGE) (and Excluding Water Well Drilling)

Modification Number	Publication Date
0	03/01/2002
1	03/22/2002
2	03/29/2002
3	06/07/2002
4	07/12/2002
5	08/09/2002

COUNTY(ies):

CARSON CITY	EUREKA	NYE
CHURCHILL	HUMBOLDT	PERSHING
CLARK	LANDER	STOREY
DOUGLAS	LINCOLN	WASHOE
ELKO	LYON	WHITE PINE
ESMERALDA	MINERAL	

CARP0034L 07/01/1998

	Rates	Fringes
CARSON CITY, CHURCHILL, DOUGLAS, ELKO, EUREKA, HUMBOLDT, LANDER, LYON, MINERAL, PERSHING, STOREY, WASHOE AND WHITE PINE COUNTIES		
DIVER STANDBY	27.65	12.425
DIVER WET	38.90	12.425
DIVER TENDER	27.65	12.425
PILE DRIVERS: (Bridge, Warf & Dock Builders)	25.65	12.425

CARP0971E 07/01/2001

	Rates	Fringes
CHURCHILL, DOUGLAS, ELKO, EUREKA, HUMBOLDT, LANDER, LYON, MINERAL, PERSHING, STOREY, WASHOE, AND WHITE PINE.		
CARPENTERS	24.95	5.75

CARP1780A 07/01/1999

	Rates	Fringes

CLARK, ESMERALDA, LINCOLN AND NYE COUNTIES		
CARPENTERS:		
30 Mile radius around Las Vegas (Measured from the intersection of Maryland Parkway and Charleston Blvd.)	27.18	7.65
30 to 50 Mile radius around Las Vegas (same as above)	28.68	7.65
Over 50 mile Mile radius around Las Vegas (same as above)	30.43	7.65
Laughlin Area	29.18	7.65

ELEC0357F 12/01/2001		
	Rates	Fringes
CLARK, LINCOLN, AND NYE (South of the Mt. Diablo Base Line) COUNTIES		
ELECTRICIANS	28.55	10.21+3%

ELEC0357G 07/01/1997		
	Rates	Fringes
CLARK, LINCOLN, AND NYE COUNTIES		
LINE CONSTRUCTION WORKERS:		
Area bound by a 30 mile radius from the intersection of Main Street and Fremont Street in Las Vegas (Free Area)		
Groundman	17.98	5.95+3%
Line Equipment Operators	21.86	5.95+3%
Lineman	24.45	5.95+3%
Area between a 30 mile radius and 60 mile radius from Main and Fremont Streets		
Groundman	18.98	5.95+3%
Line Equipment Operators	22.86	5.95+3%
Lineman	25.45	5.95+3%
Area Over 60 mile radius from Main and Fremont Streets		
Groundman	20.98	5.95+3%
Line Equipment Operators	24.86	5.95+3%
Lineman	27.45	5.95+3%

ELEC0401F 06/01/2002		
	Rates	Fringes
CHURCHILL, DOUGLAS, ELKO, ESMERALDA, EUREKA, HUMBOLDT, LANDER, LYON, MINERAL, PERSHING, STOREY, WASHOE, AND WHITE PINE COUNTYS.		
ELECTRICIANS:		
ELECTRICAINS	27.17	7.20+3%
CABLE SPLICER	29.89	7.20+3%

ELEC0401G 02/01/1993		
	Rates	Fringes
CHURCHILL, DOUGLAS, ELKO, ESMERALDA, EUREKA, LANDER, LYON, MINERAL, PERSHING, STOREY, WASHOE, AND WHITE PINES COUNTYS.		
LINE CONSTRUCTION:		
Lineman	21.74	5.34+3-3/4%
Cable Splicer	23.91	5.34+3-3/4%

Equipment Operator	19.57	5.34+3-3/4%
Groundman	14.13	5.34+3-3/4%

ENGI0012H 08/01/1999

	Rates	Fringes
HYDRAULIC SUCTION AND CLAMSHELL DREDGES		
Leverman	34.20	8.00
Deck Captain	31.30	8.00
Dozer	30.73	8.00
Watch Engineer, Welder and Deckmate	30.62	8.00
Winchman (Stern Winch) (on dredge)	30.07	8.00
Deckhand (can operate anchor scow under direction of mate), Bargeman	29.53	8.00
Barge mate	30.14	8.00

ENGI0012J 07/01/2002

	Rates	Fringes
CLARK, ESMERALDA LINCOLN AND NYE COUNTIES		
POWER EQUIPMENT OPERATORS:		
Group 1	27.64	9.05
Group 2	28.59	9.05
Group 3	28.88	9.05
Group 4	30.17	9.05
Group 5	30.79	9.05
Group 6	30.39	9.05
Group 7	30.92	9.05
Group 8	30.50	9.05
Group 9	31.42	9.05
Group 10	30.62	9.05
Group 11	32.22	9.05
Group 12	30.79	9.05
Group 13	30.89	9.05
Group 14	30.92	9.05
Group 15	31.00	9.05
Group 16	31.12	9.05
Group 17	31.29	9.05
Group 18	31.39	9.05
Group 19	31.50	9.05
Group 20	31.62	9.05
Group 21	31.79	9.05
Group 22	31.89	9.05
Group 23	32.00	9.05
Group 24	32.12	9.05
CRANES, PILEDRIVING & HOISTING EQUIPMENT		
Group 1	28.79	9.05
Group 2	29.74	9.05
Group 3	30.03	9.05
Group 4	30.17	9.05
Group 5	30.39	9.05
Group 6	30.50	9.05
Group 7	30.62	9.05
Group 8	30.79	9.05
Group 9	30.96	9.05
Group 10	31.96	9.05

Group 11	32.96	9.05
Group 12	33.96	9.05
Group 13	34.96	9.05
TUNNEL GROUP:		
Group 1	29.36	9.05
Group 2	30.17	9.05
Group 3	30.39	9.05
Group 4	30.67	9.05
Group 5	30.79	9.05
Group 6	30.89	9.05
Group 7	31.79	9.05

From the City Hall of Las Vegas
20 Miles to 40 Miles - add $1.50 per hour to wage rates
40 Miles to 60 Miles - add $2.50 per hour to wage rates
Over 60 Miles - add $3.00 per hour to wage rates

POWER EQUIPMENT OPERATOR CLASSIFICATIONS:

GROUP 1: Bargeman, brakeman, compressor operator (when more than five (5) 900 CFM or larger units, additional operator required), ditch witch, with seat or similar type equipment, elevator operator - inside, engineer oiler, generator operator, generator, pump or compressor plant operator, pump operator, signalman, switchman

GROUP 2: Asphalt - rubber plant operator, concrete mixer operator - skip type, conveyor operator, fireman, hydrostatic pump operator, oiler crusher (asphalt or concrete plant), skiploader (when wheel type up to 3/4 yd. without attachment), soils field technician, tar pot fireman, temporary heating plant operator, trenching machine oiler, nurse tank operator.

GROUP 3: Asphalt - rubber blend operator, equipment greaser (rack), ford ferguson (with dragtype attachments), helicopter radioman (ground), power concrete curing machine operator, power concrete saw operator, power - driven jumbo form setter operator, stationary pipe wrapping and cleaning machine operator

GROUP 4: Asphalt plant fireman, backhoe operator (mini-max or similar type), boring machine operator, boxman or mixerman (asphalt or concrete), chip spreading machine operator, concrete pump operator (small portable), drilling machine operator, small auger types (Texoma super economatic or similar types - Hughes 100 or 200 or similar types - drilling depth of 30' maximum), equipment greaser (grease truck), guard rail post driver operator, highline cableway signalman, hydra-hammer-aero stomper, power sweeper operator, roller operator (compacting), screed operator (asphalt or concrete), trenching machine operator (up to 6ft.), concrete cleaning decontamination machine operator, power concrete curing machine operator,

GROUP 5: Equipment Greaser (Grease Truck)

GROUP 6: Asphalt plant engineer, batch plant operator, bit sharpener, concrete joint machine operator (canal and similar type), concrete planer operator, deck engine operator, derrickman (oilfield type), drilling machine operator, bucket or auger types (Caldwell 100 bucket or similar types - Watson 1000 auger or similar types - Texoma 330, 500 or 600 auger or similar types - drilling depth of 45' maximum), drilling machine operator, hydrographic seeder machine operator (straw, pump or seed), Jackson track maintainer, or similar type, Kalamazoo switch tamper, or similar type, machine tool operator, Maginnis internal full slab vibrator, mechanical berm, curb or gutter

(concrete or asphalt), mechanical finisher operator (concrete, Clary-Johnson-Bidwell or similar type), pavement breaker operator (truck mounted), road oil mixing machine operator, roller operator (asphalt or finish), rubber - tired earth moving equipment (single engine, up to and including 25 yds. struck), self-propelled tar pipelining machine operator, skiploader operator (crawler and wheel type, over 3/4 yd. and up to and including 1-1/2 yds.), slip form pump operator (power driven hydraulic lifting device for concrete forms), tractor operator - bulldozer, tamper-scraper (single engine, up to 100 h.p. flywheel and similar types, up to and including D-5 and similar types), tugger hoist operator

GROUP 7: Asphalt or concrete spreading operator (tamping or finishing), asphalt paving machine operator (Barber Greene or similar type - 1 screedman required), Asphalt -rubber distributor operator, backhoe operator (up to and including 3/4 yd.), small Ford, Case or similar, cast-in-place pipe laying machine operator, combination mixer and compressor operator (gunite work), compactor operator (self-propelled), concrete mixer operator (paving), crushing plant operator, drill doctor, drilling machine operator, bucket or auger types (Caldwell 150 bucket or similar types - Watson 1500, 2000 2500 auger or similar types - Texoma 700, 800 auger or similar types - drilling depth of 60' maximum), elevating grader operator, grade checker, gradall operator, grouting machine operator, heavy-duty repairman, kalamazoo ballast regulator or similar type, Kolman belt loader and similar type, Le Tourneau blob compactor or similar type, loader operator (Athey, Euclid, Sierra and similar types), pneumatic concrete placing machine operator (Hackley-Presswell or similar type), pumpcrete operator, rotary drill operator (excluding caisson type), rubber-tired earth-moving equipment operator (single engine, Caterpillar, Euclid, Athey Wagon and similar types with any and all attachments over 25 yds. up to and including 50 cu. yds. struck), rubber-tired earth-moving equipment operator (multiple engine up to and including 25 yds. struck), rubber-tired scraper operator (self-loading paddle wheel type - John Deere, 1040 and similar single unit), self- propelled curb and gutter machine operator, skipload operator (crawler and wheel type over 1-1/2 yds. up to and including 6-1/2 yds.), surface heaters and planer operator, tractor compressor drill combination operator, tractor operator (any type larger than D-5 - 100 flywheel h.p. and over, or similar - bulldozer, tamper, scraper and push tractor single engine), tractor operator (boom attachments), traveling pipe wrapping, cleaning and bending machine operator, trenching machine operator (over 6 ft. depth capacity, oiler required)

GROUP 8: Heavy duty repairman

GROUP 9: Drilling machine operator, bucket or auger types (Caldwell 200 B bucket or similar types - Watson 3000 or 5000 auger or similar types - Texoma 900 auger or similar types - drilling depth of 105' maximum), dual drum mixer, monorail locomotive operator (diesel, gas or electric), motor patrol - blade operator (single engine), multiple engine tractor operator (Euclid and similar type - except Quad 9 cat.), rubber-tired earth-moving equipment operator (single engine, over 50 yds. struck), rubber-tired earth-moving equipment operator (multiple engine, Euclid, Caterpillar and similar over 25 yds. and up to

50 yds.), tower crane repair person, tractor loader operator (crawler and wheel type over 6-1/2 yds.), Woods mixer operator (and similar pugmill equipment)

GROUP 10: Dynamic compactor LDC350 (or similar types

GROUP 11: Auto grader operator, automatic slip form operator, drilling machine operator, bucket or auger types (Caldwell, auger 20 CA or similar types - Watson auger 6000 or similar types - drilling depth of 175' maximum), hoe ram or similar with compressor, mass excavator operator, mechanical finishing machine operator, mobile form traveler operator, motor patrol operator (multi-engine), pipe mobile machine operator, rubber-tired earth-moving equipment operator (multiple engine, Euclid, Caterpillar and similar type, over 50 cu. yds. struck), rubber-tired self-loading scraper operator (paddle-wheel-auger type self-loading - two (2) or more units)

GROUP 12: Rubber-tired earth-moving equipment operator operating equipment with push-pull system (single engine, up to and including 25 yds. struck)

GROUP 13: Canal liner operator, canal trimmer operator, remote-control earth-moving equipment operator, wheel excavator operator

GROUP 14: Rubber-tired earth-moving equipment operator, operating equipment with push-pull system (single engine, Caterpillar, Euclid, Athey Wagon and similar types with any and all attachments over 25 yds. and up to and including 50 yds. struck), rubber-tired earth-moving equipment operator, operating equipment with push-pull system (multiple engine - up to and including 25 yds. struck)

GROUP 15: Rubber-tired earth-moving equipment operator, operating equipment with push-pull system (single engine, over 50 yds. struck), rubber-tired earth-moving equipment operator, operating equipment with push-pull system (multiple engine, Euclid, Caterpillar and similar, over 25 yds. and up to 50 yds. struck)

GROUP 16: Rubber-tired earth-moving equipment operator, operating equipment with push-pull system (multiple engine, Euclid, Caterpillar and similar, over 50 cu. yds. struck), tandem tractor operator (operating crawler type tractors in tandem - Quad 9 and similar type)

GROUP 17: Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - single engine, up to and including 25 yds. struck)

GROUP 18: Rotex concrete belt operator (or similar types), rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, including compaction units - single engine, Caterpillar, Euclid, Athey Wagon and similar types with any and all attachments over 25 yds. and up to and including 50 cu. yds. struck), rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - multiple engine, up to and including 25 yds. struck),

GROUP 19: Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - single engine, over 50 yds. struck), rubber-tired earth moving equipment

operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - multiple engine, euclid, caterpillar and similar over 25 yds. and up to 50 yds. struck)
GROUP 20: Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - multiple engine, Euclid, Caterpillar and similar type, over 50 cu. yds. struck)
GROUP 21: Rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (single engine, up to and including 25 yds. struck)
GROUP 22: Rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (single engine, Caterpillar, Euclid, Athey Wagon and similar types with any and all attachments over 25 yds. and up to and including 50 yds. struck), rubber-tired earth-moving equipment operator, operating with the tandem push-pull system (multiple engine, up to and including 25 yds. struck)
GROUP 23: Rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (single engine, over 50 yds. struck), rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (multiple engine, Euclid, Caterpillar and similar, over 25 yds. and up to 50 yds. struck)
GROUP 24: Concrete pump operator - truck mounted (oiler required when boom over 105' or 36 meters), rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (multiple engine, Euclid, Caterpillar and similar type, over 50 cu. yds. struck)
CRANES, PILEDRIVING AND HOISTING EQUIPMENT CLASSIFICATIONS:
GROUP 1: Engineer oiler; Fork lift operator (under 5 tons capacity)
GROUP 2: Truck crane oiler
GROUP 3: A-frame or winch truck operator; Ross carrier operator (jobsite)
GROUP 4: Bridge-type unloader and turntable operator; Helicopter hoist operator
GROUP 5: Stinger crane (Austin-Western or similar type); Tugger hoist operator (1 drum)
GROUP 6: Bridge crane operator; Cretor crane operator; Fork lift operator (over 5 tons); Hoist operator (Chicago boom and similar type); Lift mobile operator; Lift slab machine operator (Vagtborg and similar types); Material hoist operator; Shovel, backhoe, dragline, clamshell operator (over 3/4 yd. and up to 5 cu. yds. mrc); Tugger hoist operator
GROUP 7: Pedestal crane operator; Shovel, backhoe, dragline, clamshell operator (over 5 cu. yds. mrc); Tower crane repair; Tugger hoist operator (3 drum)
GROUP 8: Crane operator (up to and including 25 ton capacity); Crawler transporter operator; Derrick barge operator (up to and including 25 ton capacity); Hoist operator, stiff legs, Guyderrick or similar type (up to and including 25 ton capacity); Shovel, backhoe, dragline, clamshell operator (over 7 cu. yds. mrc)
GROUP 9: Crane operator (over 25 tons and up to and including 50 tons mrc); Derrick barge operator (over 25 tons up to and including 50 tons mrc); Highline cableway operator; Hoist

operator, stiff legs, Guy derrick or similar type (over 25 tons up to and including 50 tons mrc); K-crane operator; Polar crane operator; Tower crane operator

GROUP 10: Crane operator (over 50 tons and up to and including 100 tons mrc); Derrick barge operator (over 50 tons up to and including 100 tons mrc); Hoist operator, stiff legs, Guy derrick or similar type (over 50 tons up to and including 100 tons mrc)

GROUP 11: Crane operator (over 100 tons and up to and including 200 tons mrc); Derrick barge operator (over 100 tons up to and including 200 tons mrc); Hoist operator, stiff legs, Guy derrick or similar type (over 100 tons up to and including 200 tons mrc); Mobile tower crane operator (over 100 tons up to and including 200 tons mrc)

GROUP 12: Crane operator (over 200 tons up to and including 300 tons mrc); Derrick barge operator (over 200 tons up to and including 300 tons mrc); Hoist operator, stiff legs, Guy derrick or similar type (over 200 tons, up to and including 300 tons mrc); Mobile tower crane operator (over 200 tons, up to and including 300 tons mrc)

GROUP 13: Crane operator (over 300 tons); Derrick barge operator (over 300 tons); Helicopter pilot; Hoist operator, stiff legs, Guy derrick or similar type (over 300 tons); Mobile tower crane operator (over 300 tons)

TUNNEL CLASSIFICATIONS

GROUP 1: Skiploader (wheel type up to 3/4 yd. without attachment)

GROUP 2: Power-driven jumbo form setter operator

GROUP 3: Dinkey locomotive or motorman (up to and including 10 tons)

GROUP 4: Bit sharpener; Equipment greaser (grease truck); Slip form pump operator (power-driven hydraulic lifting device for concrete forms); Tugger hoist operator (1 drum); Tunnel locomotive operator (over 10 and up to and including 30 tons); Welder - general

GROUP 5: Backhoe operator (up to and including 3/4 yd.); Small Ford, Case or similar; Drill doctor; Grouting machine operator; Heading shield operator; Heavy-duty repairperson; Loader operator (Athey, Euclid, Sierra and similar types); Mucking machine operator (1/4 yd., rubber-tired, rail or track type); Pneumatic concrete placing machine operator (Hackley-Presswell or similar type); Pneumatic heading shield (tunnel); Pumpcrete gun operator; Tractor compressor drill combination operator; Tugger hoist operator (2 drum); Tunnel locomotive operator (over 30 tons)

GROUP 6: Heavy duty repairman - welder combination

GROUP 7: Tunnel mole boring machine operator

ENGI9993D 07/01/2000

	Rates	Fringes
CHURCHILL, DOUGLAS, ELKO, EUREKA, HUMBOLDT, LANDER, LYON, MINERAL, PERSHING, STOREY, WASHOE, WHITE PINE AND CARSON CITY		
POWER EQUIPMENT OPERATORS		
(Except Piledriving and Steel Erection)		
AREA 1:		
Group 1a	25.33	8.21

Group 2	25.86	8.21
Group 3	26.13	8.21
Group 4	26.87	8.21
Group 5	27.17	8.21
Group 6	27.34	8.21
Group 7	27.59	8.21
Group 8	28.18	8.21
Group 9	28.50	8.21
Group 10	28.85	8.21
Group 10a	29.04	8.21
Group 11	29.28	8.21
Group 11a	30.92	8.21
Group 11b	31.73	8.21
PILEDRIVING		
AREA 1:		
Group 1	37.32	8.21
Group 1a	31.38	8.21
Group 1b	29.46	8.21
Group 2	35.80	8.21
Group 2a	31.17	8.21
Group 2b	29.26	8.21
Group 3	34.35	8.21
Group 3a	30.95	8.21
GROUP 3b	29.03	8.21
Group 4	32.84	8.21
Group 5	31.73	8.21
Group 6	30.62	8.21
Group 7	29.66	8.21
Group 8	27.80	8.21
STEEL ERECTION		
AREA 1:		
Group 1	37.87	8.21
Group 1a	31.70	8.21
Group 1b	29.74	8.21
Group 2	36.36	8.21
Group 2a	31.45	8.21
Group 2b	29.53	8.21
Group 3	35.12	8.21
Group 3a	31.23	8.21
Group 3b	29.31	8.21
Group 3c	34.76	8.21
Group 4	33.39	8.21
Group 5	32.29	8.21

POWER EQUIPMENT OPERATOR CLASSIFICATIONS

CHURCHILL, DOUGLAS, ELKO, EUREKA, HUMBOLDT, LANDER, LYON, MINERAL, PERSHING, STOREY, WASHOE, WHITE PINE, CARSON CITY (EXCLUDING PILEDRIVING AND STEEL ERECTION)

GROUP 1a: Oiler; Partsman (heavy duty repair shop partsroom when needed).

GROUP 2: Compressor; Material Loader and/or Conveyor (handling building materials); Pump Operator

GROUP 3: Bobcat or similar loader (1/4 cu. yd. or less); Concrete Curing Machines (streets, highways, airports, canals); Conveyor belt operator(tunnel); Forklift (under 20 ft.); Engineer Generating plant (500 K.W.); Mixer box operator (concrete plant); Motorman; Rotomist Operator; Screedman (except asphaltic or concrete paving); Oiler (truck crane)

GROUP 4: Concrete mixer, skip type; Dinky; Forklift (20' and over) or Lumber stacker; Ross Carrier; Skip Loader (under 1 cu. yd); Tie Spacer.
GROUP 5: Concrete mixer (over 1 cu. yd); concrete pumps or pumpcrete guns; Elevator and material Hoist (1 drum); Groundman for Asphalt Milling and similar.
GROUP 6: Auger type drilling equipment up to and including 30 ft. depth digging capacity m.r.c.; Boom Truck or Dual Purpose "A" Frame Truck; B.L.H. Lima road pactor or similar; Chip box spreader (flaherty type or similar); Concrete batch plant (wet or dry); Concrete saws (highways, streets, airports, canals); Locomotive (over 30 tons); Lubrication and service engineer (mobile & grease rack); Maginnis international full slab vibrator (airports, highways, canals, warehouses); Mechanical finishers (concrete)(clary, Johnson, Bidwell Bridge Deck or similar types); Mechanical Burn, Curb and/or Curb and Gutter Machine (concrete or asphalt); Pavement breaker, truck mounted, with compressor combination; Pavement breaker or tamper (with or without compressor (combination); Power Jumbo (setting slip-forms, etc. in tunnels); Roller (except asphalt); Self-propelled tape machine; Self-propelled compactor (single engine); Self-propelled power sweeper; slip form pump (power-driven by hydraulic, electric, air, gas, etc. lifting device for concrete forms); Small Rubber-tired Tractors; Snooper Crane, Paxton-Mitchell or similar; Stationary Pipe Wrapping, Cleaning and Bending Machine Operator
GROUP 7: Auger type drilling equipment over 30 ft. depth digging capacity m.r.c.; Compressor (over 2); Concrete conveyor or concrete pump, truck equipment mounted (boom length to apply); Concrete conveyor, building site; Drilling and boring Machinery, vertical and horizontal (not to apply to waterliners, wagon drills or jackhammers); Crusher Plant Engineer; Generators; Kolman Loader; Material Hoist (2 or more drums); Mechanical finishers or spreader machine (asphalt, Barber-Greene and similar); (Screedman required); Mine or shaft hoist; Pipe bending machines (pipelines only); Pipe cleaning machines (tractor propelled and supported); Pipe wrapping machines (tractor propelled and supported); Portable crushing and screening plants; Post driller and/or driver; Pumps (over 2); Roller operator (asphalt); Screedman (except asphaltic or concrete paving; Screedman (Barber-Green and similar)(Aspaltic or concrete paving); Self-propelled boom-type lifting device (center amount) (on 10 ton capacity or less); Slusher; Soil tester (certified); Soils and material tester; Surface heater and planer; Trenching machine (maxiumum digging capacity 3 feet depth); Truck type loader; Welding machines (gasoline or diesel.
GROUP 8: Asphalt plant Engineer; Asphalt milling machine; Cast-in-place pipe laying machine; Combination slusher and motor op.; Concrete batch plant (multiple units); Dozer Operator; Drill doctor; Elevating grader; Gradesetter, Grade checker; Grooving and grinding machine (highway); Heavy duty repairman and/or welder; Ken-seal; Loader (up to and including 2 1/2 cu. yds.); Mechanical trench shield; Mixermobile; Push cats; Road oil mixing machine (wood-mixer and other similar pugmill equipment); Rubber-tired earth-moving equipment (up to and including 35 cu. yds."struck" M.R.C. Euclid, T-pulls, DW's 10, 20, 21, and

similar); Self-propelled compactor with dozer; Hyster 450 or cat 825 or similar; Sheepfoot; Small tractor (with boom); Soil stabilizer (P & H or equal); Timber skidder (rubber-tired and/or similar equipment); Tractor-drawn scraper; Tractor; Tractor-mounted compressor drill combination; Trenching machine (over 3 feet depth); Tri-batch paver; Tunnel badger or tunnel boring machine; Tunnel mole boring machine; Vermeer T-600b rock cutter.
GROUP 9: Chicago boom; Combination backhoe and loader (up to and including 3/8 yard); Combination mixer and compressor (gunite); Lull hi-lift (20 feet or over); Mucking machine; Sub-grader (gurries or other types); Tractor (with boom) (D6 or larger); Track-laying-type earthmoving machine (single engine with tandem scrapers).
GROUP 10: Boom-type backfillng machine; Bridge crane; Carylift or similar; Chemical grouting machine; Derricks (two (2) Group 10 operators required when swing engine remote from hoist); Derrick barges (except excavation work); Euclid loader and similar types; Heavy-Duty rotary drill rigs; Lift-slab (vagtborg and similar types); Loader (over 2 1/2 cu yds. up to and including 4 cu. yds); Locomotive (over 100 tons) (single or multiple units); Multiple-Engine earth-moving machines (euclid, dozers, etc.); Pre-stress wire-wrapping machine; Rubber-tried scraper, self-loading; Single-engine scraper (over 35 cu. yds); Shuttle car (reclaim station); Train loading station; Trenching machine multi-engine with sloping attachment (jefco or similar); Vacuum cooling plant; Whirley crane (up to and including 25 tons).
GROUP 10a: Backhoe (up to and including 1 cu. yd hydraulic); Backhoe (up to and including 1 cu. yd. cable); CMI dual lane auto -grader SP30 or similar; Cranes (not over twenty five (25) tons (hammerhead and gantry); Finish Blade; Gradalls (up to and in-cluding 1 cu. yd); Motor patrol; Power shovels, Clamshells, Draglines, Cranes (up to and including 1 cu. yd.); Rubber-tried scraper, self-loading (twin-engine); Self-propelled boom-type lifting device (center mount) (over 10 tons up to and including 25 tons).
GROUP 11: Automatic asphalt or concrete slip-form paver; Automatic railroad car dumper; Canal trimmer; Cary lift, campbell or similar; Cranes (over 25 tons); Euclid loader when controled from the pullcat; Highline cableway operator; Loader (over 4 cu yds. up to and including 12 cu. yds.); Multi-Engine earthmoving equipment (up to and including 75 cu. yds. "struck M.R.C); Multi ple Engine Scrapers (when used to push pull); Power shovels, Clam-shells, Draglines, Backhoes, Gradealls (over 1 cu. yd. and up to and including 7 cu. yds. M.R.C.); Self-propelled Boom type lifting device (over 25 tons M.R.C.); Self-propelled Compactor (with multiplepropulsion power units); Single-engine rubber-tried earthmoving machine (with tandem scraper); Slip-form paver (concrete or asphalt)(one (1) Operator and two (2) screedman); Tandem cats and scrapers; Tower crane mobile (including rail-mounted); Truck-mounted hydraulic crane when remote-control equipped (over 10 tons up to and including 25 tons); Universal Liebher and tower cranes (and similar types)(in the erection, dismantling and moving of equipment there shall be an additional operating engineer at group 8 rates); Wheel excavator (up to and including 750 cu. yds. per hour); Whirley cranes (over 25 tons).
GROUP 11a: Band wagons (in conjuction with wheel excavators); Operator of helicopter (when used in construction work);

Loaders (over 12 cu. yds.); Multi-engine earthmoving equimpent (over 75 cu. yds. "struck" M.R.C.); Power shovels, Clamshells, Draglines, Backhoes and Gradalls (over 7 cu. yds. M.R.C.); Remote-controlled Earthmoving equipment; Wheel excavator (over 750 cu. yds. per hour)(two (2) Group 11A operators required).
GROUP 11b: Holland loader or similar or loader (over 18 cu. yds)

PILEDRIVING CLASSIFICATIONS

GROUP 1: Derrick barge pedestal mounted over 100 tons; Clam-shells over 7 cu. yds.; Self propelled boom type lifting device over 100 tons; Truck crane or crawler, land or barge mounted over 100 tons;
GROUP 1a: Truck crane oiler.
GROUP 1b: Oiler
GROUP 2: Derrick barge pedestal mounted 45 tons up to and including 100 tons; Clamshells up to and including 7 cu. yds; Self propelled boom type lifting device over 45 tons; Truck crane or crawler, land or barge mounted over 45 tons up to and including 100 tons.
GROUP 2a: Truck crane oiler.
GROUP 2b: Oiler
GROUP 3: Derrick barge pedestal mounted under 45 tons; self propelled boom type lifting device 45 tons and under; Skid/Scow Piledriver, any tonnage; (any assistance required shall be by an employee covered by this agreement); Truck crane or crawler, land or barge mounted 45 tons and under.
GROUP 3a: Truck Crane oiler
GROUP 3b: Oiler
GROUP 4: Forklift, 10 tons and over
GROUP 5: No current classification.
GROUP 6: Deck engineer
GROUP 7: No current classification
GROUP 8: Deckhand, Fireman

STEEL ERECTORS AND FABRICATORS

GROUP 1: Cranes, over 100 tons; Derrick over 100 tons, Self-propelled boom type lifting devices over 100 tons.
GROUP 1a: Truck crane oiler.
GROUP 1b: Oiler
GROUP 2: Cranes, over 45 tons up to and including 100 tons; Derrick 100 tons and under, Self-propelled boom type lifting device, over 45 tons; Tower Crane.
GROUP 2a: Truck crane oiler.
GROUP 2b: Oiler
GROUP 3: Cranes, 45 tons and under; Self propelled boom type lifting device, 45 tons and under
GROUP 3a: Truck crane oiler
GROUP 3b: Hydraulic
GROUP 3c: Oiler
GROUP 4: Chicago boom; Forklift, 10 tons and over; Heavy Duty Repairman/Welder.
GROUP 5: Boom cat

AREA DEFININITIONS AND PAY RATES

AREA 1:
ALL AREA FALLING WITHIN 50 ROAD MILES OF EITHER THE CARSON CITY COURTHOUSE OR THE WASHOE COUNTY COURHOUSE SHALL BE CONSIDERED FREE AREA.
AREA 2:
ALL WORK FALLING BETWEEN 50 AND 150 ROAD MILES OF THE WASHOE

COUNTY COURTHOUSE SHALL BE COMPUTED AT AN ADDITIONAL $1.50 PER HOUR ABOVE THE BASE RATE.
AREA 3:
ALL WORK FALLING BETWEEN 150 AND 300 ROAD MILES OF THE WASHOE COUNTY COURTHOUSE SHALL BE COMPUTED AT AN ADDITIONAL $2.00 PER HOUR ABOVE THE BASE RATE.
AREA 4:
ANY WORK PERFORMED IN EXCESS OF 300 ROAD MILES OF THE WASHOE COURTHOUSE SHALL BE COMPUTED AT AN ADDITIONAL $3.00 PER HOUR ABOVE THE BASE RATE.

ENGI9993K 07/01/1997

	Rates	Fringes
CHURCHILL, DOUGLAS, ELKO, EUREKA, HUMBOLDT, LANDER, LYON, MINERAL, PERSHING, STOREY, WASHOE, WHITE PINE AND CARSON CITY		
HYDRAULIC SUCTION & CLAMSHELL & DIPPER DREDGE		
GROUP 1:		
Area 1	31.04	11.89
Area 2	33.04	11.89
GROUP 2:		
Area 1	26.08	11.89
Area 2	28.08	11.89
GROUP 3:		
Area 1	24.96	11.89
Area 2	26.96	11.89

DREDGING CLASSIFICATIONS

GROUP 1:
Day Mate (Captain); Leverman/Operator
GROUP 2:
Booster Pump Operator, Deck Engineer, Deck Mate, Dredge Dozer; Dredge Tender; Heavy Duty Repairman; Watch Engineer; Winchman
GROUP 3:
Bargeman; Deckhand; Fireman; Leveehand; Oiler

AREA DEFININITIONS

AREA 1:
ALL AREA FALLING WITHIN 50 ROAD MILES OF EITHER THE CARSON CITY COURTHOUSE OR THE WASHOE COUNTY COURHOUSE SHALL BE CONSIDERED FREE AREA.
AREA 2:
ALL WORK FALLING BETWEEN 50 AND 150 ROAD MILES OF THE WASHOE COUNTY COURTHOUSE.
AREA 3:
ALL WORK FALLING BETWEEN 150 AND 300 ROAD MILES OF THE WASHOE COUNTY COURTHOUSE.
AREA 4:
ANY WORK PERFORMED IN EXCESS OF 300 ROAD MILES OF THE WASHOE COURTHOUSE.

IRON0027J 07/01/2001

	Rates	Fringes
ELKO, EUREKA, AND WHITE PINE COUNTIES		
IRON WORKERS:		
Fence Erectors: Machinery Movers		
Ornamental: Reinforcing. Rigger		
Structural	25.19	14.575

IRON0155B 07/01/2001

	Rates	Fringes
CHURCHILL, CLARK, DOUGLAS, ESMERALDA, HUMBOLDT, LANDER, LINCOLN, LYON, MINERAL, NYE, PERSHING, STOREY, WASHOE, AND WHITE PINE COUNTIES		
IRONWORKERS:		
STRUCTURAL, ORNAMENTAL AND REINFORCING	26.08	14.575
FENCE ERECTORS (Excluding Clark County)	25.19	14.575

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* LABO0169F 10/01/2001

	Rates	Fringes
CHURCHILL, DOUGLAS, ELKO, EUREKA, HUMBOLDT, LANDER, LYON, MINERAL, PERSHING, STOREY, WASHOE, WHITE PINE, CARSON CITY		
Group 1	19.45	5.42
Group 1-A	16.58	5.42
Group 2	19.55	5.42
Group 3	19.70	5.42
Group 4	19.95	5.42
Group 5	20.25	5.42
Group 6	20.25	5.42
Group 7	19.95	5.42
Group 8	19.60	5.42
Group 9	14.29	5.42

From the Washoe County Courthouse
50 Miles to 150 Miles - add $1.50 per hour to wage rates
150 Miles to 300 Miles - $2.00 per hour to wage rates
Over 300 Miles - add $3.00 per hour to wage rates

CLASSIFICATIONS

GROUP 1: All cleanup work of debris, grounds and building including windows and tile; dump or spotter (other than asphalt); general laborers; limber, brushloader and piler

GROUP 1-A: Flagmen

GROUP 2: Choker setter or rigger (clearing work only); Pittsburgh chipper and similar type brush shredders; concrete worker (wet or dry) all concrete work not listed in Group 3; crusher or grizzle tender; Guinea chaser (stake); panel forms (wood or metal) handling, cleaning and stripping of; loading and unloading of all rods and materials for reinforcing concrete; railroad track (builders); sloper; semi-skilled wrecker (salvaging of building materials other than those listed in Group 3).

GROUP 3: Asphalt workers (ironers, shoveler, cutting machine); buggymobile; chainsaw, faller, logloader and bucker; compactor (all types); concrete mixer, under 1/2 yd.; concrete pan work (breadpan type) (handling, cleaning, stripping); concrete saw, chipping, grinding, sanding, vibrator; cribbing, shoring, lagging, trench jacking, hand-guided lagging hammer; curbing or divider machine; curb setter (precast or cut); Ditching machine (hand-guided); driller's tender, chuck tender; form raiser, slip forms; grouting of concrete walls, windows and door jams; headerboard; jackhammer, pavement breaker, air spade; mastic worker (wet or dry); pipe wrapper, kettle, pot, and workers applying asphalt, Creosote and similar type materials; all power tools (air, gas or electric); post driver; riprap stonepaver and rock slinger, including placing of sack concrete, wet or dry;

roto tiller; rigging and signaling in connection with laborers work, sandblaster, pot men; vibrascreed; skilled wrecker (removing and salvaging of sash windows, doors, plumbing and electrical; fixtures)
GROUP 4: Burning and welding in connection with laborers' work; joy drill model TWM-2A, gardener denver model DN 143 and similar type drills; track drillers, diamond core drillers, wagon drillers, mechanical drillers on multiple units; high scalers; concrete pump; heavy duty vibrator with stinger 5" diameter or over; pipelayer, caulker and bander; pipelayer - waterline, sewerline, gasline, conduit; asphalt rakers
GROUP 5: Blaster and powder, all work of loading, placing and blasting of all powder and explosive of any type, regardless of method used used for such loading and placing; asbestos removal; lead abatement, hazardous waste and material removal.
GROUP 6: Nozzlemen, Rodman
GROUP 7: Gunmen, Materialmen
GROUP 8: Reboundmen
GROUP 9: Landscaper

LABO0872D 07/01/2001

	Rates	Fringes
CLARK, ESMERALDA, AND LINCOLN COUNTIES; NYE COUNTY (South half, including Highway #6)		
LABORERS:		
Group 1	21.58	7.46
Group 2	21.74	7.46
Group 3	21.84	7.46
Group 4	21.93	7.46
Group 5	22.02	7.46
Group 6	21.84	7.46
Group 7	18.53	7.46

30 - 50 Miles From City Hall, Las Vegas $1.50 above the base rate.

50 - 70 Miles From City Hall, Las Vegas $2.50 above the base rate.

Over 70 Miles From City Hall, Las Vegas $3.00 above the base rate.

Laughlin Area $2.25 above the base rate.

LABORER CLASSIFICATIONS

Group 1: Dry Packing of concrete and filling of form-bolt holes; fine grader, highway and street paving, airport runaways and similar type heavy construction; gas and oil pipeline laborer; guinea chaser; laborer, general; construction or demolition laborer; packing rod steel and pans; laborers; temporary water lines (portable type); landscape gardener and nursery worker (must have knowledge of plant materials and how to plant them lay out plant arrangements to-follow the landscape plan); tarman and mortarman; kettleman; potman and worker applying asphalt lay-kold creosote, lime and similar type materials ("applying" means applying, dipping, brushing or handling of such materials

for pipe wrapping and waterproofing); underground laborer, including caisson bellowers; window cleaner; scafford erector - (excludes tenders); fence erector - chain link; mortarless, barrier wall and/or retaining walls; mechanical stabilized earth wall; landscape decorative rock installer - ponds, water fall etc.; material handler - (incidental to trade).

Group 2: Asphalt raker, ironer, spreader, Luteman, buggymobile man; cement dumper (on 1 yard or larger mixers and handling bulk cement); cesspool digger and installer; chucktender (except tunnels); concrete core cutter; concrete curer, impervious membrane and oiler of all materials; concrete saw, excluding tractor type, cutting, scoring old or new concrete; gas and oil pipeline wrapper, pot tender and form; making and caulking of all non metallic pipe joints; operators and tenders of pneumatic and electric tools, vibrating machines, hand-propelled trenching machines, impact wrench, multiplate and similar mechanical tools not separately classified herein; operator of cement grinding machine; riprap stonepaver; roto-scraper; sandblaster (pot tender); scaler; septic tank digger and installer; tank scaler and cleaner; tree climber, faller, chain saw operator, pittsburgh chipper and similar type brush shredders

Group 3: Cutting torch operator; gas and oil pipeline wrapper; gas and oil pipeline laborer, certified; jackhammer and/or pavement breaker, laying of all non-metallic pipe, including landscape sprinklers, sewerpipe, drain pipe, and underground tile; mudcutter; concrete vibrator, all sizes; rock slinger; scaler (using Bos'n chair or safety belt or power tools); forklift (incidental to trade) a journeyman shall hold OSHA certification at time of referral.

Group 4: Cribber or shorer, lagging, sheeting, trenching bracing hand guided lagging hammer; head rock slinger; powder - blaster, all work of loading holes, placing and blasting of all powder and explosives of whatever type, regardless of method used for such loading and placing; sandblaster (nozzle operator); steel headerboard

Group 5: Driller (core, diamond or wagon); joy driller model TW-M-2a, Gardener-Denver Model DH 143 and similar type drills (in accordance with memorandum of understanding between laborers and operating engineers dated Miami, Florida, February 3, 1954); Gas and oil pipeline fusion; gas and oil pipeline wrappers, 6" pipe and over-

Group 6: Environmental specialist (asbestos abatement, lead abatement, Hazardous waste abatement, petro-chemical abate ment, radiation remediation.

Group 7: Flag and Signal Person

LABO0872I 07/01/2001

	Rates	Fringes
CLARK, ESMERALDA, AND LINCOLN COUNTIES; NYE COUNTY (South half, including Highway #6)		

LABORERS:

MINER AND BULLGANG

Group 1	24.04	9.18
Group 2	23.54	9.18
Group 3	23.29	9.18
Group 4	23.90	9.18
Group 5	23.54	9.18

30 - 50 Miles From City Hall, Las Vegas $1.50 above the base rate.

50 - 70 Miles From City Hall, Las Vegas $2.50 above the base rate.

Over 70 Miles From City Hall, Las Vegas $3.00 above the base rate.

Laughlin Area $2.25 above the base rate.

CLASSIFICATIONS

Group 1: Shaft, Raise, Stope Miner

Group 2: Miner - Tunnel (Hardrock)

Group 3: BullGang, Mucker, Trackman

Group 4: Miner - Welder

Group 5: Pipe Jacking, Micro-Tunneling, Tunnel Boring Machine

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PAIN0159F 07/01/2002

CLARK, ESMERALDA, LINCOLN AND NYE COUNTIES

	Rates	Fringes
PAINTERS:		
Brush, Roller, Paperhangers, Spray, Sandblasters, Pot Tender, Nozzleman, Tapers, Marbleizing, Metal Leafing Sign Painters, Acid Staining, Graining and Buffing	27.52	6.26
Structural Steel Paint and Sandblasting, Buffing Steel	27.92	6.26
Special Coating	27.52	6.26
Steeplejack	29.32	6.26

PAIN0567E 10/01/2001

CARSON CITY, CHURCHILL, DOUGLAS, ELKO, EUREKA, HUMBOLDT, LANDER, LYON, MINERAL, PERSHING, STOREY, WASHOE AND WHITE

PINE COUNTIES

PAINTERS:		
Brush and Roller	20.53	5.06
Spray; Paperhangers; and Sandblaster; Special Coatings Application - Brush	21.03	5.06
Structural Steel (not to include stairways, tube steel, Q-decks & trust joints worked off powered lift in enclosed building); Steeplejack Brush/ Spray over 40 feet with open space below; Special Coatings Application - Spray	21.53	5.06
Special Coatings Application - Spray Steel	21.78	5.06
Drywall Taper	22.08	5.06
Steeplejack - Taper, over 40 ft. with open space	23.58	5.06

PLAS0241G 10/01/2001

	Rates	Fringes
CHURCHILL, DOUGLAS, ELKO, ESMERALDA, EUREKA, HUMBOLDT, LANDER, LYON, MINERAL, PERSHING, STOREY, WASHOE, AND WHITE PINE COUNTIES		
CEMENT MASONS		
Cement Masons	17.52	6.23
Mastic. magesite and all composition masons	17.77	6.23

PLAS0797G 07/01/2001

	Rates	Fringes
CLARK, ESMERALDA, LINCOLN AND NYE COUNTIES		
CEMENT MASONS:		
0 to 30 Miles from City Hall in Las Vegas	25.88	6.95
30 to 50 Miles from City Hall in Las Vegas	27.38	6.95
50 to 70 Miles from City Hall in Las Vegas	28.38	6.95
Over 70 Miles from City Hall in Las Vegas	29.38	6.95

PLUM0350G 08/01/2001

	Rates	Fringes
CHURCHILL, DOUGLAS, ELKO, EUREKA, HUMBOLDT, LANDER, LYON, MINERAL, PERSHING, STOREY, WASHOE, WHITE PINE, CARSON CITY		

COUNTIES, and NYE COUNTY (North of Hwy. #6 including the City of Tonopah)

PLUMBERS & PIPEFITTERS	28.15	6.25

PLUM0525G 06/01/2001

	Rates	Fringes
CLARK, ESMERALDA AND LINCOLN, COUNTIES; NYE COUNTY (South of Hwy. #6 including the City of Tonopah)		
PLUMBERS & PIPEFITTERS	30.01	10.61

ROOF0162D 03/01/1999

	Rates	Fringes
ROOFERS	17.78	3.17

SHEE0026C 07/01/2001

	Rates	Fringes
CHURCHILL, DOUGLAS, ELKO, EUREKA, HUMBOLDT, LANDER, LYON, MINERAL, PERSHING, STOREY, WASHOE, CARSON CITY AND NYE COUNTY (North of the First Standard Parallel Line north of the 38th Parallel)		
SHEET METAL WORKERS	25.83	8.77

* SHEE0088H 07/01/2002

	Rates	Fringes
CLARK, ESMERALDA, AND LINCOLN COUNTIES; NYE COUNTY (South of the First Standard Parallel Line north of the 38th Parallel); WHITE PINE COUNTY		
SHEET METAL WORKERS	32.57	9.68

TEAM0533A 07/01/2002

	Rates	Fringes
REMAINING COUNTIES AND NYE COUNTY (North of and including Highway #6)		
TRUCK DRIVERS		
All dump trucks (Single or multiple dump units including Semi's and Double and Transfer units:		
Under 4 yards (water level)	20.32	7.90
4 yards and under 8 yards (water level)	20.54	7.90
yards & under 18 yards (water level)	20.75	7.90

3 yards & under 25 yards (water level)	20.57	7.90
25 yards & under 60 yards (water level)	21.34	7.90
60 yards & under 75 yards (water level)	22.78	7.90
75 yards & under 100 yards (water level)	23.52	7.90
100 yards & over (water level)	24.20	7.90
150 yards & under 250 yards	26.20	7.90
250 yards & under 350 yards	29.20	7.90
Over 350 yards	30.70	7.90

(Men regularly employed underground on tunnel work shall be paid forty-five ($.60) cents per hour for such work, provided that such employment underground on tunnel work continues for one (1) or more hours)

Bulk cement spreader (with or with or without Auger) Use dump truck scales.

Bootman (a bootman when employed on such equipment shall receive the rate specified for the classification of road oil trucks or bootman).

Transit Mix, Manufactures Rating:

Under 8 yards	20.75	7.90
8 yards & including 12 yards	20.86	7.90
Over 12 yards	21.08	7.90

Transit Mix with boom shall receive $.16 cents per hour above the appropriate yardage classification rate of pay when such boom is used.

Water Trucks:

Up to 2,500 gallons	20.54	7.90
2,500 gallons & over	20.75	7.90

Jetting truck (use appropriate water truck rate.		
DW20's and 21's and other similar cat type, Terra cobra, Le Tourneau pulls, Tournerocker, Euclid and similar type equipment when pulling Aqua/pak, Water tank trailers and fuel and/or Grease Tank trailer or other miscellaneous trailers (except as definded under dump trucks.	21.03	7.90
Heavy Duty Transport (High bed)	20.92	7.90
Heavy Duty Transport (Gooseneck Low Bed)	20.92	7.90
Tiltbed or Flatbed Pull Trailers	20.92	7.90
Bootman, combination bootman and road oiler	20.81	7.90
Flat Rack (2 or 3 axle unit)	18.64	7.90
Bus and Manhaul drivers:		
Up to 18,000 lbs. (single unit)	20.37	7.90
18,000 lbs & over (single unit)	20.48	7.90
Helicopter Pilot (when transporting men or materials)	34.94	7.90
Industrial Lift truck (use appropriate flat rack rate (mechanical tailgate)		
Lift Jitneys & Fork Lift	20.59	7.90
Winch Truck & "A" Frame Drivers:		
Under 18,000 lbs.	20.48	7.90
18,000 lbs. & over	20.59	7.90
Warehouse Spotters	20.43	7.90
Teamsters Warehouse Clerk	20.54	7.90
Tire Repairman	20.75	7.90
Truck Repairman	21.08	7.90
Pick-up Truck & Pilot Cars (Job Site)	18.44	7.90
Pick-up Truck & Pilot Car (over the road)	20.43	7.90

Truck Oil and Greaser	20.48	7.90
Fuel Truck Driver	20.48	7.90
Fuel Man & Fuel Island Man	20.48	7.90
Oil Tanker	20.92	7.90
Oil Tanker With Pup	21.34	7.90

When on grease and fuel truck, an Engineer Oil and Teamster Oil, work interchangeable servicing trucks and other equipment, The wage rate shall be identical.

AREA 1: All that area falling within fifty (50) road miles of either the Carson City or Washoe County Courthouse shall be considerer a free area.

AREA 2: All work falling between fifty (50) and (150) road miles of the Washoe County Courthouse shall be computed at and additional $1.50 per hour.

AREA 3: All work falling between one hundred and fifty (150) and three hundred (300) road miles of the Washoe County Courthouse shall be computed at additional $2.00 per hour.

AREA 4: Any work performed in excess of three hundred (300) road miles of the Washoe County Courthouse shall be computed at $3.00 per hour.

TEAM0631A 07/01/1999

CLARK, ESMERALDA, LINCOLN COUNTIES AND NYE COUNTY (South of and excluding Highway #6)

	Rates	Fringes
TRUCK DRIVERS:		
GROUP 1:	21.35	7.12
GROUP 2:	21.46	7.12
GROUP 3:	21.67	7.12
GROUP 4:	21.85	7.12
GROUP 5:	22.00	7.12
GROUP 6:	22.35	7.12

30 - 50 Miles from City Hall, Las Vegas $1.00 above the base rate.
50 - 70 Miles from City Hall, Las Vegas $2.00 above the base rate.
70 - 80 Miles from City Hall, Las Vegas $3.00 above the base rate.
Over 80 Miles from City Hall, Las Vegas $3.50 above the base

rate.
Laughlin and Mesquite Areas, $3.00 above the base rate.

Group 1: Dump trucks (less than 12 yards water level); trucks (legal payload capacity less than 15 tons); water and fuel trucks (under 2500 gallons); pickups; service; drivers of busses (on jobsite used for transportation of up to 25 passengers); teamster equipment (highest rate for dual craft operation); working flat rack driver.

Group 2: Dump trucks (12 yards but less than 16 yards water level); trucks (legal payload capacity between 15 and 20 tons); transit mix trucks (under 3 yds.; dumpcrete trucks (less than 6-1/2 yds. water level); gas and oil pipeline working truck drivers; including winch truck and all sizes of trucks; water and fuel truck drivers (2,500 gallon to 4,000 gallon); truck greaser; drivers of busses (on jobsite used for transportation of more than twenty-five (25) passengers); warehouse clerk.

Group 3: Dump trucks (16 yds. up to and including 22 yds. water level); driver of trucks (legal payload cap. 20 tons but less than 30 tons); dumpster trucks; drivers of transit-mix trucks (3 yds. but less than 6 yds.); dumpcrete trucks (6-1/2 yds. water level and over); fork lift driver; ross carrier driver; highway water and fuel drivers (4,000 gallons but less than 6,000 gallons); stock room clerk; tireman.

Group 4: Transit-mix trucks (6 yds. or more); dump trucks (over 22 yds. water level); trucks (legal payload capacity 30 tons and over); fuel and water trucks (6,000 gallons and over).

Group 5: Drivers of trucks and trailers in combination (seven axles or more).

Group 6: All offroad equipment; truck repairmen and drivers of road oil spreader trucks; D.W. 10 and D.W. 20 euclid-type equipment, letourneau pulls, terra cobras and similar types of equipment; also PB and similar-type trucks when performing work within Teamsters' jurisidiction, regardless of types of attachment inlcuding power unit pulling off highway belly dumps in tandem.

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29 CFR 5.5(a)(1)(ii)).

In the listing above, the "SU" designation means that rates listed under that identifier do not reflect collectively bargained wage and fringe benefit rates. Other designations indicate unions whose rates have been determined to be

prevailing.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U. S. Department of Labor
200 Constitution Avenue, N. W.
Washington, D. C. 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator

U.S. Department of Labor
200 Constitution Avenue, N. W.
Washington, D. C. 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U. S. Department of Labor
200 Constitution Avenue, N. W.
Washington, D. C. 20210

9 4.) All decisions by the Administrative Review Board are final.
0 END OF GENERAL DECISION

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SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01200

GENERAL REQUIREMENTS

-- End of Section Table of Contents --

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.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM F 1667	(1995) Driven Fasteners: Nails, Spikes, and Staples

ASME INTERNATIONAL (ASME)

ASME B18.2.1	(1996) Square and Hex Bolts and Screws (Inch Series)
ASME B18.2.2	(1987; R 1993) Square and Hex Nuts (Inch Series)

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

NIST PS 20	(1994; Addenda Jan. 1997) American Softwood Lumbar Standards

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE EM 385-1-1	(1996) Safety and Health Requirements Manual
COE EM 1110-1-1003	(01 Aug 96) NAVSTAR Global Positioning System Survey
COE EM 1110-1-1005	(31 Aug 94) Topographic Surveying

U.S. DEPARTMENT OF COMMERCE (DOC)

DOC PS 1	(1996) Voluntary Product Standard - Construction and Industrial Plywood

U.S. DEPARTMENT OF TRANSPORTATION (DOT)

DOT MUTCD Part 6	(2000) Manual on Uniform Traffic Control Devices for Streets and Highways

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

CID A-A-2246	(Rev B) Paint, Latex
CID A-A-2336	(Rev A) Primer Coating (Alkyd, Exterior Wood, White and Tints)

1.2 SUBMITTALS

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

SD-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

DOC PS 1, grade A-C, Group 1, exterior type.

2.1.1.3 Bolts, Nuts and Nails

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

2.1.1.4 Paints and Oils

Paints shall conform to CID A-A-2336 for primer and CID A-A-2246 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.

3.9.5.3 Disposal Site

Excess Satisfactory excavated materials not utilized as part of the construction shall be crashed or processed to maximum particle size of 3/4 of lift thickness, hauled, placed, and compacted in the disposal site per lines and grades shown on the drawings. Unsatisfactory soils and materials designated as scrap shall be removed from project site and disposed according to paragraph UNSATISFACTORY AND SCRAP MATERIAL of this section. The Contractor shall indicate the approximate quantities of material he proposes to place in disposal 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 the disposal area, and 48 hours in advance of any work which he proposes to do in the disposal area on Saturday, Sunday or legal holidays.

3.9.5.4 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.

3.9.5.5 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 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 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.

3.9.6.3 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.

3.9.6.4 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.

3.9.6.5 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.

3.9.6.6 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.

3.9.6.7 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 MUTCD Part 6.

3.9.6.8 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.

3.9.6.9 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.

3.9.6.10 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.

3.11 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, COE 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 COE 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 AS-BUILT DRAWINGS

3.14.1 General

The Contractor shall furnish 3 full size sets of as-built blueline prints for use in preparation of as-built drawings by the Government. The as-built prints shall be a record of the construction as installed and completed by the Contractor. They shall include all the information shown on the contract set of drawings and a record of all deviations, modifications, or changes from those drawings, however minor, which were incorporated in the work, all additional work not appearing on the contract drawings, and all changes which are made after final inspection of the contract work. In event the Contractor accomplishes additional work which

changes the as-built conditions. The requirements for these additional drawings will be the same as for the as-built drawings included in the original submission. The prints shall show the following information, but not be limited thereto:

a. The location and description of any utility lines or other installations of any kind or description known to exist within the construction area. The location includes dimensions to permanent features.

b. The location and dimensions of any changes within the building or structure.

d. Correct grade or alignment of roads, structures, or utilities if any changes were made from contract plans.

e. Correct elevations if changes were made in site grading.

f. Changes in details of design or additional information obtained from working drawings specified to be prepared and/or furnished by the Contractor including but not limited to fabrication, erection, installation plans and placing details, pipe sizes, insulation material, dimensions of equipment foundations, etc.

g. The topography and grades of all drainage installed or affected as a part of the project construction.

h. All changes or modifications which results from the final inspection.

3.14.2 Options

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

3.14.3 Submittal to Contracting Officer for review and approval

Not later than two weeks after acceptance of the project by the Government, the Contractor shall deliver to the Contracting Officer 3 full size sets of blueline prints marked up to depict as-built conditions. If upon review, the drawings are found to contain errors and/or omissions, they shall be returned to the Contractor for corrections. The Contractor shall complete the corrections and return the drawings to the Contracting Officer within ten (10) calendar days.

3.15 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 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).

3.16 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.

3.17 SPECIAL CONSTRUCTION REQUIREMENTS

The Contractor shall restrict his operation and adapt his construction schedule to accomodate the following:

3.17.1 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 Flamingo 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 Rigt-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.

3.17.2 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.

3.17.2.1 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 (east to west), 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.

3.17.2.2 Temporary Construction Easement Expiration

The north side channel Temporary Construction Easement (TCE) from Sta 44+71 to Sta 43+75 expires on 1 Oct 03. All work inside this TCE limit and outside the Channel Right of Way (ROW) shall be completed by that date to include final grading and soil stabilization.

3.17.3 DISPOSAL SITES

Excess satisfactory excavated natural material not utilized as part of the construction shall be hauled, placed and compacted in disposal site per lines and grades shown on the drawings. Materials characterized as unsatisfactory soil in accordance with Section 02300 EARTHWORK shall become

the property of the Contractor and shall be removed from the project site.

Disposal of excess excavated materials shall occur in two general areas as described herein, east of Rainbow and adjacent to Tenaya. The disposal site east of Rainbow Blvd (through Sta 39+00) shall not be fully available to the Contractor at time of contract award. The disposal site east of Rainbow includes areas in both base bid and the option bid. The base bid area and the option bid area disposal sites east of Rainbow are separated by the parcel line which extends from the Upper Flamingo Diversion Channel south to Russell Road (at approx Sta 44+71). The base bid portion of the disposal site may be utilized immediately with the contract award/notice to proceed, however, fill shall not be placed wherein storm or other waters will create ponding across this parcel line. The remaining portion of the east of Rainbow Disposal Site (option bid item area upstream of the parcel line at Sta 44+71) shall not be utilized until and only if, the option bid item award is made.

The disposal site adjacent to Tenaya may be used at any time, however, final disposition of excess excavated materials shall be prioritized by areas. The east of Rainbow Disposal Site shall be filled first prior to permanently using the disposal site adjacent to Tenaya. If the Contractor elects to temporarily store material at the Tenaya Disposal Site until the option bid items are awarded, no additional money shall be provided to re-load and haul this excess material to the east of Rainbow Disposal Site. In the event that the option bid items are awarded, the east of Rainbow Disposal area shall be completed filled before permanent fill is allowed to remain at the Tenaya Disposal Site.

3.17.4 Dewey Drive Phasing

The Reinforced Box Channel (RCB) construction along Dewey Drive (Sta 51+75.702 to Sta 56+00.000) shall be conducted in phases so as to minimize disruptions to merchants and Durango High School (see Dwg D15). The Durango High School Summertime Phase shall be from 1 Jun 03 through 21 Aug 03 and shall be from Sta 54+30 to Sta 56+00. The Summertime Phase shall include asphalt replacement and the RCP piping for the side drain at Sta 55+03.050 Right. The Merchant Phase (Sta 51+75.702 to Sta 54+30) shall be constructed before or after the Summertime Phase is started/completed. In the event that the bid option items are awarded, the Merchant Phase shall not be constructed at the same time as the Rainbow Phase 1 which entends into Rainbow Blvd upstream to Sta 51+75.702 (see Dwg D16). The Contractor shall make temporary connections for utilities (street lighting, irrigation, etc.) between these phases of construction so as to ensure continual operation of the undisturbed/replaced utilities at all times. Replacement of merchants signage, parking, landscaping, block walls, etc., shall be completed with each phase of RCB construction to include Rainbow Phase 1. Consideration for pedestrian foot traffic along Rainbow shall be made given for both Rainbow Phase 1 and 2. The Summertime Phase includes the installation and the removal of the temporary asphalt access road from Russell Road to Dewey Drive through the Contractor Stagging area as identified on Dwg D-22.

3.17.5 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 Stagging area as identified on Dwg T5.

3.17.6 Tenaya Sewer

The sewer line at Tenaya shall be relocated so as not to disrupt service. Any temporary by pass sewers installed for the purposes of this sewer relocation work shall be coordinated with the Clark County Sanitation District, if approved. Sewer shall be maintained at all times so as not to disrupt service.

3.17.7 Russell Road Improvements

The Upper Flamingo Diversion Channel Contractor is notified that the Russell Road Improvements (by others) is schedule to commence in Apr '03. Russell Road will be improved from Rainbow Blvd east along the haul route corridor identified on Dwg T5. Hauling operations shall be coordinated with the Russell Road Improvements Contractor.

3.17.8 Outlet Structure/Restrictor Plate

The Outlet Structure/Restrictor Plate (Sht S16) shall not be installed at the Flamingo Detention Basin outlet structure until storm waters can be safely released through the completed Upper Flamingo Diversion Channel. In the event that the option bid items (RCB through and east of Rainbow) are not awarded under this contract, the steel restrictor plate shall neither be fabricated nor installed by the Upper Flamingo Diversion Channel Contractor. Safe passage of water through the Upper Flamingo Diversion Channel shall include the installation of joint sealant at all channel invert joints requiring same.

3.17.9 Buffalo Road and Tioga Way Phasing

Construction of the Buffalo Road and Tioga Way areas of the Upper Flamingo Diversion Channel shall be constructed in phases as described herein. The Buffalo Lateral (Sta 10+00 to Sta 12+10.198) 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.

3.17.9.1 Tioga Way RCB

The Tioga Way RCB (Sta 68+14.537 to Sta 68+51.117) shall not be started until traffic has been safely detoured to and the new asphalt road completed (Sht D-23) over the upstream half of the Buffalo Road RCB. Detour signage shall be maintained through the completion of the Tioga Way RCB and road asphalt replacement.

3.17.9.2 Buffalo Road RCB Phase 1

The Buffalo Road RCB and Transition Structure shall be constructed in a

minimum of two phases. Phase 1 shall include the upstream portion of the RCB and the new paved road over same. Phase one shall extend from Sta 79+34.000 (a minimum of 3.048 meters downstream of the 36 " LVVWD water main) upstream through Sta 71+55.214. The Phase 1 Buffalo RCB work shall also include a temporary grouted stone rip rap transition structure from Sta 79+34.000 to Sta 70+29.000 to temporarily transition storm waters through the channel invert elevation differences between new RCB and existing gabion/low flow channel.

3.17.9.3 Buffalo Road RCB/Open Channel Phase 2

The Buffalo Road RCB/Open Channel Phase 2 (Bid Option 2) shall not be started until the downstream option (Bid Option 1 RCB and open channel through and east of Rainbow) is completed to the extent that storm waters can safely pass through this downstream reach as well as the remaining portions of the Upper Flamingo Diversion Channel. A separate notice to proceed shall be issued by the Contracting Officer for this Buffalo Road Phase 2 area. The Phase 2 Buffalo Road work shall include the removal of the temporary grouted stone rip rap section installed under the Buffalo Road Phase 1 work, and construction of the remaining RCB (Sta 70+34 to Sta 70+20.372 and the open channel wall height transition section from Sta 70+20.372 to Sta 70+03.551. All remaining portions of the contract required work through this Phase 2 area may also be completed at this time.

3.17.10 Existing and New Utility Lines

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

3.17.10.1 Southwest Gas Utility Lines

Numerous areas of the Upper Flamingo Channel and Laterals cross or interface with existing Southwest Gas lines. As identified by the design, the Upper Flamingo Contractor shall support in place or coordinate relocations of these lines. Lines to be relocated shall be done by Southwest gas after the Upper Flamingo Diversion Contractor has completed mass excavation through the area where the utility is to be relocated. The Upper Flamingo Contractor shall expose and temporarily support/protect in place these utility lines until they are relocated by Southwest Gas. The Contractor shall allow Southwest Gas five (5) working days to relocate these lines after the mass excavation through these areas is completed, and proper notification coordination with Southwest Gas has been made.

3.17.10.2 Sprint Telephone/Cox Cable

Numerous areas of the Upper Flamingo Channel and Laterals cross or

interface with existing Sprint/Cox Cable lines. As identified by the design, the Upper Flamingo Contractor shall support in place or coordinate relocations of these lines. Lines to be relocated shall be done by Sprint/Cox Cable after the Upper Flamingo Diversion Contractor has completed mass excavation through the area where the utility is to be relocated. The Upper Flamingo Contractor shall expose and temporarily support/protect in place these utility lines until they are relocated by Sprint/Cox Cable. The Contractor shall allow Sprint/Cox Cable seven (7) working days to relocate these lines after the mass excavation through these areas is completed, and proper notification coordination with Sprint/Cox Cable has been made. All existing conduits for Sprint/Cox Cable which are temporarily disturbed by the Flamingo Diversion Channel Contractor shall be reconnected, mandrelled and have the pull ropes re-installed by the Upper Flamingo Diversion Contractor. Relocations by the utility owner does not include those utilities identified by the Upper Flamingo design to be relocated or protected by the Upper Flamingo Channel Contractor.

3.17.10.3 Nevada Power

Numerous areas of the Upper Flamingo Channel and Laterals cross or interface (aerial and underground) with existing Nevada Power circuits/ductbanks. As identified by the design, the Upper Flamingo Contractor shall coordinate their construction with relocation or protection in place requirements for Nevada Power interfaces. Circuits/Ductbanks to be relocated shall be done by Nevada Power as described herein. The Rainbow Blvd east and west ductbanks shall be relocated by Nevada Power by 1 Jan 03. The Tenaya Way relocation at Mesa Vista shall be completed by Nevada Power by 1 Jan 03. The Tioga Way relocation shall be completed by Nevada Power by 1 Jan 03. The existing aerial circuit at the Torrey Pines crossing shall be raised (with the possibility that another pole will be added) by 1 Nov 02. The Upper Flamingo Diversion Channel Contractor shall schedule all Upper Flamingo Channel work so that these utility areas may be worked around until the services are relocated by others.

3.17.11 Active Side Drains/Storm Flows

The Upper Flamingo Diversion Channel will be constructed in and through existing residential and commercial neighborhoods. As a result, the Upper Flamingo Contractor shall anticipate runoff into the channel and channel construction area(s) from both storm flows and nuisance flows (excessive irrigation). The Upper Flamingo 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.

3.18 CONTRACTOR'S SURVEYS

3.18.1 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 FLAMINGO DIVERSION CHANNEL; ENTIRE PROJECT SITE 2002 AND 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).

3.18.2 Survey Data Standards

The Contractor's surveys for progress payment shall meet or exceed the survey standards listed in COE 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.

3.18.3 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 COE EM 1110-1-1003 and COE EM 1110-1-1005.

3.18.4 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.

3.18.5 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.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01270

MEASUREMENT AND PAYMENT

6.2.3 Fill for Structures.
6.2.4 Trenches.
6.2.5 Subgrade Preparation.

PART 7 CONCRETE, EXCEPT BETWEEN STA. 46+51.092 TO STA. 45+76.000 AND BETWEEN STA. 70+20.372 TO STA. 69+80.000.

7.1 Measurement.
7.2 Payment.
7.2.1 CONCRETE, CHANNEL INVERT SLAB, EXCEPT BETWEEN STA. 46+51.092 TO STA. 45+76.000 AND BETWEEN STA. 70+20.372 TO STA. 69+80.000 (Bid Item 0007).
7.2.2 CONCRETE, CHANNEL WALLS, EXCEPT BETWEEN STA. 46+51.092 TO STA. 45+76.000 AND BETWEEN STA. 70+20.372 TO STA. 69+80.000 (Bid Item 0008).
7.2.3 Concrete, Channel Side Slope.
7.2.4 Concrete, Cut-off Wall.
7.2.5 Concrete, Transition
7.2.6 CONCRETE OVERFLOW STRUCTURES (Bid Item 0009).

PART 8 GROUTED RIPRAP, EXCEPT BETWEEN STA. 51+75.702 TO STA. 45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000 (Bid Item 0010)

8.1 Measurement.
8.2 Payment.

PART 9 REINFORCING STEEL, EXCEPT BETWEEN STA. 46+51.092 TO STA. 45+76.000 AND BETWEEN STA. 70+20.372 TO STA. 69+80.000 (Bid Item 0011).

9.1 Measurement.
9.2 Payment.

PART 10 AGGREGATE BASE COURSE, EXCEPT BETWEEN STA. 51+75.702 TO STA. 45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000 (Bid Item 0012).

10.1 Measurement.
10.2 Payment.

PART 11 ASPHALT CONCRETE PAVEMENT, EXCEPT BETWEEN STA. 51+75.702 TO STA. 45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000 (Bid Item 0013).

11.1 Measurement.
11.2 Payment.

PART 12 WEEPHOLE SYSTEM, EXCEPT BETWEEN STA. 46+51.092 TO STA. 45+14.894 AND BETWEEN STA. 70+20.372 TO STA. 69+80.000 (Bid Item 0014).

PART 13 BOX CONDUIT @ TORREY PINES DRIVE, STA. 42+52.904 to STA. 42+95.578 (Bid Item 0015).

PART 14 CHANNEL BOX CONDUIT, STA. 51+75.702 to STA. 62+00.000 (Bid Item 0016).

PART 15 INVERT ACCESS RAMP, STA. 66+16.692 to STA. 66+80.000 (Bid Item 0017).

PART 16 BOX CONDUIT @ TIOGA WAY, STA. 68+14.537 to STA. 68+51.117 (Bid Item 0018).

PART 17 CONFLUENCE/INVERT TRANSITION FOR FLAMINGO CHANNEL STA. 68+51.117 to STA. 69+53.335, AND A PORTION OF BUFFALO LATERAL STA. 10+00.000 to STA. 10+76.563 (Bid Item 0019).

PART 18 BOX CONDUIT @ BUFFALO DRIVE, STA. 70+37.278 to STA. 70+58.784 (Bid Item 0020) (Note: Other portion of Box Conduit @ Buffalo Drive is in the Optional Bid Items).

PART 19 RECTANGULAR TO TRAPEZOIDAL TRANSITION, STA. 70+95.214 to STA. 71+15.521 (Bid Item 0021).

PART 20 BUFFALO LATERAL, STA. 10+76.563 to STA. 12+10.198 (Bid Item 0022).

PART 21 SIDE DRAINS (Bid Items 0023, 0024, 0025, 0026, 0027, 0028, 0029).

PART 22 SLOTTED CHAMBER, STA. 42+62.879 (Bid Item 0030).

PART 23 21 FOOT CHANNEL (Bid Item 0031).

PART 24 INLET STRUCTURES, SINGLE AND DOUBLE RCP (Bid Item 0032, 0034).

PART 25 43 FOOT CHANNEL & TENAYA WAY ROAD MODIFICATIONS (Bid Item 0033).

PART 26 TIOGA STREET REMOVAL AND RECONSTRUCTION (Bid Item 0035).

PART 27 TENAYA/DIABLO STORM DRAIN SYSTEM FOR SIDE DRAIN, STA 58+21.761 RT (Bid Item 0036)

PART 28 TENAYA/ELDRIDGE STORM DRAIN SYSTEM FOR SIDE DRAIN, STA 61+30.000 RT (Bid Item 0037)

PART 29 MANHOLES FOR BOX CONDUITS, CULVERTS, AND LATERALS, EXCEPT BETWEEN STA. 51+75.702 TO STA. 46+51.092 (Bid Item 0038).

PART 30 ACCESS ROAD @ DURANGO HIGH SCHOOL (Bid Item 0039).

PART 31 ROAD DETOURS @ BUFFALO/TIOGA (Bid Item 0040).

PART 32 CHAIN LINK FENCE, EXCEPT BETWEEN STA. 51+75.702 TO STA. 45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000 (Bid Item 0041).

32.1 Measurement.
32.2 Payment.

PART 33 PIPE SAFETY RAILING, EXCEPT BETWEEN STA. 46+52.000 TO STA. 45+14.894 AND BETWEEN STA. 70+20.000 TO STA. 70+21.000 (Bid Item 0042).

33.1 Measurement
33.2 Payment

PART 34 CABLE SAFETY RAILING, EXCEPT BETWEEN STA. 51+75.702 TO STA. 45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000 (Bid Item 0043).

34.1 Measurement
34.2 Payment

PART 35 DOUBLE SWING GATES, EXCEPT BETWEEN STA. 51+75.702 TO STA. 45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000 (Bid Item 0044).

35.1 Measurement
35.2 Payment.

PART 36 SOIL STABILIZER, EXCEPT BETWEEN STA. 51+75.702 TO STA. 45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000 (Bid Item 0045).

36.1 Measurement.
36.2 Payment

PART 37 STATION MARKINGS, EXCEPT BETWEEN STA. 51+75.702 TO STA. 45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000 (Bid Item 0046).

PART 38 AS-BUILT DRAWINGS (Bid Item 0047).

38.1 Measurement
38.2 Payment

PART 39 DEWEY STREET REMOVAL AND REPLACEMENT STATION 56+00.000 to STATION

51+75.702 (Bid Item 0048).

39.1 Dewey Street Road Closure and Detour Plan
39.2 Removal
39.3 Removal and Storage for Reinstallation
39.4 Protect In Place
39.5 Replacement Items
39.6 Restore, Replant, Install and Reinstall Items
39.7 STORAGE ONE Sign Removal, Storage and/or Temporary Reinstallation and Permanent Reinstallation

PART 40 0.250 M (10 INCH) SEWER @ TENAYA WAY (Bid Item 0049).

PART 41 0.300 M (12 INCH) WATERLINE @ BUFFALO DRIVE (Bid Item 0050).

PART 42 LADDER SYSTEMS, EXCEPT BETWEEN STA. 51+75.702 TO STA. 45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000 (Bid Item 0051)

PART 43 TRAFFIC CONTROL, STA. 51+75.702 TO STA. 45+14.894 (Bid Item 0052).

PART 44 DIVERSION AND CONTROL OF WATER, STA. 51+75.702 TO STA. 45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000 (Bid Item 0053).

PART 45 CLEAR SITE AND REMOVE OBSTRUCTIONS, STA. 51+75.702 TO STA. 45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000 (Bid Item 0054).

PART 46 EXCAVATION, STA. 51+75.702 TO STA. 45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000 (Bid Item 0055).

46.1 Measurement.
46.2 Payment.
46.3 Unsatisfactory Soils
46.4 Excavation for Structures
46.5 Excavation for Utilities
46.6 Shoring

PART 47 COMPACTED FILLS, STA. 51+75.702 TO STA. 45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000.

47.1 Measurement.
47.2 Payment.
47.2.1 COMPACTED FILL, CHANNEL STA. 51+75.702 TO STA. 45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000 (Bid Item 0056).
47.2.2 Fill for Structures.
47.2.3 Trenches.
47.2.4 Subgrade Preparation.

PART 48 CONCRETE, STA. 46+51.092 TO STA. 45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000.

48.1 Measurement.
48.2 Payment.
48.2.1 CONCRETE, CHANNEL INVERT SLAB, STA. 46+51.092 TO STA. 45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000 (Bid Item 0057).
48.2.2 CONCRETE, CHANNEL WALLS, STA. 46+51.092 TO STA. 45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000 (Bid Item 0058).
48.2.3 Concrete, Cut-off Wall.
48.2.4 Concrete, Transition

PART 49 REINFORCING STEEL, STA. 46+51.092 TO STA. 45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000 (Bid Item 0059).

49.1 Measurement.
49.2 Payment.

PART 50 AGGREGATE BASE COURSE, STA. 46+51.092 TO STA. 45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000 (Bid Item 0060).

50.1 Measurement.
50.2 Payment.

PART 51 ASPHALT CONCRETE PAVEMENT, STA. 46+51.092 TO STA. 45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000 (Bid Item 0061).

51.1 Measurement.
51.2 Payment.

PART 52 WEEPHOLE SYSTEM, STA. 46+51.092 TO STA. 45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000 (Bid Item 0062).

PART 53 INVERT ACCESS RAMP, STA. 45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000 to STA. 45+76.000 (Bid Item 0063).

PART 54 BOX CONDUIT @ REDWOOD STREET, STA. 46+51.092 to STA. 46+87.668 (Bid Item 0064).

PART 55 CHANNEL BOX CONDUIT STA. 46+87.668 TO STA. 47+04.000 (Bid Item 0065).

PART 56 COVERED CONFLUENCE/INVERT TRANSITION (SECTION R), STA. 47+04.000 to STA. 49+73.000 (Bid Item 0066).

PART 57 CHANNEL BOX CONDUIT SECTION S, STA. 49+73.000 to STA. 49+93.000 AND PORTION OF RAINBOW LATERAL, STA. 9+99.100 to STA. 10+19.983 (Bid Item 0067).

PART 58 CHANNEL BOX CONDUIT, STA. 49+93.000 to STA. 50+37.018 (Bid Item 0068).

PART 59 BOX CONDUIT @ RAINBOW BLVD., STA. 50+37.018 to STA. 50+88.000 (Bid Item 0069).

PART 60 TRANSITION STRUCTURE, STA. 50+88.000 to STA. 51+38.000 (Bid Item 0070).

PART 60 CHANNEL BOX CONDUIT, STA. 51+38.000 to 51+75.702 (Bid Item 0071).

PART 61 RAINBOW LATERAL, STA. 10+19.983 to STA. 11+38.403 (Bid Item 0072).

PART 62 SIDE DRAINS (Bid Items 0073, 0074, 0075, 0076).

PART 63 DROP INLET STRUCTURE FOR SIDE DRAIN, STA. 48+67.994 RT (Bid Item 0077).

PART 64 RAINBOW/DEWEY STORM DRAIN SYSTEM FOR SIDE DRAIN, STA. 50+76.739 RT (Bid Item 0078).

PART 65 RAINBOW/DEWEY STORM DRAIN SYSTEM FOR SIDE DRAIN, STA. 50+84.247 RT (Bid Item 0079).

PART 66 ROAD DETOURS @ RAINBOW BLVD (Bid Item 0080).

PART 67 MANHOLES FOR BOX CONDUITS, BETWEEN STA. 51+75.702 TO STA. 45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000 (Bid Item 0081).

PART 68 STREET/SIGNAGE MODIFICATIONS, REDWOOD STREET (Bid Item 0082).

PART 69 CHAIN LINK FENCE, STA. 51+75.702 TO STA. 45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000 (Bid Item 0083).

70.1 Measurement.
70.2 Payment.

PART 70 PIPE SAFETY RAILING, BETWEEN STA. 46+52.000 TO STA. 45+14.894 AND BETWEEN STA. 70+20.000 TO STA. 70+21.000 (Bid Item 0084).

-- End of Section Table of Contents --

SECTION 01270

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.1 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.

1.2 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.**

1.3 UNIT PRICE PAYMENT ITEMS

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

1.4 OPTIONAL BID 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. Optional bid items include channel construction work and appurtenances between **Station 51+75.702 to Station 45+14.894 and between Station 70+37.278 to Station 69+80.000** that may or may not be awarded depending on acquisition of right-of-way grants. **Some of the optional bid lump sum payment items reference drawings and plans that utilize english units of measurements.**

1.5 OPTIONAL BID 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. Optional bid items include channel construction work and appurtenances between **Station 51+75.702 to Station 45+14.894 and between Station 70+37.278 to Station 69+80.000** that may or may not be awarded depending on acquisition of right-of-way grants.

PART 2 TRAFFIC CONTROL, EXCEPT BETWEEN STA. 51+75.702 TO STA. **45+14.894** (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 safety barriers; providing traffic warning and control signs and lighting; stripping; flag men as required.

PART 3 DIVERSION AND CONTROL OF WATER, EXCEPT BETWEEN STA. 51+75.702 TO STA. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000** (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.

PART 4 CLEAR SITE AND REMOVE OBSTRUCTIONS, EXCEPT BETWEEN STA. 51+75.702 TO STA. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000** (Bid Item 0003).

Payment 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 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 including removal of existing grouted riprap rock as shown on the drawings; and including removal and salvage of existing concrete blocks and fence as shown on the drawings and storage of same as shown on the drawings; and including removal of existing concrete pavement and concrete curb and gutter and plantmix bituminous surface (pbs) as shown on the drawings; and including removal of existing gabions consisting of gabion cages, gabion hold downs and gabion rocks;** 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.

PART 5 EXCAVATION, EXCEPT BETWEEN STA. 51+75.702 TO STA. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000** (Bid Item 0004).

5.1 Measurement.

A survey of the site shall be made 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. 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 unsuitable 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 total quantity of excavated material for which payment will be made will be the theoretical quantity between the ground surface as determined by a survey and the grade and slope of the theoretical cross sections indicated. No allowance will be made for overdepth excavation or for the removal of any material outside the required slope lines. All excavation outside of excavation lines shown on the drawings will be considered as being for the convenience of the Contractor.

5.2 Payment.

Payment will be made for costs associated with excavation for the channel at the applicable contract price, which payment shall constitute full compensation for excavating the channel, and other areas as indicated on the drawings, including shoring, rock removal, and cemented alluvium excavation; shaping and trimming of areas to receive concrete; including foundation preparation; crushing or otherwise processing, loading, stockpiling, hauling, and placing suitable materials for compacted fill; Including crushing/processing, loading, hauling, placing excess satisfactory excavated materials at disposal site shown on drawings. Payment will not be included for excavation (including shoring) outside the excavation limits indicated on the drawings or staked in the field, and other excavation requirements for which separate payments are provided.

5.3 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.

5.4 Excavation for Structures

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

5.5 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.

5.6 Shoring

When shoring is indicated or directed for items for which separate payment is made, payment will be included in the applicable contract price for the items of work under which the shoring is placed.

PART 6 **COMPACTED FILL, EXCEPT BETWEEN STA. 51+75.702 TO STA. 45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000.**

6.1 Measurement.

Measurement for compacted 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.

6.2 Payment.

6.2.1 **COMPACTED FILL, CHANNEL, EXCEPT BETWEEN STA. 51+75.702 TO STA. 45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000 (Bid Item 0005)**.

Payment for **compacted fill, channel, except between sta. 51+75.702 to sta. 45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000** 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. 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.

6.2.2 **COMPACTED FILL, DISPOSAL SITE (Bid Item 0006)**.

Payment for **compacted fill, disposal site** will be made at the applicable

contract price, which payment shall constitute full compensation for shaping, grading, and compacting the fill, at disposal site(s) shown on the drawings, 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.

6.2.3 Fill for 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.

6.2.4 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.

6.2.5 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.

PART 7 **CONCRETE, EXCEPT BETWEEN STA. 46+51.092 TO STA. 45+76.000 AND BETWEEN STA. 70+20.372 TO STA. 69+80.000.**

7.1 Measurement.

Measurement of concrete will be made on the basis of the actual volume, in cubic yards, 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.

7.2 Payment.

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, **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.

7.2.1 **CONCRETE, CHANNEL INVERT SLAB, EXCEPT BETWEEN STA. 46+51.092 TO STA.**

45+76.000 AND BETWEEN STA. 70+20.372 TO STA. 69+80.000 (Bid Item 0007).

Payment for concrete, channel invert slab will be made at the applicable contract price, which shall constitute full compensation for all concrete **(including all necessary items described in Paragraph 7.2 above)** placed for the invert slab of the channel, keys, starter walls, and cut-off walls, complete.

7.2.2 **CONCRETE, CHANNEL WALLS, EXCEPT BETWEEN STA. 46+51.092 TO STA. 45+76.000 AND BETWEEN STA. 70+20.372 TO STA. 69+80.000 (Bid Item 0008).**

Payment for concrete, channel walls will be made at the applicable contract price, which payment shall constitute full compensation for all concrete **(including all necessary items described in Paragraph 7.2 above)** placed above the starter walls in the vertical walls of the channel, the walls of the warped transition structures, including wall height transitions, complete.

7.2.3 **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..

7.2.4 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.

7.2.5 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.

7.2.6 **CONCRETE OVERFLOW STRUCTURES (Bid Item 0009).**

Payment for concrete overflow structures will be made at the applicable contract price, which payment shall constitute full compensation for all concrete (including all necessary items described in Paragraph 7.2 above) placed for the concrete overflow structure, including furnishing and placing reinforcing steel; furnishing and placing metal fences and metal gates where shown on the drawings (two locations), complete except earthwork.

PART 8 GROUTED RIPRAP, EXCEPT BETWEEN STA. 51+75.702 TO STA. 45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000 (Bid Item 0010)

8.1 Measurement.

Measurement of Grouted Riprap will be made on the basis of the actual volume, in cubic meters, of grouted riprap within the pay 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 pay 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 which are either less than 0.15 cubic meter in volume or one-tenth of square meterin cross section. 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.

8.2 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.

PART 9 REINFORCING STEEL, EXCEPT BETWEEN **STA. 46+51.092 TO STA. 45+76.000 AND BETWEEN STA. 70+20.372 TO STA. 69+80.000** (Bid Item 0011).

9.1 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 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.

9.2 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.

PART 10 AGGREGATE BASE COURSE, EXCEPT BETWEEN STA. 51+75.702 TO STA. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000** (Bid Item 0012).

10.1 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.

10.2 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.

PART 11 ASPHALT CONCRETE PAVEMENT, EXCEPT BETWEEN STA. 51+75.702 TO STA. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000** (Bid Item 0013).

11.1 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.

11.2 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.

PART 12 WEEPHOLE SYSTEM, EXCEPT BETWEEN **STA. 46+51.092 TO STA. 45+14.894 AND BETWEEN STA. 70+20.372 TO STA. 69+80.000** (Bid Item 0014).

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.

PART 13 **BOX CONDUIT** @ TORREY PINES DRIVE, STA. 42+52.904 to STA. 42+95.578 (Bid Item 0015).

Payment for **Box Conduit** @ Torrey Pines Drive (Sta. 42+52.904 to Sta. 42+95.578) will be made at the applicable contract price, which payment shall constitute full compensation for the **box conduit** except earthwork, complete, including furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete, and all incidentals, **including extended headwalls, and including maintaining existing traffic barriers on North side of channel at Torrey Pines Drive, and including extra traffic control devices that will be left in place after Contractor leaves site on South side of channel at Torrey Pines Drive,** complete as shown on the drawings except for pipe safety hand rail, and chain link fencing.

PART 14 **CHANNEL BOX CONDUIT**, STA. 51+75.702 to STA. 62+00.000 (Bid Item 0016).

Payment for **Channel Box Conduit**, (Sta. 51+75.702 to Sta. 62+00.000) will be made at the applicable contract price, which payment shall constitute full compensation for the **channel box conduit** except earthwork, 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 pipe safety hand rail, and chain link fencing.

PART 15 INVERT ACCESS RAMP, STA. **66+16.692** to STA. 66+80.000 (Bid Item 0017).

Payment for Invert Access Ramp, Sta. **66+16.692** to Sta. 66+80.000 also includes the adjacent open channel from Sta. **66+16.692** to Sta. **66+80.000**. 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;** and all incidentals, complete as shown on the drawings except for pipe safety hand rail, chain link fencing, and double swing gate.

PART 16 **BOX CONDUIT** @ TIOGA WAY, STA. 68+14.537 to STA. **68+51.117** (Bid Item 0018).

Payment for **Box Conduit** @ Tioga Way, (Sta. 68+14.537 to Sta. **68+51.117**) will be made at the applicable contract price, which payment shall constitute full compensation for the **box conduit** except earthwork, 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 pipe safety hand rail, and chain link fencing.

PART 17 **CONFLUENCE/INVERT TRANSITION FOR FLAMINGO CHANNEL STA. 68+51.117 to STA. 69+53.335, AND A PORTION OF BUFFALO LATERAL STA. 10+00.000 to STA. 10+76.563 (Bid Item 0019).**

Payment for the **Confluence/Invert Transition for Flamingo Channel (Sta. 68+51.117 to Sta. 69+53.335) and a Portion of Buffalo Lateral (Sta. 10+00.000 to Sta. 10+76.563)** will be made at the applicable contract price, which payment shall constitute full compensation for the confluence/invert transition except earthwork **and except weepholes**, complete, **including details of Section Q and Section P shown on drawing "S6", and including details of Section R, Section S, and Section T shown on drawing "S7", and including extended headwall shown on drawing "S3",;** including furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete; and all incidentals, complete as shown on the drawings except for pipe safety hand rail, chain link fencing and double swing gate.

PART 18 **BOX CONDUIT** @ BUFFALO DRIVE, STA. **70+37.278** to STA. 70+58.784 (Bid Item 0020) **(Note: Other portion of Box Conduit @ Buffalo Drive is in the Optional Bid Items).**

Payment for **Box Conduit** @ Buffalo Drive, (Sta. **70+37.278** to Sta. 70+58.784) will be made at the applicable contract price, which payment shall constitute full compensation for the **box conduit including removal of existing gabion and existing low flow channel, including temporary concrete k-rail traffic safety barriers that may be required for safety,** except earthwork, 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 pipe safety hand rail, and chain link fencing.

PART 19 RECTANGULAR TO TRAPEZOIDAL TRANSITION, STA. 70+95.214 to STA. 71+15.521 (Bid Item 0021).

Payment for Rectangular to Trapezoidal Transition (Sta. 70+95.214 to Sta. 71+15.521) will be made at the applicable contract price, which payment shall constitute full compensation for the trapezoidal to rectangular transition 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 pipe safety hand rail, and chain link fencing.

PART 20 BUFFALO LATERAL, STA. 10+76.563 to STA. 12+10.198 (Bid Item 0022).

Payment for Buffalo Lateral (Sta. 10+76.563 to Sta. 12+10.198) will be made at the applicable contract price, which payment shall constitute full compensation for the box culvert **(conduit)** and stub-outs except earthwork **and except manholes**, complete, **including bulkhead shown on drawing "S8";** including furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete; and all incidentals, complete as shown on the drawings.

PART 21 SIDE DRAINS (Bid Items 0023, 0024, 0025, 0026, 0027, 0028, 0029).

Payment for side drain 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, including 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.

PART 22 SLOTTED CHAMBER, STA. 42+62.879 (Bid Item 0030).

Payment for the Slotted Chamber, Sta. 42+62.879 will be made at the applicable contract price for each slotted chamber which payment shall constitute full compensation for the slotted chamber complete, including slabs and walls (excluding main channel wall), excavation and compacted fill; furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete**; 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 barrier (plug) for stub-out,** manhole frame and cover and all incidentals, complete as shown on the drawings. 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.

PART 23 21 FOOT CHANNEL (Bid Item 0031).

Payment for 21 Foot Channel will be made at the application contract lump sum price, which payment shall constitute full compensation for the 21 foot channel, complete, including excavation and compacted fill; furnishing and placing riprap; furnishing and placing all appurtenances; and all incidentals, complete as shown on the drawings.

PART 24 INLET STRUCTURES, SINGLE AND DOUBLE RCP (Bid Item 0032, 0034).

Payment for the Inlet Structure, Single and Double RCP, will be made at the application contract lump sum price, which payment shall constitute full compensation for the inlet structure, complete, including excavation and compacted fill; furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete; **connecting to concrete pipe stub-outs from related side drain structure,** furnishing and placing riprap; furnishing and placing all appurtenances**, including galvanized trash racks**; and all incidentals, complete as shown on the drawings.

PART 25 43 FOOT CHANNEL & TENAYA WAY ROAD MODIFICATIONS (Bid Item 0033).

Payment for 43 Foot Channel & Tenaya Way Road Modifications will be made at the application contract lump sum price, which payment shall constitute full compensation for the 43 foot channel & Tenaya Way Road modifications, complete, including all necessary sawcutting of existing concrete structures and plantmix bituminous surfaces (PBS) requiring sawcutting; including excavation and compacted fill; furnishing, forming, placing concrete cutoff walls, concrete inlet ramp, concrete channel; furnishing and placing riprap; grading, scarifying compacted road subgrade; furnishing, and placing compacted type II aggregate base course; furnishing, and placing compacted plantmix bituminous surface (PBS) furnishing and placing all appurtenances including drain; and all incidentals, complete as shown on the drawings "D4" and "D5". Contractor is informed that removal costs of PBS and concrete is covered under CLEAR SITE AND REMOVE OBSTRUCTIONS Bid Item

PART 26 TIOGA STREET REMOVAL AND RECONSTRUCTION (Bid Item 0035).

Payment for Tioga Street Removal and Reconstruction will be made at the applicable contract lump sum price, and shall be considered full payment for saw cutting, demolition, removal, hauling and disposal of asphaltic concrete; demolition, removal, disposal and replacement of existing curb and gutter; protection of existing landscaping; protect and support existing water, gas, and fiber optic lines and other utility lines; repair/replacement of irrigation lines; all required excavation and compacted fill; furnishing and placing the aggregate base course, complete, including subgrade preparation; asphalt concrete pavement in place, complete, including tack coat, prime coat and appurtenant work such as pavement markings; and traffic barricades/control and signage, complete.

PART 27 TENAYA/DIABLO STORM DRAIN SYSTEM FOR SIDE DRAIN, STA 58+21.761 RT (Bid Item 0036)

Payment for Tenaya/Diablo Storm Drain System for Side Drain, Sta. 58+21.761 RT will be made at the application contract lump sum price, which payment shall constitute full compensation for the Tenaya/Diablo storm drain system for connection to side drain stub-out, sta. 58+21.761, complete, including excavation and compacted fill; furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete; furnishing and placing all lengths of concrete pipe as shown on the "D" drawings, fittings and end sections and concrete thrust blocks; connecting to concrete pipe stub-outs from side drain, sta. 58+21.761; furnishing and placing riprap; furnishing and placing all appurtenances; and all incidentals, complete as shown on the drawings.

PART 28 TENAYA/ELDRIDGE STORM DRAIN SYSTEM FOR SIDE DRAIN, STA 61+30.000 RT (Bid Item 0037)

Payment for Tenaya/Eldridge Storm Drain System for Side Drain, Sta. 61+30.000 RT will be made at the application contract lump sum price, which payment shall constitute full compensation for the Tenaya/Eldridge storm drain system for connection to side drain stub-out, sta. 61+30.000, complete, including excavation and compacted fill; furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete; furnishing and placing all lengths of concrete pipe as shown on the "D" drawings, fittings and end sections and concrete thrust blocks; connecting to concrete pipe stub-outs from side drain, sta. 61+30.000; furnishing and placing riprap; furnishing and placing all appurtenances; and all incidentals, complete as shown on the drawings.

PART 29 MANHOLES FOR BOX **CONDUITS, CULVERTS, AND LATERALS**, EXCEPT BETWEEN STA. 51+75.702 TO STA. **46+51.092** (Bid Item 0038).

Manholes 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.

PART 30 **ACCESS ROAD** @ DURANGO HIGH SCHOOL (Bid Item 0039).

Payment for **Access Road** @ Durango High School will be made at the applicable contract lump sum price, and shall be considered full payment for saw cutting, demolition, removal, hauling and disposal of asphaltic concrete; all required excavation and compacted fill; furnishing and placing the aggregate base course, complete, including subgrade preparation; plantmix bituminous surface (PBS) in place, complete, including tack coat, prime coat and appurtenant work such as pavement markings; and traffic control and signage, complete.

PART 31 ROAD DETOURS @ BUFFALO**/TIOGA** (Bid Item 0040).

Payment for Road Detours @ Buffalo**/Tioga** will be made at the applicable contract lump sum price, and shall be considered full payment for saw cutting, demolition, removal, hauling and disposal of asphaltic concrete; protect and support existing water, gas, and fiber optic lines; all required excavation and compacted fill; furnishing and placing the

aggregate base course, complete, including subgrade preparation; plantmix bituminous surface (PBS) in place, complete, including tack coat, prime coat and appurtenant work such as pavement striping; and traffic control and signage, complete.

PART 32 CHAIN LINK **FENCE**, EXCEPT BETWEEN STA. 51+75.702 TO STA. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000** (Bid Item 0041).

32.1 Measurement.

Measurement of chain link **fence** will be by the linear meters of chain link fencing constructed as shown on the drawings.

32.2 Payment.

Payment for chain link fence 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, sleeves, grout, grounding, and all incidentals, complete as shown on the drawings.

PART 33 PIPE SAFETY RAILING, EXCEPT BETWEEN **STA. 46+52.000 TO STA. 45+14.894 AND BETWEEN STA. 70+20.000 TO STA. 70+21.000** (Bid Item 0042).

33.1 Measurement

Measurement of Pipe Safety Railing that is provided will be by the linear meter of pipe safety railing constructed as shown on the drawings.

33.2 Payment

Payment for Pipe Safety Railing will be made at the applicable contract unit price per linear meter, which payment shall constitute full compensation for Pipe Safety Railing, including pipe railing and posts, safety chain gates, galvanized anchor bolt assemblies, fabrication, grout or dry pack, surface preparation and painting, and all incidentals, complete.

PART 34 **CABLE SAFETY RAILING, EXCEPT BETWEEN STA. 51+75.702 TO STA. 45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000 (Bid Item 0043).**

34.1 Measurement

Measurement of **Cable Safety Railing** will be by the linear meter, measured from end to end, of railing installed as shown on the drawings.

34.2 Payment

Payment **Cable Safety 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, galvanized appurtenances, fabrication, post sleeves, grout or dry pack, and all incidentals, complete.

PART 35 DOUBLE SWING GATES, EXCEPT BETWEEN STA. 51+75.702 TO STA. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000** (Bid Item 0044).

35.1 Measurement

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

35.2 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, **padlocks,** and all incidentals, complete, as shown on the drawings.

PART 36 SOIL STABILIZER, EXCEPT BETWEEN STA. 51+75.702 TO STA. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000** (Bid Item 0045).

36.1 Measurement.

Measurement of soil stabilizer will be made on the basis of the actual area in square meters of exposed excavation and fill surfaces in the construction areas treated with soil stabilizer as indicated or directed.

36.2 Payment

Payment for soil stabilizer will be at the applicable contract price, which payment shall constitute full compensation for the soil stabilizer including materials, processing, hauling, and placing, complete in place.

PART 37 STATION MARKINGS, EXCEPT BETWEEN STA. 51+75.702 TO STA. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000** (Bid Item 0046).

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

PART 38 AS-BUILT DRAWINGS (Bid Item 0047).

38.1 Measurement

Measurement shall be made on a lump sum basis.

38.2 Payment

Payment shall be made at the applicable contract price and shall be compensation in full 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 on Compact Disk, indicating installation of work items not installed according to the contract drawings.

PART 39 DEWEY STREET REMOVAL AND REPLACEMENT STATION 56+00.000 to STATION 51+75.702 (Bid Item 0048).

Payment for Dewey Street Removal and Replacement (Sta. 56+00.000 to Sta. 51+75.702) will be made at the applicable contract lump sum price, and shall be considered full payment as per the following.

39.1 Dewey Street Road Closure and Detour Plan

Dewey Street Road Closure and Detour Plan shall include all necessary road closure and detours and plans/submittals and related items as shown in the "D" drawings including notifications, traffic control, signage, and phasing of closure and detours and maintainance of such closure and detour features for the duration of the project.

39.2 Removal

The following items and features between Station 56+00.000 and 51+75.702 are to be removed by sawcutting, demolition, hauling and disposal as shown on the drawing DEWEY DRIVE REMOVAL PLAN: concrete valley gutter; concrete sidewalk; "L" type curb & gutter; "A" type curb & gutter; roadway plantmix bituminous surface (PBS); parking lot PBS; landscaping and landscape watering system; landscape pull box; sod; other concrete gutter w/ curbs; under sidewalk drain; 6' cmu wall.

39.3 Removal and Storage for Reinstallation

The following items and features between Station 56+00.000 and 51+75.702 are to be removed or dismantled, and stored, and maintained, and kept alive if organic, as necessary, for reinstallation as shown on the drawing DEWEY DRIVE REMOVAL PLAN and on the drawing PLAN & PROFILE STA 10+00 - STA 20+00 and on the drawing PLAN & PROFILE STA 20+00 - STA 27+26 and on the drawing LANDSCAPING, STREETLIGHT, SIGNAGE & PAVEMENT MARKING PLAN DEWEY DRIVE: Palm Trees; Ground Mounted Signs; 250 Watt HPS streetlight assemblies; water valve box assemblies; Sprint vault; 5' chain link fence; pole mounted signs.

39.4 Protect In Place

The following items and features between Station 56+00.000 and 51+75.702 are to be protected in place as shown on the drawing DEWEY DRIVE REMOVAL PLAN: parking lot light/foundation; fire hydrant.

39.5 Replacement Items

The following items and features between Station 56+00.000 and 51+75.702 are to be provided, complete, as shown on the drawing PLAN & PROFILE STA 10+00 - STA 20+00 and on the drawing PLAN & PROFILE STA 20+00 - STA 27+26 and on the drawing LANDSCAPING, STREETLIGHT, SIGNAGE & PAVEMENT MARKING PLAN DEWEY DRIVE: construct plantmix bituminous surface (PBS) per pavement section; construct 2 1/2" PBS, 4" type II, prime coat (off site); construct "L" type curb & gutter per std dwg 216; construct 5' sidewalk per std dwg 234; construct sidewalk ramp per std dwg 235(case 1); construct sidewalk drain per std dwg 236; construct valley gutter per std dwg 228; construct commercial driveway (option B) per std dwg 225; construct "A" type curb &

gutter per std dwg 219; construct "on-site" concrete channel per "ON-SITE" CONCRETE CHANNEL detail on drawing PLAN & PROFILE STA 20+00 - STA 27+26; install removed 5' chain link fence;

39.6 Restore, Replant, Install and Reinstall Items

The following items and features between Station 56+00.000 and 51+75.702 are to be restored, complete, as shown on the drawing LANDSCAPING, STREETLIGHT, SIGNAGE & PAVEMENT MARKING PLAN DEWEY DRIVE: restore landscaping and landscaping watering system; install sod to match existing and surrounding; replant palm trees; reinstall removed ground mounted signs; reinstall removed pole mounted signs; install new ground mounted sign; install type 1 centerline per std dwg 244; install storage lane line per std dwg 246; install 24" white stop line (cold polymer film type 1); white pavement arrow (cold polymer film type 1) per detail on drawing LANDSCAPING, STREETLIGHT, SIGNAGE & PAVEMENT MARKING PLAN DEWEY DRIVE; white pavement "ONLY" (cold polymer film type 1) per detail on drawing LANDSCAPING, STREETLIGHT, SIGNAGE & PAVEMENT MARKING PLAN DEWEY DRIVE; white "24" longitudinal crosswalk lines, longitudinal lines shall align w/ lane lines and center of lanes (cold polymer film type 1) per std dwg 254A; 4" white paint line; reinstall removed 100 HPS streetlight per std dwg 314; 1-1/4" conduit w/ (2)#4, (1)#8 gnd, thw copper wire (connect to exist circuit in pull box @ SW corner of Rainbow/Dewey; 1-1/4" conduit only.

39.7 STORAGE ONE Sign Removal, Storage and/or Temporary Reinstallation and Permanent Reinstallation

Remove the existing STORAGE ONE sign and existing ground foundation at approximate station 52+30 and place the sign into storage or temporary reinstallation as directed by the Contracting Officer. The Contractor shall permanently reinstall the sign once the signs new ground foundation (new ground foundation shall have the same design as removed ground foundation, including materials and function) has been installed by the Contractor in the same location as the previous ground foundation.

PART 40 0.250 M (10 INCH) SEWER @ TENAYA WAY (Bid Item 0049).

Payment for 0.250 M (10 INCH) SEWER @ TENAYA WAY will be made at the applicable contract price, which payment shall constitute full compensation for provision of and installation of new utility and appurtenances, as shown on the drawings, **including removal of existing 0.250 m PVC pipe (about 35 M), including removal of two existing sewer manholes, including installation of 0.250 m PVC pipe (about 24 m), including installation of 0.250 m ductile iron pipe (about 10 m), including installation of two flex couplings for 0.250 m pipe, including installation of 2 new manholes, and including temporary sewer bypass that the Contractor must furnish and install and maintain until permanent work is accomplished,** complete. The earthwork included shall be only that earthwork which is located outside the limits of earthwork for which other payment is provided.

PART 41 0.300 M (12 INCH) WATERLINE @ BUFFALO DRIVE (Bid Item 0050).

Payment for 0.300 M (12 INCH) WATERLINE @ BUFFALO DRIVE will be made at the applicable contract price, which payment shall constitute full compensation

for provision of and installation of new utility and appurtenances, as shown on the drawings, **including removal of existing 0.300 m PVC pipe (about 54 m), including removal of existing thrust blocks (about 4), including removal of existing RCP casing (about 16 m), including installation of new 0.300 m PVC pipe (about 55 m), including installation of new thrust blocks (about 4), including installation of new RCP casing (about 10 m), and including temporary potable waterline bypass that the Contractor must furnish and install and maintain meeting potable water standards and working pressure until permanent work is accomplished,** complete. The earthwork included shall be only that earthwork which is located outside the limits of earthwork for which other payment is provided.

PART 42 LADDER SYSTEMS, EXCEPT BETWEEN STA. 51+75.702 TO STA. 45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000 (Bid Item 0051)

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.

PART 43 TRAFFIC CONTROL, STA. 51+75.702 TO STA. **45+14.894** (Bid Item 0052).

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 safety barriers; providing traffic warning and control signs and lighting; stripping; flag men as required.

PART 44 DIVERSION AND CONTROL OF WATER, STA. 51+75.702 TO STA. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000** (Bid Item 0053).

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.

PART 45 CLEAR SITE AND REMOVE OBSTRUCTIONS, STA. 51+75.702 TO STA. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000** (Bid Item 0054).

Payment 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 as otherwise specified, payment for clearing and removal work includes applicable earthwork; filling holes; removal of abandoned utility lines**, including removal of sewer line at Rainbow Boulevard and capping of ends of sewer line as indicated in the drawing; and including removal of existing concrete pavement and concrete curb and gutter and plantmix bituminous surface (pbs) as shown on the drawings; and including removal of existing gabions consisting of gabion cages, gabion hold downs and gabion rocks;** 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; 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.

PART 46 EXCAVATION, STA. 51+75.702 TO STA. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000** (Bid Item 0055).

46.1 Measurement.

A survey of the site shall be made 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. 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 unsuitable 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 total quantity of excavated material for which payment will be made will be the theoretical quantity between the ground surface as determined by a survey and the grade and slope of the theoretical cross sections indicated. No allowance will be made for overdepth excavation or for the removal of any material outside the required slope lines. All excavation outside of excavation lines shown on the drawings will be considered as being for the convenience of the Contractor.

46.2 Payment.

Payment will be made for costs associated with excavation for the channel at the applicable contract price, which payment shall constitute full compensation for excavating the channel, and other areas as indicated on the drawings, including shoring, rock removal, and cemented alluvium excavation; shaping and trimming of areas to receive concrete; including foundation preparation; crushing or otherwise processing, loading, stockpiling, hauling, and placing suitable materials for compacted fill; Including crushing/processing, loading, hauling, placing excess satisfactory excavated materials at disposal site shown on drawings. Payment will not be included for excavation (including shoring) outside the excavation limits indicated on the drawings or staked in the field, and other excavation requirements for which separate payments are provided.

46.3 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.

46.4 Excavation for Structures

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

46.5 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.

46.6 Shoring

When shoring is indicated or directed for items for which separate payment is made, payment will be included in the applicable contract price for the items of work under which the shoring is placed.

PART 47 **COMPACTED FILLS, STA. 51+75.702 TO STA. 45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000**.

47.1 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.

47.2 Payment.

47.2.1 **COMPACTED FILL, CHANNEL STA. 51+75.702 TO STA. 45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000 (Bid Item 0056)**.

Payment for compacted fill 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. 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.

47.2.2 Fill for 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.

47.2.3 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.

47.2.4 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.

PART 48 CONCRETE, STA. 46+51.092 TO STA. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000**.

48.1 Measurement.

Measurement of concrete will be made on the basis of the actual volume, in cubic yards, 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.

48.2 Payment.

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, **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.

48.2.1 **CONCRETE, CHANNEL INVERT SLAB, STA. 46+51.092 TO STA. 45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000 (Bid Item 0057).**

Payment for concrete, channel invert slab will be made at the applicable contract price, which shall constitute full compensation for all concrete **(including all necessary items described in Paragraph 41.2 above)** placed for the invert slab of the channel, keys, starter walls, and cut-off walls, complete.

48.2.2 **CONCRETE, CHANNEL WALLS, STA. 46+51.092 TO STA. 45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000 (Bid Item 0058).**

Payment for concrete, channel walls will be made at the applicable contract price, which payment shall constitute full compensation for all concrete **(including all necessary items described in Paragraph 41.2 above)** placed above the starter walls in the vertical walls of the channel, the walls of the warped transition structures, including wall height transitions,

complete.

48.2.3 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.

48.2.4 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.

PART 49 REINFORCING STEEL, STA. 46+51.092 TO STA. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000** (Bid Item 0059).

49.1 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 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.

49.2 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.

PART 50 AGGREGATE BASE COURSE, STA. 46+51.092 TO STA. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000** (Bid Item 0060).

50.1 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.

50.2 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.

PART 51 ASPHALT CONCRETE PAVEMENT, STA. 46+51.092 TO STA. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000** (Bid Item 0061).

51.1 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.

51.2 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.

PART 52 WEEPHOLE SYSTEM, STA. 46+51.092 TO STA. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000** (Bid Item 0062).

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.

PART 53 INVERT ACCESS RAMP, STA. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000** to STA. 45+76.000 (Bid Item 0063).

Payment for Invert Access Ramp, Sta. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000** to Sta. 45+76.000 also includes the adjacent open channel from Sta. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000** to Sta. **45+76.000**. 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;** and all incidentals, complete as shown on the drawings except for pipe safety hand rail, chain link fencing, and double swing gate.

PART 54 **BOX CONDUIT** @ REDWOOD STREET, STA. 46+51.092 to STA. 46+87.668 (Bid Item 0064).

Payment for **Box Conduit** @ Redwood Street (Sta. 46+51.092 to Sta. 46+87.668) will be made at the applicable contract price, which payment shall constitute full compensation for the **box conduit** 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 pipe safety hand rail, and chain link fencing.

PART 55 CHANNEL BOX CONDUIT STA. 46+87.668 TO STA. 47+04.000 (Bid Item 0065).

Payment for Channel Box Conduit, (Sta. 46+87.668 to Sta. 47+04.000) will be made at the applicable contract price, which payment shall constitute full compensation for the channel box conduit except earthwork, complete, including furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete, and all incidentals, complete as shown on the drawings except for pipe safety hand rail, and chain link fencing.

PART 56 COVERED CONFLUENCE/INVERT TRANSITION **(SECTION R)**, STA. 47+04.000 to STA. 49+73.000 (Bid Item 0066).

Payment for Covered Confluence/Invert Transition **(Section R)** (Sta. 47+04.000 to Sta. 49+73.000) will be made at the applicable contract price, which payment shall constitute full compensation for the **covered confluence/invert transition (section r)** except earthwork **and except manholes**, complete, **including details of Section R shown on drawing "S5";** including furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete; and all incidentals, complete as shown on the drawings.

PART 57 **CHANNEL BOX CONDUIT SECTION S**, STA. 49+73.000 to STA. 49+93.000 **AND PORTION OF RAINBOW LATERAL, STA. 9+99.100 to STA. 10+19.983** (Bid Item 0067).

Payment for **Channel Box Conduit Section S** (Sta. 49+73.000 to Sta. 49+93.000) **and Portion of Rainbow Lateral, Sta. 9+99.100 to Sta. 10+19.983** will be made at the applicable contract price, which payment shall constitute full compensation for the **channel box conduit section s and portion of Rainbow Lateral** except earthwork, complete, **including details of Section Q and Section P shown on drawing "S4", and including details of Section S shown on drawing "S5";** including furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete; and all incidentals, complete as shown on the drawings.

PART 58 **CHANNEL BOX CONDUIT**, STA. 49+93.000 to STA. 50+37.018 (Bid Item 0068).

Payment for **Channel Box Conduit** (Sta. 49+93.000 to Sta. 50+37.018) will be made at the applicable contract price, which payment shall constitute full compensation for the **channel box conduit** except earthwork, complete, including furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete; and all incidentals, complete as shown on the drawings.

PART 59 **BOX CONDUIT** @ RAINBOW BLVD., STA. 50+37.018 to STA. 50+88.000 (Bid Item 0069).

Payment for **Box Conduit** @ Rainbow Blvd., (Sta. 50+37.018 to Sta. 50+88.000) will be made at the applicable contract price, which payment shall constitute full compensation for the **box conduit** except earthwork, complete, including furnishing and placing reinforcing steel; furnishing,

placing, finishing and curing concrete, and all incidentals, complete as shown on the drawings.

PART 60 TRANSITION STRUCTURE, STA. 50+88.000 to STA. 51+38.000 (Bid Item 0070).

Payment for Transition Structure (Sta. 50+88.000 to Sta. 51+38.000) will be made at the applicable contract price, which payment shall constitute full compensation for the transition structure **(box conduit)** except earthwork, complete, including furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete, and all incidentals, complete as shown on the drawings except for pipe safety hand rail, and chain link fencing.

PART 60 **CHANNEL BOX CONDUIT**, STA. **51+38.000** to 51+75.702 (Bid Item 0071).

Payment for **Channel Box Conduit**, (Sta. **51+38.000** to Sta. 51+75.702) will be made at the applicable contract price, which payment shall constitute full compensation for the **channel box conduit** except earthwork, complete, including furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete, and all incidentals, complete as shown on the drawings except for pipe safety hand rail, and chain link fencing.

PART 61 RAINBOW LATERAL, STA. **10+19.983** to STA. 11+38.403 (Bid Item 0072).

Payment for Rainbow Lateral (Sta. **10+19.983** to Sta. 11+38.403) will be made at the applicable contract price, which payment shall constitute full compensation for the box **conduit** and stub-outs except earthwork **and except manholes**, complete, **and bulkhead shown on drawing "S8";** including furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete; and all incidentals, complete as shown on the drawings.

PART 62 SIDE DRAINS (Bid Items 0073, 0074, 0075, 0076).

Payment for side drain 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, including 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.

PART 63 DROP INLET STRUCTURE FOR SIDE DRAIN, STA. 48+67.994 RT (Bid Item 0077).

Payment for the Drop Inlet Structure For Side Drain, Sta. 48+67.994 RT will be made at the application contract lump sum price, which payment shall constitute full compensation for the drop inlet structure connection to side drain stub-out, sta. 48+67.994 RT, complete, including excavation and

compacted fill; furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete; connecting to concrete pipe stub-outs from side drain, sta. 48+67.994; furnishing and placing all appurtenances; and all incidentals, complete as shown on the drawings.

PART 64 RAINBOW/DEWEY STORM DRAIN SYSTEM FOR SIDE DRAIN, STA. 50+76.739 RT (Bid Item 0078).

Payment for the Rainbow/Dewey Storm Drain System for Side Drain, Sta. 50+76.739 RT will be made at the application contract lump sum price, which payment shall constitute full compensation for the Rainbow/Dewey storm drain system for connection to side drain stub-out, sta. 50+76.739 RT, complete, including excavation and compacted fill; furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete; furnishing and placing all lengths of concrete pipe as shown on the "D" drawings, fittings and end sections and concrete thrust blocks; connecting to concrete pipe stub-outs from side drain, sta. 50+76.739 RT; furnishing and placing riprap; furnishing and placing all appurtenances; and all incidentals, complete as shown on the drawings.

PART 65 RAINBOW/DEWEY STORM DRAIN SYSTEM FOR SIDE DRAIN, STA. 50+84.247 RT (Bid Item 0079).

Payment for the Rainbow/Dewey Storm Drain System for Side Drain, Sta. 50+84.247 RT will be made at the application contract lump sum price, which payment shall constitute full compensation for the Rainbow/Dewey storm drain system for connection to side drain stub-out, sta. 50+84.247 RT, complete, including excavation and compacted fill; furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete; furnishing and placing all lengths of concrete pipe as shown on the "D" drawings, fittings and end sections and concrete thrust blocks; connecting to concrete pipe stub-outs from side drain, sta. 50+84.247 RT; furnishing and placing riprap; furnishing and placing all appurtenances; and all incidentals, complete as shown on the drawings.

PART 66 ROAD DETOURS @ RAINBOW BLVD (Bid Item 0080).

Payment for Road Detours @ Rainbow Blvd will be made at the applicable contract lump sum price, and shall be considered full payment for saw cutting, demolition, removal, hauling and disposal of asphaltic concrete; demolition, removal, disposal and replacement of existing curb and gutter; removal and replacement of existing medians in Rainbow Boulevard; protection of existing landscaping; protect and support existing water, gas, and fiber optic lines; repair/replacement of irrigation lines; all required excavation and compacted fill; furnishing and placing the aggregate base course, complete, including subgrade preparation; asphalt concrete pavement in place, complete, including tack coat, prime coat and appurtenant work such as pavement markings; and traffic control and signage, complete.

PART 67 MANHOLES FOR BOX CONDUITS, BETWEEN STA. 51+75.702 TO STA. 45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000 (Bid Item 0081).

Manholes 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.

PART 68 **STREET/SIGNAGE MODIFICATIONS, REDWOOD STREET** (Bid Item 0082).

Payment for Street/Signage Modifications, Redwood Street will be made at the applicable contract price, which payment shall constitute full compensation for street/signage work, including necessary earthwork, including removal of concrete sidewalk, removal of concrete curb and gutter, removal of plantmix bituminous surface (PBS), removal of ground mounted sign, installation of portable concrete barrier rail, installation of ground mounted sign, addition of sign panel to existing ground mounted sign, as shown on the "D" drawings, complete. The earthwork included shall be only that earthwork which is located outside the limits of earthwork for which other payment is provided.

PART 69 CHAIN LINK **FENCE**, STA. 51+75.702 TO STA. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000** (Bid Item 0083).

70.1 Measurement.

Measurement of chain link **fence** will be by the linear meters of chain link fencing constructed as shown on the drawings.

70.2 Payment.

Payment for chain link **fence** 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, sleeves, grout, grounding, and all incidentals, complete as shown on the drawings.

PART 70 PIPE SAFETY RAILING, **BETWEEN STA. 46+52.000 TO STA. 45+14.894 AND BETWEEN STA. 70+20.000 TO STA. 70+21.000** (Bid Item 0084).

71.1 Measurement

Measurement of Pipe Safety Railing that is provided will be by the linear meter of pipe safety railing constructed as shown on the drawings.

71.2 Payment

Payment for Pipe Safety Railing will be made at the applicable contract unit price per linear meter, which payment shall constitute full compensation for Pipe Safety Railing, including pipe railing and posts, safety chain gates, galvanized anchor bolt assemblies, fabrication, grout or dry pack, surface preparation and painting, and all incidentals, complete.

PART 71 DEWEY STREET REMOVAL AND REPLACEMENT STATION 51+75.702 to STATION 50+59.000 (Bid Item 0085).

Payment for Dewey Street Removal and Replacement will be made at the

applicable contract lump sum price, and shall be considered full payment as per the following.

72.1 Removal

The following items and features between Station 51+75.702 and 50+59.000 are to be removed by sawcutting, demolition, hauling and disposal as shown on the drawing DEWEY DRIVE REMOVAL PLAN: concrete valley gutter; concrete sidewalk; "L" type curb & gutter; "A" type curb & gutter; roadway plantmix bituminous surface (PBS); parking lot PBS; landscaping and landscape watering system; landscape pull box; sod; other concrete gutter w/ curbs; under sidewalk drain; 6' cmu wall.

72.2 Removal and Storage for Reinstallation

The following items and features between Station 51+75.702 and 50+59.000 are to be removed or dismantled, and stored, and maintained, and kept alive if organic, as necessary, for reinstallation as shown on the drawing DEWEY DRIVE REMOVAL PLAN and on the drawing PLAN & PROFILE STA 10+00 - STA 20+00 and on the drawing PLAN & PROFILE STA 20+00 - STA 27+26 and on the drawing LANDSCAPING, STREETLIGHT, SIGNAGE & PAVEMENT MARKING PLAN DEWEY DRIVE: Palm Trees; Ground Mounted Signs; 250 Watt HPS streetlight assemblies; water valve box assemblies; Sprint vault; 5' chain link fence; pole mounted signs.

72.3 Protect In Place

The following items and features between Station 51+75.702 and 50+59.000 are to be protected in place as shown on the drawing DEWEY DRIVE REMOVAL PLAN: parking lot light/foundation; fire hydrant.

72.4 Replacement Items

The following items and features between Station 51+75.702 and 50+59.000 are to be provided, complete, as shown on the drawing PLAN & PROFILE STA 10+00 - STA 20+00 and on the drawing PLAN & PROFILE STA 20+00 - STA 27+26 and on the drawing LANDSCAPING, STREETLIGHT, SIGNAGE & PAVEMENT MARKING PLAN DEWEY DRIVE: construct plantmix bituminous surface (PBS) per pavement section; construct 2 1/2" PBS, 4" type II, prime coat (off site); construct "L" type curb & gutter per std dwg 216; construct 5' sidewalk per std dwg 234; construct sidewalk ramp per std dwg 235(case 1); construct sidewalk drain per std dwg 236; construct valley gutter per std dwg 228; construct commercial driveway (option B) per std dwg 225; construct "A" type curb & gutter per std dwg 219; construct "on-site" concrete channel per "ON-SITE" CONCRETE CHANNEL detail on drawing PLAN & PROFILE STA 20+00 - STA 27+26; install removed 5' chain link fence;

72.5 Restore, Replant, Install and Reinstall Items

The following items and features between Station 51+75.702 and 50+59.000 are to be restored, complete, as shown on the drawing LANDSCAPING, STREETLIGHT, SIGNAGE & PAVEMENT MARKING PLAN DEWEY DRIVE: restore landscaping and landscaping watering system; install sod to match existing and surrounding; replant palm trees; reinstall removed ground mounted signs; reinstall removed pole mounted signs; install new ground mounted

sign; install type 1 centerline per std dwg 244; install storage lane line per std dwg 246; install 24" white stop line (cold polymer film type 1); white pavement arrow (cold polymer film type 1) per detail on drawing LANDSCAPING, STREETLIGHT, SIGNAGE & PAVEMENT MARKING PLAN DEWEY DRIVE; white pavement "ONLY" (cold polymer film type 1) per detail on drawing LANDSCAPING, STREETLIGHT, SIGNAGE & PAVEMENT MARKING PLAN DEWEY DRIVE; white "24" longitudinal crosswalk lines, longitudinal lines shall align w/ lane lines and center of lanes (cold polymer film type 1) per std dwg 254A; 4" white paint line; reinstall removed 100 HPS streetlight per std dwg 314; 1-1/4" conduit w/ (2)#4, (1)#8 gnd, thw copper wire (connect to exist circuit in pull box @ SW corner of Rainbow/Dewey; 1-1/4" conduit only.

PART 72 0.250 M (10 INCH) WATERLINE @ RAINBOW BOULEVARD (Bid Item 0086)

Payment for 0.250 M (10 INCH) WATERLINE @ RAINBOW BOULEVARD will be made at the applicable contract price, which payment shall constitute full compensation for provision of and installation of new utility and appurtenances, as shown on the drawings, **including removal of existing 0.250 m PVC pipe (about 17 M), including installation of 0.250 m PVC pipe (about 5 m), including installation of 0.250 m ductile iron pipe (about 13 m), including installation of two flex couplings for 0.250 m pipe, and including temporary potable waterline bypass that the Contractor must furnish and install and maintain meeting potable water standards and working pressure until permanent work is accomplished,** complete. The earthwork included shall be only that earthwork which is located outside the limits of earthwork for which other payment is provided.

PART 73 DOUBLE SWING GATES, STA. 51+75.702 TO STA. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000** (Bid Item 0087).

74.1 Measurement

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

74.2 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, **padlocks,** and all incidentals, complete, as shown on the drawings.

PART 74 SOIL STABILIZER, STA. 51+75.702 TO STA. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000** (Bid Item 0088).

75.1 Measurement.

Measurement of soil stabilizer will be made on the basis of the actual area in square meters of exposed excavation and fill surfaces in the construction areas treated with soil stabilizer as indicated or directed.

75.2 Payment

Payment for soil stabilizer will be at the applicable contract price, which payment shall constitute full compensation for the soil stabilizer including materials, processing, hauling, and placing, complete in place.

PART 75 STATION MARKINGS, STA. 51+75.702 TO STA. **45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000** (Bid Item 0089).

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

PART 76 LADDER SYSTEMS, BETWEEN STA. 51+75.702 TO STA. 45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000 (Bid Item 0090).

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.

PART 8 GROUTED RIPRAP, BETWEEN STA. 51+75.702 TO STA. 45+14.894 AND BETWEEN STA. 70+37.278 TO STA. 69+80.000 (Bid Item 0091)

78.1 Measurement.

Measurement of Grouted Riprap will be made on the basis of the actual volume, in cubic meters, of grouted riprap within the pay 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 pay 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 which are either less than 0.15 cubic meter in volume or one-tenth of square meterin cross section. 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.

78.2 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.

PART 77 RESTRICTOR PLATE FOR FLAMINGO DETENTION BASIN OUTLET (Bid Item 0092)

Payment for Restrictor Plate For Flamingo Detention Basin Outlet will be made at the applicable contract unit price, which payment shall constitute full compensation for restrictor plate, including all materials, anchor bolt assemblies, fabrication, grout or dry pack, surface preparation and necessary painting, and all incidentals, complete.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01330

SUBMITTAL PROCEDURES

-- End of Section Table of Contents --

SECTION 01330

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

1.1.1 Government-Furnished Information

Submittal register [database and submittal management program] will be delivered to the contractor, by contracting officer [on 3 1/2 inch disk]. Register [database]will have the following fields completed, to the extent that will be required by the Government during subsequent usage.

Column (c): Lists specification section in which submittal is required.

Column (d): Lists each submittal description (SD No. and type, e.g. SD-04 Drawings) required in each specification section.

Column (e): Lists one principal paragraph in specification section where a material or product is specified. This listing is only to facilitate locating submitted requirements. Do not consider entries in column (e) as limiting project requirements.

Column (f): Indicate approving authority for each submittal. A "G" indicates approval by contracting officer; a blank indicates approval by QC manager.

[The database and submittal management program will be extractable from the disk furnished to contractor, for operation on contractor's IBM compatible personal computer with 640kb RAM,a hard drive,and 3 1/2 inch high density floppy disk drive.]

1.2 DEFINITIONS

1.2.1 Submittal

Shop drawings, product data, samples, and administrative submittals presented for review and approval. Contract Clauses "FAR 52.236-5, Material and Workmanship," paragraph (b) and "FAR 52.236-21, Specifications and Drawings for Construction," paragraphs (d), (e), and (f) apply to all "submittals."

1.2.2 Types of Submittals

All submittals are classified as indicated in paragraph "Submittal Descriptions (SD)". Submittals also are grouped as follows:

a. Shop drawings: As used in this section, drawings, schedules, diagrams, and other data prepared specifically for this contract, by contractor or through contractor by way of subcontractor, manufacturer, supplier, distributor, or other lower tier contractor, to illustrate portion of work.

b. Product data: Preprinted material such as illustrations, standard schedules, performance charts, instructions, brochures, diagrams, manufacturer's descriptive literature, catalog data, and other data to illustrate portion of work, but not prepared exclusively for this contract.

c. Samples: Physical examples of products, materials, equipment, assemblies, or workmanship that are physically identical to portion of work, illustrating portion of work or establishing standards for evaluating appearance of finished work or both.

d. Administrative submittals: Data presented for reviews and approval to ensure that administrative requirements of project are adequately met but not to ensure directly that work is in accordance with design concept and in compliance with contract documents.

1.3 SUBMITTAL IDENTIFICATION (SD)

Submittals required are identified by SD numbers and titles as follows:

SD-01 Preconstruction Submittals

Certificates of insurance.
Surety bonds.
List of proposed subcontractors.
List of proposed products.
Construction Progress Schedule.
Submittal schedule.
Schedule of values.
Health and safety plan.
Work plan.
Quality control plan.
Environmental protection plan.

SD-02 Shop Drawings

Drawings, diagrams and schedules specifically prepared to illustrate some portion of the work.

Diagrams and instructions from a manufacturer or fabricator for use in producing the product and as aids to the contractor for integrating the product or system into the project.

Drawings prepared by or for the contractor to show how multiple systems and interdisciplinary work will be coordinated.

SD-03 Product Data

Catalog cuts, illustrations, schedules, diagrams, performance charts, instructions and brochures illustrating size, physical appearance and other characteristics of materials or equipment for some portion of the work.

Samples of warranty language when the contract requires extended product warranties.

SD-04 Samples

Physical examples of materials, equipment or workmanship that illustrate functional and aesthetic characteristics of a material or product and establish standards by which the work can be judged.

Color samples from the manufacturer's standard line (or custom color samples if specified) to be used in selecting or approving colors for the project.

Field samples and mock-ups constructed on the project site establish standards by which the ensuring work can be judged. Includes assemblies or portions of assemblies which are to be incorporated into the project and those which will be removed at conclusion of the work.

SD-05 Design Data

Calculations, mix designs, analyses or other data pertaining to a part of work.

SD-06 Test Reports

Report signed by authorized official of testing laboratory that a material, product or system identical to the material, product or system to be provided has been tested in accord with specified requirements. (Testing must have been within three years of date of contract award for the project.)

Report which includes findings of a test required to be performed by the contractor on an actual portion of the work or prototype prepared for the project before shipment to job site.

Report which includes finding of a test made at the job site or on sample taken from the job site, on portion of work during or after installation.

Investigation reports

Daily checklists

Final acceptance test and operational test procedure

SD-07 Certificates

Statements signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements. Must be dated after award of project contract and clearly name the project.

Document required of Contractor, or of a supplier, installer or subcontractor through Contractor, the purpose of which is to further quality of orderly progression of a portion of the work by documenting procedures, acceptability of methods or personnel qualifications.

Confined space entry permits.

SD-11 Closeout Submittals

Documentation to record compliance with technical or administrative requirements or to establish an administrative mechanism.

As-built drawings.

Special warranties.

Posted operating instructions.

Training plan.

1.3.1 Approving Authority

Person authorized to approve submittal.

1.3.2 Work

As used in this section, on- and off-site construction required by contract documents, including labor necessary to produce construction and materials, products, equipment, and systems incorporated or to be incorporated in such construction.

1.4 SUBMITTALS

Submit the following in accordance with the requirements of this section.

SD-01 Preconstruction Submittals

Submittal register; G

1.5 USE OF SUBMITTAL REGISTER [DATABASE]

Prepare and maintain submittal register, as the work progresses.[Use electronic submittal register program furnished by the Government or any other format.] Do not change data which is output in columns (c), (d), (e), and (f) as delivered by government; retain data which is output in columns (a), (g), (h), and (i) as approved.

1.5.1 Submittal Register

Submit submittal register[as an electronic database, using submittals management program furnished to contractor]. Submit with quality control plan and project schedule required by Section 01450A, "Quality Control" and [Section 01321N, "Network Analysis Schedules."] [Section 01320N, "Construction Progress Documentation."] Do not change data in columns (c), (d), (e), and (f) as delivered by the government. Verify that all submittals required for project are listed and add missing submittals. Complete the following on the register[database]:

Column (a) Activity Number: Activity number from the project schedule.

Column (g) Contractor Submit Date: Scheduled date for approving authority to receive submittals.

Column (h) Contractor Approval Date: Date contractor needs approval of submittal.

Column (i) Contractor Material: Date that contractor needs material delivered to contractor control.

1.5.2 Contractor Use of Submittal Register

Update the following fields[in the government-furnished submittal register program or equivalent fields in program utilized by contractor].

Column (b) Transmittal Number: Contractor assigned list of consecutive numbers.

Column (j) Action Code (k): Date of action used to record contractor's review when forwarding submittals to QC.

Column (l) List date of submittal transmission.

Column (q) List date approval received.

1.5.3 Approving Authority Use of Submittal Register

Update the following fields[in the government-furnished submittal register program or equivalent fields in program utilized by contractor].

Column (b).

Column (l) List date of submittal receipt.

Column (m) through (p).

Column (q) List date returned to contractor.

1.5.4 Contractor Action Code and Action Code

Entries used will be as follows (others may be prescribed by Transmittal Form):

NR - Not Received

AN - Approved as noted

A - Approved

RR - Disapproved, Revise, and Resubmit

1.5.5 Copies Delivered to the Government

Deliver one copy of submitted register updated by contractor to government with each invoice request. [Deliver in electronic format, unless a paper copy is requested by contracting officer.]

1.6 PROCEDURES FOR SUBMITTALS

1.6.1 Reviewing, Certifying, Approving Authority

QC organization shall be responsible for reviewing and certifying that submittals are in compliance with contract requirements. Approving authority on submittals is QC manager unless otherwise specified for specific submittal. At each "Submittal" paragraph in individual specification sections, a notation "G," following a submittal item, indicates contracting officer is approving authority for that submittal item.

1.6.2 Constraints

a. Submittals listed or specified in this contract shall conform to provisions of this section, unless explicitly stated otherwise.

b. Submittals shall be complete for each definable feature of work; components of definable feature interrelated as a system shall be submitted at same time.

c. When acceptability of a submittal is dependent on conditions, items, or materials included in separate subsequent submittals, submittal will be returned without review.

d. Approval of a separate material, product, or component does not imply approval of assembly in which item functions.

1.6.3 Scheduling

a. Coordinate scheduling, sequencing, preparing and processing of submittals with performance of work so that work will not be delayed by submittal processing. Allow for potential requirements to resubmit.

b. Except as specified otherwise, allow review period, beginning with receipt by approving authority, that includes at least [15] [_____] working days for submittals for QC manager approval and [20] [_____] working days for submittals for contracting officer approval. Period of review for submittals with contracting officer approval begins when Government receives submittal from QC

organization. Period of review for each resubmittal is the same as for initial submittal.

c. For submittals requiring review by fire protection engineer, allow review period, beginning when government receives submittal from QC organization, of [30] [_____] working days for return of submittal to the contractor. Period of review for each resubmittal is the same as for initial submittal.

1.6.4 Variations

Variations from contract requirements require Government approval pursuant to contract Clause entitled "FAR 52.236-21, Specifications and Drawings for Construction" and will be considered where advantageous to government.

1.6.4.1 Considering Variations

Discussion with contracting officer prior to submission, will help ensure functional and quality requirements are met and minimize rejections and resubmittals. When contemplating a variation which results in lower cost, consider submission of the variation as a Value Engineering Change Proposal (VECP).

1.6.4.2 Proposing Variations

When proposing variation, deliver written request to the contracting officer, with documentation of the nature and features of the variation and why the variation is desirable and beneficial to government. If lower cost is a benefit, also include an estimate of the cost saving. In addition to documentation required for variation, include the submittals required for the item. Clearly mark the proposed variation in all documentation.

1.6.4.3 Warranting That Variations Are Compatible

When delivering a variation for approval, contractor warrants that this contract has been reviewed to establish that the variation, if incorporated, will be compatible with other elements of work.

1.6.4.4 Review Schedule Is Modified

In addition to normal submittal review period, a period of [10] [_____] working days will be allowed for consideration by the Government of submittals with variations.

1.6.5 Contractor's Responsibilities

a. Determine and verify field measurements, materials, field construction criteria; review each submittal; and check and coordinate each submittal with requirements of the work and contract documents.

b. Transmit submittals to QC organization in accordance with schedule on approved Submittal Register, and to prevent delays in the work,

delays to government, or delays to separate contractors.

c. Advise contracting officer of variation, as required by paragraph entitled "Variations."

d. Correct and resubmit submittal as directed by approving authority. When resubmitting disapproved transmittals or transmittals noted for resubmittal, the contractor shall provide copy of that previously submitted transmittal including all reviewer comments for use by approving authority. Direct specific attention in writing or on resubmitted submittal, to revisions not requested by approving authority on previous submissions.

e. Furnish additional copies of submittal when requested by contracting officer, to a limit of 20 copies per submittal.

f. Complete work which must be accomplished as basis of a submittal in time to allow submittal to occur as scheduled.

g. Ensure no work has begun until submittals for that work have been returned as "approved," or "approved as noted", except to the extent that a portion of work must be accomplished as basis of submittal.

1.6.6 QC Organization Responsibilities

a. Note date on which submittal was received from contractor on each submittal.

b. Review each submittal; and check and coordinate each submittal with requirements of work and contract documents.

c. Review submittals for conformance with project design concepts and compliance with contract documents.

d. Act on submittals, determining appropriate action based on QC organization's review of submittal.

(1) When QC manager is approving authority, take appropriate action on submittal from the possible actions defined in paragraph entitled, "Actions Possible."

(2) When contracting officer is approving authority or when variation has been proposed, forward submittal to Government with certifying statement or return submittal marked "not reviewed" or "revise and resubmit" as appropriate. The QC organization's review of submittal determines appropriate action.

e. Ensure that material is clearly legible.

f. Stamp each sheet of each submittal with QC certifying statement or approving statement, except that data submitted in bound volume or on one sheet printed on two sides may be stamped on the front of the first sheet only.

(1) When approving authority is contracting officer, QC organization will certify submittals forwarded to contracting officer with the following certifying statement:

"I hereby certify that the (equipment) (material) (article) shown and marked in this submittal is that proposed to be incorporated with contract Number [_____], is in compliance with the contract drawings and specification, can be installed in the allocated spaces, and is submitted for Government approval.

Certified by Submittal Reviewer _____, Date _____
(Signature when applicable)

Certified by QC manager _____, Date _____"
(Signature)

(2) When approving authority is QC manager, QC manager will use the following approval statement when returning submittals to contractor as "Approved" or "Approved as Noted."

"I hereby certify that the (material) (equipment) (article) shown and marked in this submittal and proposed to be incorporated with contract Number [_____], is in compliance with the contract drawings and specification, can be installed in the allocated spaces, and is _____ approved for use.

Certified by Submittal Reviewer _____, Date _____
(Signature when applicable)

Approved by QC manager _____, Date _____"
(Signature)

g. Sign certifying statement or approval statement. The person signing certifying statements shall be QC organization member designated in the approved QC plan. The signatures shall be in original ink. Stamped signatures are not acceptable.

h. Update submittal register [database]as submittal actions occur and maintain the submittal register at project site until final acceptance of all work by contracting officer.

i. Retain a copy of approved submittals at project site, including contractor's copy of approved samples.

1.6.7 Government's Responsibilities

When approving authority is contracting Officer, the Government will:

a. Note date on which submittal was received from QC manager, on each submittal for which the contracting officer is approving authority.

b. Review submittals for approval within scheduling period specified and only for conformance with project design concepts and

compliance with contract documents.

c. Identify returned submittals with one of the actions defined in paragraph entitled "Actions Possible" and with markings appropriate for action indicated.

1.6.8 Actions Possible

Submittals will be returned with one of the following notations:

a. Submittals marked "not reviewed" will indicate submittal has been previously reviewed and approved, is not required , does not have evidence of being reviewed and approved by contractor, or is not complete. A submittal marked "not reviewed" will be returned with an explanation of the reason it is not reviewed. Resubmit submittals returned for lack of review by contractor or for being incomplete, with appropriate action, coordination, or change.

b. Submittals marked "approved" "approved as submitted" authorize contractor to proceed with work covered.

c. Submittals marked "approved as noted" or "approval except as noted; resubmission not required" authorize contractor to proceed with work as noted provided contractor takes no exception to the notations.

d. Submittals marked "revise and resubmit" or "disapproved" indicate submittal is incomplete or does not comply with design concept or requirements of the contract documents and shall be resubmitted with appropriate changes. No work shall proceed for this item until resubmittal is approved.

1.7 FORMAT OF SUBMITTALS

1.7.1 Transmittal Form

Transmit each submittal, except sample installations and sample panels, to office of approving authority. Transmit submittals with transmittal form prescribed by contracting officer and standard for project. The transmittal form shall identify contractor, indicate date of submittal, and include information prescribed by transmittal form and required in paragraph entitled "Identifying Submittals." Process transmittal forms to record actions regarding sample panels and sample installations.

1.7.2 Identifying Submittals

Identify submittals, except sample panel and sample installation, with the following information permanently adhered to or noted on each separate component of each submittal and noted on transmittal form. Mark each copy of each submittal identically, with the following:

a. Project title and location.

b. Construction contract number.

c. Section number of the specification section by which submittal is required.

d. Submittal description (SD) number of each component of submittal.

e. When a resubmission, add alphabetic suffix on submittal description, for example, SD-10A, to indicate resubmission.

f. Name, address, and telephone number of subcontractor, supplier, manufacturer and any other second tier contractor associated with submittal.

g. Product identification and location in project.

1.7.3 Format for Product Data

a. Present product data submittals for each section as a complete, bound volume. Include table of contents, listing page and catalog item numbers for product data.

b. Indicate, by prominent notation, each product which is being submitted; indicate specification section number and paragraph number to which it pertains.

c. Supplement product data with material prepared for project to satisfy submittal requirements for which product data does not exist. Identify this material as developed specifically for project.

d. Provide product data in metric dimensions. Where product data are included in preprinted catalogues with inch-pound units only, submit metric dimensions on separate sheet.

1.7.4 Format for Shop Drawings

a. Shop drawings shall not be less than A4 (297 by 210 mm) nor more than AO (1189 by 841 mm).

b. Present A4 (297 by 210 mm) sized shop drawings as part of the bound volume for submittals required by section. Present larger drawings in sets.

c. Include on each drawing the drawing title, number, date, and revision numbers and dates, in addition to information required in paragraph entitled "Identifying Submittals."

d. Dimension drawings, except diagrams and schematic drawings; prepare drawings demonstrating interface with other trades to scale. Shop drawing dimensions shall be the same unit of measure as indicated on the contract drawings. Identify materials and products for work shown.

1.7.5 Format of Samples

a. Furnish samples in sizes below, unless otherwise specified or unless the manufacturer has prepackaged samples of approximately same size as specified:

(1) Sample of Equipment or Device: Full size.

(2) Sample of Materials Less Than 50 by 75 mm: Built up to A4 (297 by 210 mm).

(3) Sample of Materials Exceeding A4 (297 by 210 mm): Cut down to A4 (297 by 210 mm) and adequate to indicate color, texture, and material variations.

(4) Sample of Linear Devices or Materials: 250 mm length or length to be supplied, if less than 250 mm. Examples of linear devices or materials are conduit and handrails.

(5) Sample of Non-Solid Materials: 750 ml. Examples of non-solid materials are sand and paint.

(6) Color Selection Samples: 50 by 100 mm.

(7) Sample Panel: 1200 by 1200 mm.

(8) Sample Installation: 10 square meters.

b. Samples Showing Range of Variation: Where variations are unavoidable due to nature of the materials, submit sets of samples of not less than three units showing extremes and middle of range.

c. Reusable Samples: Incorporate returned samples into work only if so specified or indicated. Incorporated samples shall be in undamaged condition at time of use.

d. Recording of Sample Installation: Note and preserve the notation of area constituting sample installation but remove notation at final clean up of project.

e. When color, texture or pattern is specified by naming a particular manufacturer and style, include one sample of that manufacturer and style, for comparison.

1.7.6 Format of Administrative Submittals

a. When submittal includes a document which is to be used in project or become part of project record, other than as a submittal, do not apply contractor's approval stamp to document, but to a separate sheet accompanying document.

b. Operation and Maintenance Manual Data: Submit in accordance with Section 01781N, "Operation and Maintenance Data." Include components required in that section and the various technical sections.

c. Provide all dimensions in administrative submittals in metric. Where data are included in preprinted material with inch-pound units only, submit metric dimensions on separate sheet.

1.8 QUANTITY OF SUBMITTALS

1.8.1 Number of Copies of Product Data

a. Submit [six] [_____] copies of submittals of product data requiring review and approval only by QC organization and [seven] [_____] copies of product data requiring review and approval by contracting officer. [Submit three copies of submittals of product data for operation and maintenance manuals.]

1.8.2 Number of Copies of Shop Drawings

Submit shop drawings in compliance with quantity requirements specified for product data.

1.8.3 Number of Samples

a. Submit [two] [_____] samples, or [two] [_____] sets of samples showing range of variation, of each required item. One approved sample or set of samples will be retained by approving authority and one will be returned to contractor.

b. Submit one sample panel. Include components listed in technical section or as directed.

c. Submit one sample installation, where directed.

d. Submit one sample of non-solid materials.

1.8.4 Number of Copies of Administrative Submittals

a. Unless otherwise specified, submit administrative submittals compliance with quantity requirements specified for product data.

b. Submit administrative submittals required under "SD-10 Operation and Maintenance Data" to conform to Section 01781N, "Operation and Maintenance Data."

1.9 FORWARDING SUBMITTALS

1.9.1 Samples Required of the Contractor

Submit samples to [Commander, LANTNAVFACENGCOM, 1510 Gilbert Street, Norfolk, Virginia 23511-2699] [Architect-Engineer: [_____],].

1.9.2 Shop Drawings, Product Data, and O&M Data

As soon as practicable after award of contract, and before procuremetn of

fabrication, submit, except as specified otherwiae, to the [Commander, LANTNAVFACENGCOM, Code CI4A1, 1510 Gilbert Street, Norfolk, Virginia, 23511-2699] [Architect-Engineer: [_____],] the shop drawings, product data and O&M Data required in the technical sections of this specification. [The Architect-Engineer for this project] [LANTNAVFACENGCOM] will review and provide surveillance for the Contracting Officer to determine if Contractor-approved submittals comply with the contract requirements, and will review and approve for the Contracting Officer those submittals not permitted to be Contractor approved to determine if submittals comply with the contract requirements. One copy of the transmittal form for submittals shall be forwarded to the Resident Officer in Charge of Construction

[1.9.2.1 Submittals Reserved for LANTNAVFACENGCOM Approval

As an exception to the standard submittal procedure, submit the following to the Commander, LANTNAVFACENGCOM, Code CI4A1, 1510 Gilbert Street, Norfolk, Virginia 23511-2699:

[a. Section [_____], "[_____]": Pile driving recrods]

[b. Section [_____], "[_____]": All fire protection system submittals]

[c. Section [_____], "[_____]": All fire alarm system submittals]

[d. Section 15901, "Space Temperature Control Systems": SD-12 field test reports]

[e. Section 15910, "Direct Digital Control Systems": SD-12 field test reports]

[f. Section 15950, "HVAC Testing/Adjusting/Balancing": All submittals]

[g. Section 15951, "Testing Industrial Ventilation Systems": All submittals]

[h. Section 16272, "Three-Phase Pad Mounted Transformers": All submittals]

[i. Section 16273, "Single-Phase Pad Mounted Transformers": All submittals]

[j. Section 16301, "Overhead Transmission and Distribution": Transformer submittals]

[k. Section 16360, "Secondary Unit Substations": Transformer submittals]

[l. Section 16361, "Primary Unit Substations": Transformer submittals]
][1.9.2.2 Overseas Shop Drawing Submittals

All submittals shall be sent via overnight express mail service. All costs associated with the overnight express mail service shall be borne by the construction contractor. Costs associated with the overnight express mail of submittals related to proposed submittal variances of resubmittals

necessary as a result of noncompliant or incomplete contractor submittals shall be the responsibility of the contractor.
]

1.10 SUBMITTAL CLASSIFICATION

Submittals are classified as follows:

1.10.1 Government Approved

Government approval is required for extensions of design, critical materials, deviations, equipment whose compatibility with the entire system must be checked, and other items as designated by the Contracting Officer. Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction," they are considered to be "shop drawings."

1.10.2 Information Only

All submittals not requiring Government approval will be for information only. They are not considered to be "shop drawings" within the terms of the Contract Clause referred to above.

1.11 APPROVED SUBMITTALS

The Contracting Officer's approval of submittals shall not be construed as a complete check, but will indicate only that the general method of construction, materials, detailing and other information are satisfactory. Approval will not relieve the Contractor of the responsibility for any error which may exist, as the Contractor under the Contractor Quality Control (CQC) requirements of this contract is responsible for dimensions, the design of adequate connections and details, and the satisfactory construction of all work. After submittals have been approved by the Contracting Officer, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary.

1.12 DISAPPROVED SUBMITTALS

The Contractor shall make all corrections required by the Contracting Officer and promptly furnish a corrected submittal in the form and number of copies specified for the initial submittal. If the Contractor considers any correction indicated on the submittals to constitute a change to the contract, a notice in accordance with the Contract Clause "Changes" shall be given promptly to the Contracting Officer.

1.13 WITHHOLDING OF PAYMENT

Payment for materials incorporated in the work will not be made if required approvals have not been obtained.

1.14 GENERAL

The Contractor shall make submittals as required by the specifications. The Contracting Officer may request submittals in addition to those specified when deemed necessary to adequately describe the work covered in

the respective sections. Units of weights and measures used on all submittals shall be the same as those used in the contract drawings. Each submittal shall be complete and in sufficient detail to allow ready determination of compliance with contract requirements. Prior to submittal, all items shall be checked and approved by the Contractor's Quality Control (CQC) System Manager and each item shall be stamped, signed, and dated by the CQC System Manager indicating action taken. Proposed deviations from the contract requirements shall be clearly identified. Submittals shall include items such as: Contractor's, manufacturer's, or fabricator's drawings; descriptive literature including (but not limited to) catalog cuts, diagrams, operating charts or curves; test reports; test cylinders; samples; O&M manuals (including parts list); certifications; warranties; and other such required submittals. Submittals requiring Government approval shall be scheduled and made prior to the acquisition of the material or equipment covered thereby. Samples remaining upon completion of the work shall be picked up and disposed of in accordance with manufacturer's Material Safety Data Sheets (MSDS) and in compliance with existing laws and regulations.

1.15 SUBMITTAL REGISTER

At the end of this section is a submittal [register] [list] showing items of equipment and materials for which submittals are required by the specifications; this list may not be all inclusive and additional submittals may be required. The Contractor shall maintain a submittal register for the project in accordance with Section 01312A QUALITY CONTROL SYSTEM (QCS).

1.16 SCHEDULING

Submittals covering component items forming a system or items that are interrelated shall be scheduled to be coordinated and submitted concurrently. Certifications to be submitted with the pertinent drawings shall be so scheduled. Adequate time (a minimum of [_____] calendar days exclusive of mailing time) shall be allowed and shown on the register for review and approval. No delay damages or time extensions will be allowed for time lost in late submittals. An additional [_____] calendar days shall be allowed and shown on the register for review and approval of submittals for [food service equipment] [and] [refrigeration and HVAC control systems].

1.17 TRANSMITTAL FORM (ENG FORM 4025)

The sample transmittal form (ENG Form 4025) attached to this section shall be used for submitting both Government approved and information only submittals in accordance with the instructions on the reverse side of the form. These forms [will be furnished to the Contractor][are included in the Quality Control System (QCS) software that the Contractor is required to use for this contract]. This form shall be properly completed by filling out all the heading blank spaces and identifying each item submitted. Special care shall be exercised to ensure proper listing of the specification paragraph and/or sheet number of the contract drawings pertinent to the data submitted for each item.

1.18 SUBMITTAL PROCEDURES

Submittals shall be made as follows:

1.18.1 Procedures

[_____]

1.18.2 Deviations

For submittals which include proposed deviations requested by the Contractor, the column "variation" of ENG Form 4025 shall be checked. The Contractor shall set forth in writing the reason for any deviations and annotate such deviations on the submittal. The Government reserves the right to rescind inadvertent approval of submittals containing unnoted deviations.

1.19 CONTROL OF SUBMITTALS

The Contractor shall carefully control his procurement operations to ensure that each individual submittal is made on or before the Contractor scheduled submittal date shown on the approved "Submittal Register."

1.20 GOVERNMENT APPROVED SUBMITTALS

Upon completion of review of submittals requiring Government approval, the submittals will be identified as having received approval by being so stamped and dated. [_____] copies of the submittal will be retained by the Contracting Officer and [_____] copies of the submittal will be returned to the Contractor.

1.21 INFORMATION ONLY SUBMITTALS

Normally submittals for information only will not be returned. Approval of the Contracting Officer is not required on information only submittals. The Government reserves the right to require the Contractor to resubmit any item found not to comply with the contract. This does not relieve the Contractor from the obligation to furnish material conforming to the plans and specifications; will not prevent the Contracting Officer from requiring removal and replacement of nonconforming material incorporated in the work; and does not relieve the Contractor of the requirement to furnish samples for testing by the Government laboratory or for check testing by the Government in those instances where the technical specifications so prescribe.

1.22 STAMPS

Stamps used by the Contractor on the submittal data to certify that the submittal meets contract requirements shall be similar to the following:

CONTRACTOR
(Firm Name)
_____ Approved
_____ Approved with corrections as noted on submittal data and/or attached sheets(s).
SIGNATURE: _____
TITLE: _____
DATE: _____

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
UPPER FLAMINGO DIVERSION CHANNEL

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION		DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION		DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		01200	SD-01 Preconstruction Submittals															
			Topographic Surveyor	3.18.2	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	G RE													
			SD-07 Certificates															
			Monthly Network Analysis Updates	1.7.7	G RE													
			SD-11 Closeout Submittals															
			As-Built Schedule	1.7.9	G RE													
		01330	SD-01 Preconstruction Submittals															
			Submittal register	1.5.1	G													
		01355	SD-01 Preconstruction Submittals															
			Environmental Protection Plan	1.7	G RE													
			Joint Condition Survey Report	1.8	G RE													
		01356	SD-07 Certificates															
			Mill Certificate or Affidavit	2.1.3	G RE													

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
UPPER FLAMINGO DIVERSION CHANNEL

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ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH	CLASSIFICATION	GOVT A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		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	3.7.1	G	RE												
			SD-02 Shop Drawings															
			Shop Drawings	3.3	G	RE												
			Explosive Storage Location	3.2.8.2	G	RE												
			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															
			Blast Data Report	3.2.2														
			Blast Data Report	3.2.7														
			SD-06 Test Reports															
			Field Density Tests	3.10.1	G	RE												
			Treating of Compacted Fill Materials	3.10.1	G	RE												
		02316	SD-06 Test Reports															
			Field Density Tests	3.4.3	G	RE												
			Testing of Backfill Materials	3.4.2	G	RE												

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION: UPPER FLAMINGO DIVERSION CHANNEL

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH	CLASSIFICATION	GOVT A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION		DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION		DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		02380	SD-01 Preconstruction Submittals															
			Source of Stone		G	RE												
			Testing Facilities		G	RE												
			SD-04 Samples															
			Stone Quality															
			Bulk Specific Gravity															
			SD-05 Design Data															
			Method of Placement															
			SD-06 Test Reports															
			Gradation Testing															
			Daily Report of Operations															
			SD-07 Certificates															
			Waybills and Delivery Tickets															
			Weigh Scale Certification															
		02500	SD-03 Product Data															
			Composition Requirements	2.1	G	RE												
		02510	SD-03 Product Data															
			Installation	3.1	G	RE												
			Waste Water Disposal Method	3.2	G	RE												
			Satisfactory Installation	3.5	G	RE												
			SD-06 Test Reports															
			Bacteriological Disinfection	3.3	G	RE												
			Bacteriological Disinfection	3.3.1	G	RE												
			SD-07 Certificates															
			Manufacturer's Representative	1.4	G	RE												
			Installation	3.1	G	RE												

SUBMITTAL REGISTER

CONTRACT NO.

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UPPER FLAMINGO DIVERSION CHANNEL

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAG # RAPH	CLASSIFICATION	GOVT OR A/E REVW	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		02510	Meters	2.7.8	G RE													
		02531	SD-07 Certificates															
			Portland Cement	2.7.1	G RE													
			Joints	2.3	G RE													
		02630	SD-03 Product Data															
			Placing Pipe	3.3	G RE													
			SD-04 Samples															
			Pipe for Culverts and Storm Drains	2.1	G RE													
			SD-07 Certificates															
			Resin Certification	2.1.8	G RE													
			Resin Certification	2.1.9	G RE													
			Pipeline Testing	3.8	G RE													
			Hydrostatic Test on Watertight Joints	2.7	G RE													
			Determination of Density	3.7.5	G RE													
			Frame and Cover for Gratings	2.3.7	G RE													
		02700	SD-02 Shop Drawings															
			Placing Pipe	3.3	G RE													
			SD-06 Test Reports															
			Pipeline Testing	3.7	G RE													
		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	G RE													

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
UPPER FLAMINGO DIVERSION CHANNEL

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH	CLASSIFICATION	GOVT A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION		DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION		DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		02722	SD-06 Test Reports															
			Sampling and testing	1.4	G RE													
			Field Density Tests	1.4.2.4	G RE													
		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														
			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 Stability and Flow	3.9.3.6														
			In-place Density	3.9.3.7														
			Thickness	3.9.3.8														

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
UPPER FLAMINGO DIVERSION CHANNEL

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH	CLASSIFICATION	GOVT A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION		DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
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		02741	Grade Conformance and Surface Smoothness	3.9.3.9													
			Asphalt Cement Binder	2.2													
			Aggregates	2.1	G RE												
			QC Monitoring	3.9.3.11	G RE												
			SD-07 Certificates														
			Testing Laboratory	3.5	G RE												
			Certification of compliance	3.9.3.11													
			Plant Scale Calibration Certification	1.4													
		02748	SD-06 Test Reports														
			Sampling and Testing	3.7													
			SD-07 Certificates														
			Waybills and Delivery Tickets	3.4	G												
		02821	SD-07 Certificates														
			Chain Link Fence	2.1.1	G RE												
		03101	SD-02 Shop Drawings														
			Shop Drawings	3.1.1	G RE												
			Shop Drawings	3.2.3	G RE												
			SD-03 Product Data														
			Materials	2.1													
			SD-07 Certificates														
			Shop Drawings	3.1.1	G RE												
			Shop Drawings	3.1.1	G RE												
			Shop Drawings	3.2.3	G RE												
			Shop Drawings	3.2.3	G RE												

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
UPPER FLAMINGO DIVERSION CHANNEL

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		03101	Inspection	3.3														
			Formwork Not Supporting the Weight of Concrete	3.2.1	G	RE												
		03151	SD-07 Certificates															
			Premolded Expansion Joint Filler Strips	2.1.1	G													
			Compression Seals and Lubricant	2.1.2.2	G													
			Field Molded Sealants and Primer	2.1.2.1	G													
		03200	SD-02 Shop Drawings															
			Fabrication and Placement	3.1	G	RE												
			SD-06 Test Reports															
			Materials	2.1	G	RE												
			Tests, Inspections, and Verifications	2.1.1														
		03301	SD-03 Product Data															
			Concrete Mixture Proportioning	2.2														
			Batch Plant	3.1.2														
			Capacity	3.1.1														
			Concrete Mixers	3.1.3														
			Conveying Equipment	3.1.4														
			Placing Equipment	3.1.1														
			Tests and Inspections	3.7														
			Testing Technicians	3.7.1														

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
UPPER FLAMINGO DIVERSION CHANNEL

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION		DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
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		03301	Concrete Transportation Construction Inspector (CTCI)	3.7.1														
			Construction Joint Treatment	3.2.4	G RE													
			Curing and Protection	3.5	G RE													
			Cold-Weather Placing	3.3.4	G RE													
			Hot-Weather Placing	3.3.5	G RE													
			Finishing	3.4	G RE													
			SD-04 Samples															
			Aggregates	1.3.1.1	G RE													
			Cementitious Materials, Admixtures, and Curing Compound	1.3.1.2	G RE													
			SD-06 Test Reports															
			Quality of Aggregates	3.7.2.3	G RE													
			Mixer Uniformity	3.7.2.13														
			Test Results and Inspection Reports	3.7														
			SD-07 Certificates															
			Cementitious Materials	2.1.1														
			Chemical Admixtures	2.1.3														
			Membrane-Forming Curing Compound	2.1.4.1														
			Epoxy Resin	2.1.8														
			Latex Bonding Compound	2.1.7														
			Nonshrink Grout	2.1.6														
		05502	SD-02 Shop Drawings															

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
UPPER FLAMINGO DIVERSION CHANNEL

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH	CLASSIFICATION	GOVT A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
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		05502	Miscellaneous Metal Items	3.1	G RE													

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SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01355

ENVIRONMENTAL PROTECTION

-- End of Section Table of Contents --

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
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)

COE EM 385-1-1	(1996) 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

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 environmental Federal, State, and local 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 following shall be submitted 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.

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. A 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 COE 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.

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 COE 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 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.

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 an extended review, processing, and approval time. 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) 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.

3.4.2 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

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

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 02 - SITE WORK

SECTION 02300

EARTHWORK

-- End of Section Table of Contents --

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)

COE EM 385-1-1	(1996) Safety and Health Requirements Manual

AMERICAN SOCIETY FOR TESTING AND MATERIALS (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
ASTM D 2487	(2000) Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 2922	(1996el) 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.

SD-02 Shop Drawings

Shop Drawings; G, RE.

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

Explosive Storage Location; G, RE.

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

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; G, RE.

Treating of Compacted Fill Materials; G, RE.

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 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 to support construction equipment.

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.

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-excavation 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.

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.

3.2 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 close to the 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, ect. 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, which ever 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, COE 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 COE 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 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.

3.7 DISPOSITION AND DISPOSAL OF EXCAVATED MATERIALS

Excavated materials suitable for required fills shall be placed in temporary stockpiles or used directly in the work. Excess satisfactory

excavated material that are not utilized as part of the shall be processed as necessary, hauled and placed in the designated disposal site. Material to be placed in disposal site shall be free from trash, debris, and hazardous substance. Materials characrerized as unsatisfactory soil including trash, dumped debris and demolition products and materials suspected of having characteristics of hazardous and/or toxic waste shall become the property of the contractor and shall be removed from the project site in accordance with 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. Prior to placing material, the approved stockpile area(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 stockpiles 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.

3.7.1 Hauled Excavated Material

The Contractor shall have a haul route plan within the project limits, including removal of required excavated materials and placing fill materials and hauling of excess excavated materials. The haul route plan shall be submitted to the Contracting Officer for approval. Haul routes for transport of the excess excavated material shown on the drawing are approximate. The Contractor will 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 excess excavated material.

3.8 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.

3.9 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.

3.10 GENERAL REQUIREMENTS FOR COMPACTED FILLS AND COMPACTED BACKFILLS

3.10.1 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.

3.10.1.1 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.

3.10.1.2 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.

3.10.2 Settling of Fills or Backfills with Water

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

3.10.3 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.

3.10.4 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.

3.10.5 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.

3.10.6 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.

3.11 COMPACTED FILL, CHANNEL

3.11.1 Invert

3.11.1.1 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.

3.11.1.2 Compaction

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

3.11.2 Behind Channel Walls

3.11.2.1 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.

3.11.2.2 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).

3.11.2.3 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.

3.11.2.4 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 recompacted 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.

3.11.2.5 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.

3.11.3 Compacted Fill Over Covered Channel

3.11.3.1 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.

3.11.3.2 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.

3.11.3.3 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 if 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.

3.11.3.4 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.

3.11.3.5 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.

3.11.4 Compacted Fill, Roadway

3.11.4 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.

3.11.4.2 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 recompacted 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.

3.12 BACKFILL

3.12.1 Structural Backfill

3.12.1.1 Location

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

3.12.1.2 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.

3.12.1.3 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.

3.12.1.4 Compaction

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

3.13 SUBGRADE PREPARATION

3.13.1 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.

3.14 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 --

SECTION TABLE OF CONTENTS

DIVISION 02 - SITE WORK

SECTION 02380

STONE PROTECTION

SECTION 02380

STONE 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.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 33	(1999) Concrete Aggregates
ASTM C 88	(1990) Soundness of Aggregates by use of Sodium Sulfate or Magnesium Sulfate
ASTM C 97	(1996) Test Methods for Absorption and Bulk Specific Gravity of Natural Building Stone.
ASTM C 127	(1988; R 1993) Specific Gravity and Absorption of Coarse Aggregate
ASTM C 131	(1989) Resistance to Degradation of Small Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 136	(1996a) Sieve Analysis of Fine and Coarse Aggregates
ASTM C 170	Test Method for Compressive Strength Of Dimension Stone
ASTM C 295	(1998) Petrographic Examination of Aggregates for Concrete
ASTM C 535	(1989) Resistance to Degradation of Large Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM D 75	(1997) Standard Practice for Sampling Aggregates
ASTM D 653	(1997) Standard Terminology Relating to Soil, Rock, and Contained Fluids
ASTM C 1141	(1998) Substitute Ocean Water

ASTM D 1429	(1995) Specific Gravity of Water and Brine
ASTM D 3740	(1996) Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
ASTM D 4791	(1995) Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
ASTM D 5519	(1994) Particle Size Analysis of Natural and Man-Made Riprap Materials
ASTM E 548	(1994) General Criteria Used for Evaluating Laboratory Competence

U.S. ARMY CORPS OF ENGINEERS (COE)

COE CRD-C 148	(1969) Testing Stone for Expansive Breakdown on Soaking in Ethylene Glycol
COE CRD-C 169	(1993) Resistance of Rock to Wetting and Drying
EM 1110-2-1601	(1994) Hydraulic Design of Flood Control Channels
EM 1110-2-1906	(1986) Laboratory Soils Testing

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

NIST HB 44	(1997) NIST Handbook 44: Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices

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.

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

Source of Stone; G, RE.

The submittal shall include the name and location of the Contractor's proposed quarry source in accordance with paragraph: Source Authorization.

Testing Facilities; G, RE.

The submittal shall include the name of the Contractor's gradation sampling and testing laboratory in accordance with paragraph: Gradation Sampling and Testing.

SD-04 Samples

Stone Quality.

Samples of stone for testing, in accordance with paragraph: Quality Compliance Testing, shall be submitted 45 days in advance of the time when the stone will be used.

Bulk Specific Gravity.

At least 30 calendar days in advance of shipment of stone to the work site, submit a copy of bulk specific gravity test results for each gradation range of stone proposed to be furnished. The information shall be furnished prior to preparation of pre-production demonstration stockpiles.

SD-05 Design Data

Method of Placement.

The submittal shall include a detailed description of the proposed method of placement of riprap including the equipment to be used and logistic considerations.

SD-06 Test Reports

Gradation Testing.

Results of required gradation tests, in accordance with paragraph: Gradation Sampling and Testing, shall be submitted prior to placement of riprap.

Daily Report of Operations.

Contractor to submit daily report of operation at the end of each day.

SD-07 Certificates

Waybills and Delivery Tickets.

Copies of waybills or delivery tickets shall be submitted in accordance with paragraph: Waybills and Delivery Tickets.

Weigh Scale Certification.

Submit a copy of the certification from the regulation agency attesting to

the scale's accuracy.

1.3 TESTING AND SOURCES

1.3.1 Stone

1.3.1.1 General

The Contractor shall make all arrangements, pay all royalties, and secure all permits for the procurement, furnishing and transporting of stone. The Contractor shall vary the quarrying, processing, loading and placing operations to produce the sizes and quality of stone specified. If the stone being furnished by the Contractor does not fully meet all of the requirements of these specifications, the Contractor shall furnish at no additional cost to the Government, other stone meeting the requirements of these specifications.

All stone shall be durable material as approved by the Contracting Officer. [Selected salvage stone from the required excavation may be used if it satisfies all requirements as to quality and dimensions.] In case an unlisted source is to be used, the Contractor shall show that an adequate quantity of material is available. Stone shall be of a suitable quality to ensure permanence after being placed. The stone shall be free from cracks, blast fractures, bedding, seams and other defects that would tend to increase its deterioration from natural causes. An inspection for cracks, fractures, seams and defects shall be made by visual examination. If, by visual examination, it is determined that 10 percent or more of the stone produced contains hairline cracks, then all stone produced by the means and measures which caused the fractures shall be rejected. A hairline crack that is defined as being detrimental shall have a minimum width of 0.1 mm and shall be continuous for one-third the dimension of at least two sides of the stone. The stone shall be clean and adequately free from all foreign matter. Any foreign material adhering to or combined with the stone as a result of stockpiling shall be removed prior to placement.

1.3.1.2 Sources

Stone shall be furnished from any of the sources listed in paragraph 1.2.1.2.a, or at the option of the Contractor may be furnished from any other source proposed by the Contractor and accepted by the Contracting Officer, subject to the conditions herein stated. If the Contractor proposes to furnish stone from a source not currently listed in paragraph 1.2.1.2.a., the Government will conduct a quarry investigation examine the stockpiles and the quarry faces and take samples to determine whether acceptable stone can be produced from the proposed source. Satisfactory service records on other work may be acceptable. In order for the stone to be acceptable on the basis of service records, stone of a similar size must have been placed in a similar thickness and exposed to weathering under similar conditions as are anticipated for this contract, and must have satisfactorily withstood such weathering for a minimum of 5 years. If no such records are available, the Government will require the Contractor to conduct tests at the Contractor's expense to assure the acceptability of the stone. In addition to an acceptable 5-year service record, the Contracting Officer has the option to elect to have other representative

samples taken and tested at the Contractors expense.

a. List of Sources. On the basis of information and data available to the Contracting Officer, stone meeting the quality requirements of these specifications has been produced from the sources listed below:

Quarry	Location
El Dorado	Henderson, NV
Sloan	SW of City of Las Vegas

b. Selection of Source. The Contractor shall designate in writing only one source or a combination of sources from which the Contractor proposes to furnish stone. The Contractor's has the responsibility to determine that the stone source or combination of sources selected is capable of providing the quality, quantities and gradation needed and at the rate needed to maintain the scheduled progress of the work. Samples for acceptance testing shall be provided in accordance with paragraph EVALUATION TESTING below. If a source for stone so designated by the Contractor is not accepted for use by the Contracting Officer, the Contractor may propose other sources at no additional cost to the Government.

c. Source Authorization. Before any stone is produced from a source for completion of the work under this contract, the source or sources of stone must be authorized by the Contracting Officer's Representative. Authorization of a stone source shall not be construed as a waiver of the right of the Government to require the Contractor to furnish stone which complies with these specifications.

d. Acceptance of Materials. Acceptance of a source of stone is not to be construed as acceptance of all material from that source. The right is reserved to reject materials from certain localized areas, zones, strata, or channels, when such materials are unsuitable for stone as determined by the Contracting Officer. The Contracting Officer also reserves the right to reject individual units of produced specified materials in stockpiles at the quarry, all transfer points, and at the project construction site when such materials are determined to be unsuitable. During the course of the work, the stone may be tested by the Government, if the Contracting Officer determines that testing is necessary. If such tests are determined necessary, the testing will be done in a commercial laboratory selected by the Contractor and approved by the Government. Any and all materials produced from a listed or unlisted source shall meet all the requirements herein. The cost of testing will be at the Contractor's expense. During the contract period, both prior to and after materials are delivered to the job site, visual inspections and measurements of the stone materials may be performed by the Contracting Officer. If the Contracting Officer, during the inspections, finds that the stone quality, gradation or weights of stone being furnished are not as

specified or are questionable, re-sampling and re-testing by the Contractor shall be required. Sampling of the delivered stone for testing and the manner in which the testing is to be performed shall be as directed by the Contracting Officer. This additional sampling and testing shall be performed at the Contractor's expense when test results indicate that the materials do not meet specified requirements. When test results indicate that materials meet specified requirements, an equitable adjustment in the contract price will be made for the sampling and testing. Any material rejected shall be removed or disposed of as specified and at the Contractor's expense.

1.3.1.3 Construction Tolerances

The finished surface and stone layer thickness shall not deviate from the lines and grades shown by more than the tolerances listed below. Tolerances are measured perpendicular to the indicated neatlines. Extreme limits of the tolerances given shall not be continuous in any direction for more than five (5) times the nominal stone dimension nor for an area greater than 9.3 m2 of the structure surface.

NEATLINE TOLERANCES

MATERIAL	ABOVE NEATLINE mm	BELOW NEATLINE mm
Grouted stone	50	50

The intention is that the work shall be built generally to the required elevations, slope and grade and that the outer surfaces shall be even and present a neat appearance. Placed material not meeting these limits shall be removed or reworked as directed by the Contracting Officer. Payment will not be made for excess material which the Contracting Officer permits to remain in place.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Stone

2.1.1.1 Evaluation Testing of Stone

If the Contractor proposes to furnish stone from an unlisted source, or a listed source which has not been tested in 5 years, the Contractor shall have evaluation tests performed on stone samples collected from the proposed source (see paragraph h below). The quarry investigation shall be performed by the Contracting Officer's Representative, a representative of the Contractor, a representative of the Quarry and an engineering geologist from the Geotechnical Branch of the Los Angeles District. The tests to which the stone shall be subjected include petrographic examination (ASTM C 295), bulk specific gravity (SSD), unit weight, absorption (ASTM C 127), wetting and drying (COE CRD-C 169 & ASTM D 5313), Abrasion/L.A. Rattler (ASTM C 131) and sulfate soundness (ASTM C 88). All expenses of the testing

shall be paid for by the Contractor.

The laboratory to perform the required testing shall be approved based on compliance with ASTM E 548 and relevant paragraphs of ASTM D 3740, and no work requiring testing shall be permitted until the laboratory has been inspected and approved.

a. Bulk Specific Gravity. All stone shall have a minimum bulk specific gravity, saturated surface dry (SSD), of 2.65 based upon water having a unit weight of 1000 kN/m3. The method of test for bulk specific gravity (SSD) shall be ASTM C 127.

b. Unit Weight and Absorption. All stone shall have an absorption less than 2 percent unless other tests and service records show that the stone is satisfactory. The method of test for unit weight and absorption shall be ASTM C 127, except the unit weight shall be calculated in accordance with Note No. 3 using bulk specific gravity, saturated surface dry.

c. Petrographic Examination. Stone shall be evaluated in accordance with ASTM C 295 which shall include information required by ASTM D 4992, paragraph 10. COE CRD-C 148 shall be used to perform Ethylene Glycol tests required on rocks containing smectite and on samples identified to contain swelling clays. See note 5 below.

d. Wetting and Drying. All stone shall pass the required 15 cycles of wetting and drying in order to be placed on the job. This test does need to be done if the quarry has been used in the last five years and has a suitable service record. The test must be run on any and all new sources of stone. See COE CRD-C 169 and ASTM D 5313. The laboratory shall furnish color photographs of the slab samples prior to and after the wetting and drying tests have been completed. (See Notes 1 and 2 below).

e. Sulfate Soundness: In accordance with ASTM C 88; 10% maximum loss. (see Notes 3 and 4 below).

f. Abrasion - L. A. Rattler. In accordance with ASTM C 131; 50% maximum lass at 1,000 revolutions. See Note 4.

g. In addition to the above tests, the stone shall be subjected to X-Ray diffraction analysis in accordance with ASTM C 295. The stone must not contain any expansive clays.

h. Samples. Samples of stone from a proposed source shall be taken at the quarry by the Contracting Officer's Representative, the Superintendent of the quarry, the Contractor and an engineering geologist from the Geotechnical Branch of the Los Angeles District. The samples shall consist of at least 135 kg of stone. The quarry faces and the stockpiles to be used shall be examined and sampled. The Contractor will then ship the samples at the Contractors expense to a licensed testing Laboratory which has been approved by the Contracting Officer's Representative. The laboratory will be under the direct supervision of a state licensed Civil Engineer, Geotechnical Engineer, Geologist or Engineering Geologist. The results of the tests shall be delivered to the Contracting Officer's Representative as soon as they are received from the

laboratory. The samples shall be submitted a minimum of 30 days in advance of the time when the stone will be required in the work.

i. Tests. The tests shall be conducted by the Contractor in accordance with applicable ASTM and Corps of Engineers methods of tests given in the Handbook for Concrete and Cement, and shall be performed at a laboratory approved by the Contracting Officer's Representative. All cost of testing shall be paid for by the Contractor.

NOTE: (1) Test Procedures for the Wetting and Drying Test: The entire sample should be large enough to produce two cut slabs, 25 millimeters thick (+- 5 millimeters) with a minimum surface area of 20,000 square millimeters on one side. Two chunks approximately 75 by 100 millimeters are also chosen. The slabs and chunks are carefully examined under a low power microscope and all visible surface features are noted and recorded. The specimens are then over dried at 60 degrees Celsius for eight hours, cooled and weighed to the nearest tenth of a gram. The test specimens are photographed to show all surface features before the test. The test specimens are then subjected to fifteen cycles of wetting and drying. One slab and one chunk are soaked in fresh tap water, the other slab and chunk are soaked in salt water prepared in accordance with ASTM C 1141. Each cycle consists of soaking for sixteen hours at room temperature and then drying in an oven for eight hours at 60 degrees Celsius. After each cycle the specimens are examined with the low power microscope to check for opening of movement of fractures, flaking along edges, swelling of clays, softening of rock surfaces, heaving of micaceous minerals, breakdown of matrix material and any other evidence of weakness developing in the rock. The cycle in which any of these actions occur is recorded. After fifteen cycles, the slabs and chunks are again carefully examined and all charges in the rocks are noted and recorded. The test specimens together with all particles broken off during the test are oven dried, weighed and photographed.

NOTE: (2): Weakening and loss of individual surface particles is permissible unless bonding of the surface grains softens and causes general disintegration of the surface material.

NOTE: (3): The test shall be made on 50 particles each weighing 100 grams, +- 5 grams, in lieu of the gradation given in ASTM C 88.

NOTE: (4): Stone which has a loss greater than the specified limit will be accepted if the Contractor demonstrates that the stone has a satisfactory service record. A satisfactory service record is defined as five years of satisfactory service on a structure similar to this structure.

NOTE: (5): The test procedure for the Petrographic and X-Ray Diffraction is performed according to ASTM C 295, except for the following:

(a). A colored microscopic photograph shall be made of each stone type (whether igneous, sedimentary or metamorphic) and the individual minerals within the stone type shall be identified by labels and arrows upon the photograph.

(b). A very detailed macroscopic and microscopic description shall

be made of the stone, to include the entire mineral constituents, individual sizes, their approximate percentages and mineralogical histories. A description of the stone hardness, texture, weathering and durability factors shall also be discussed.

(c). A written summary of the suitability of the stone for use as stone protection based upon the Petrographic and X-Ray tests and the abrasion loss (L. A. Rattler) shall be presented in the final laboratory report on stone quality.

2.1.1.2 Stone Acceptance

a. Prior to placement all stone shall be subject to acceptance by the Contracting Officer's Representative. Acceptance of any stone shall not constitute acceptance of all stone from a source. All accepted stone shall be of the same lithology as the original stone from which test results or service records were taken as a basis for authorization of the source.

b. The stone shall be: (a) sound, durable, hard, and free from laminations, weak cleavages, undesirable weathering, or blasting or handling-induced fractures. (b) of such character that it will not disintegrate from the action of air, water or conditions of handling and placing: (c) clean and free from earth, clay, refuse, or adherent coatings.

c. Salvaged stone from the excavation may be used only if the stone meets the same quality and dimension requirements as stone from a new or formerly used quarry or source of stone. Salvaged material may be tested at the Contractor's expense at the discretion of the Contracting Officer's Representative in order to insure that the meets all requirements.

2.1.1.3 Quarry Operations

Quarry operations shall be conducted by the Contractor in a manner that shall produce stone conforming to the requirements specified and may involve selective quarrying, handling, processing, blending, and loading as necessary, all of which shall be as specified in Section 01451 CONTRACTOR QUALITY CONTROL.

2.1.1.4 Gradation Test

The Contractor shall perform a gradation test or tests on the stone at the quarry in accordance with paragraph GRADATION TEST METHOD FOR GRADED STONE. The sample shall be taken by the Contractor in the presence of the Contracting Officer. The Contractor shall notify the Contracting Officer not less than 3 days in advance of each test. In the event of unavailability of the Contracting Office, the Contractor shall perform the tests and certify to the Contracting Officer that the stone shipped complies with the specifications. At least one gradation test shall be performed of each size of stone placed. The gradation tests shall be reported using the forms, GRADATION TEST DATA SHEET and ENG FORM 4794-RM, attached at end of this section. The Contractor shall designate on the test form that portion in tons (metric) of the lot tested which is applicable to this contract. Any deviation from the reported tonnage shall be corrected and recorded on a revised GRADATION TEST DATA SHEET. The

sample shall consist of not less than two tons (metric) of stone, and shall be collected in a random manner which will provide a sample which accurately reflects the actual gradation arriving at the jobsite. The sample shall consist of between 30 to 35 pieces of stone. A minimum of two tests are required for acceptance of stone. The weight of the individual pieces of stone, representing the minimum, maximum and 50 percent greater than sizes for the specified stone gradation, shall be printed on each stone and be placed in a location adjacent to the work site in order to provide a basis for visual comparison during placement of the stone. These stones shall be used as the last order of work. Failure of the test on the initial sample and on an additional sample will be considered cause for rejection of the quarry and/or quarry process, and all riprap, or any stone represented by the failed tests shall be set aside and not incorporated into the work. Any additional tests required because of the failure of an initial test sample will not be considered as one of the other required tests. If collected by the truckload, each truckload shall be representative of the gradation requirements. The Contracting Officer may direct additional testing of the stone at the project site if the stone appears, by visual inspection, to be out of gradation. The additional tests shall be performed on in-place materials at the locations directed, or on random loads selected by the Contracting Officer. In-place test areas shall be not less than 3.6 m by 3.6 m and shall include the full thickness of the placed stone layer, without disturbing or including the underlying material and shall meet the minimum sample size specified above. Each pit excavated for an in-place test sample shall be refilled and reworked to provide a surface void of signs of disturbance. One in-place gradation shall be performed on each 7500 tons (metric] or portion thereof placed. If the gradation test fails, additional gradation tests will be required at the Contractor's expense to delineate the limits of unacceptable stone. The additional gradation tests shall not count as part of the minimum number of gradation tests required. The unacceptable stone shall either be reworked to bring the stone within the specified gradation or the stone shall be removed from the project site as determined by the Contracting Officer. The Contracting Officer may direct this testing under the Contract Clause INSPECTION OF CONSTRUCTION. The Contractor shall provide all necessary screens, scales and other equipment, and operating personnel, and shall grade the sample. Certification and test results shall represent stone shipped from the quarry. All certification and tests results must be received by the Contracting Officer at the jobsite before any stone is used in the work.

2.1.1.5 Proportional Dimension Limitations

The maximum aspect ratio (greatest dimension:least dimension) of any piece of stone for size ranges, shall be not greater than 3:1 when measured across mutually perpendicular axis. Not more than 25 percent (25%) of the stones within a gradation range shall have an aspect ratio greater than 2.5:1. A maximum of 5 percent flat and elongated pieces by weight will be acceptable. A flat and elongated piece of stone is defined as having a ratio of width to thickness or length to width greater than 3:1. ASTM D 4791 shall be used as a guide to perform the test.

2.1.1.6 Stone for Riprap and Grouted Riprap

Stone may be obtained from a source authorized by the Contracting Officer's Representative and shall be reasonably well-graded between the limits specified below, when tested in accordance with ASTM D 5519, Test Method A.

STONE GRADATION FOR 300 mm THICK RIPRAP

Approximate Average Stone Size in Millimeters	Percent Smaller By Weight Of Total Mixture
300-220	100
200-180	50
160-120	15

STONE GRADATION FOR 600 mm THICK RIPRAP

Approximate Average Stone Size in Millimeters	Percent Smaller By Weight Of Total Mixture
600-450	100
400-350	50
320-240	15

PART 3 EXECUTION

3.1 CONSTRUCTION PLAN

The Contractor shall submit a Construction Plan indicating the methods and equipment proposed to conduct all construction related operations. The plan shall be submitted to the Contracting Officer for approval not less than 10 days prior to the start of construction operations. The plan shall include as a minimum, but is not limited to, the following information:

Order of work and all proposed time lines.
Operation/use of the work/storage area.
Site access route(s) and preparation requirements.

3.2 DAILY REPORT OF OPERATIONS

The Contractor will be required to prepare and maintain a Daily Report of Operations and furnish copies thereof to the Contracting Officer's Representative. The daily reports shall document all construction related operations for all shifts in a 24-hour period. Further instruction on the preparation of the report will be provided. Copies of sample submittals are provided at the end of the Contractor's Quality Control section.

3.3 PLACEMENT OF STONE PROTECTION

3.3.1 Debris

Any timbers, unsatisfactory material and debris within the reaches for construction shall be removed except as otherwise directed by the Contracting Officer, and upon removal shall become the property of the

Contractor. All materials shall be properly disposed of in accordance with the requirements of Section 01354 ENVIRONMENTAL PROTECTION, including any applicable local requirements.

3.3.2 Stone

Stone shall be placed to the lines, grades and thickness shown. Stone placement shall start at the bottom of the stone structure and extend upward to the top of the structure in a neat, orderly fashion. Placement shall be with reasonably systematic care that segregation of particle sizes will not occur. If the materials are placed by clam shell, dragline, or other similar equipment, the stone shall not be dropped from a height exceeding 460 mm above the previously placed material. The finished surface of the stone shall be adequately smooth and shall be free of mounds or windrows. The finished work shall be free of clusters or small stones and cluster of larger stones.

3.3.3 Underlayer Stone

Stone shall be placed to a full zone thickness in one operation in a manner to avoid displacing the underlying material or placing undue impact force on underlying materials and supporting subsoils. The underlayer stone shall be placed in a manner to produce a resultant graded mass of stone with minimum voids. Rearranging of individual stones may be required to achieve this result. Placement by any method which is likely to cause segregation of the various sizes shall not be permitted. Unsegregated stone shall be lowered in a bucket or container and placed in a systematic manner directly on the underlying material. Placement shall begin at the bottom of the slope and proceed upward. Casting or dropping of stone, or moving by drifting and manipulating down the slope will not be permitted. Final finish of the slope shall be performed as the material is placed.

3.3.4 Demonstration Section

3.3.4.1 General

Prior to placement of any stone, the Contractor shall construct a section of a levee to demonstrate proposed operations. The section shall demonstrate procedures, methods, equipment, and capability for placing new stone within the tolerances specified. The demonstration section shall consist of an area designated by the Contracting Officer. The quantities and gradation of all materials placed within the section shall be accurately tabulated and provided immediately to the Contracting Officer. The demonstration section shall conform with all applicable requirements specified herein.

3.3.4.2 Demonstration Section Evaluation

The Contractor shall not proceed with stone placement prior to the approval of the demonstration section by the Contracting Officer. Within a period of 3 days after completion of the section, the Contracting Officer shall determine the adequacy and acceptability of the section. The Contractor shall be notified as to the acceptability of the section. If the Contracting Officer determines the demonstration is non-compliant, the

Contractor will be required to modify the methods of construction, equipment, and materials until compliance with these specifications is achieved. Upon acceptance of the demonstration section by the Contracting Officer, the demonstration section will be considered part of the new work.

3.4 TESTS AND INSPECTIONS

3.4.1 Pre-Production

3.4.1.1 Bulk Specific Gravity

Quantity determinations are contingent upon the range of bulk specific gravity (saturated surface dry (SSD) basis) of stone to be supplied. Therefore, during the process of selecting a source or sources of stone for the project, the Contractor shall make an investigation to determine the lowest and highest bulk specific gravity (SSD) of stone available at the source or sources he proposes to utilize for each gradation range of stone. Tests shall be performed at a Government approved testing laboratory. The testing results shall be submitted in accordance with paragraph SUBMITTALS. Test results which display an extraordinarily wide range of values may necessitate additional testing to determine whether the source contains strata with stones of an acceptable range of bulk specific gravity. For sources which have been acceptably tested not more than five years earlier, and the material is of an acceptable quality and bulk specific gravity, the Contracting Officer may waive the requirement for bulk specific gravity testing.

3.4.1.2 Demonstration Stockpile at Source

Following submittal of the Contractor's Quality Control (CQC) Plan and the Contractor's selection of a source, but prior to the Government's approval of a source and the CQC Plan, the Contractor shall make arrangements to provide a pre-production demonstration stockpile for each of the stone size ranges for the project. The stockpiles shall be located at the source of the stone and be shaped in windrow fashion. All stones placed in the demonstration stockpiles shall be representative of the overall quality of materials in the source and shall not consist of the best specimens unless it is reasonable to determine that the source will provide the required amount of stone of the applicable size range with a degree of quality no less than that existent in the demonstration stockpile. The quantity of stone in each demonstration stockpile shall be dependent upon the gradation size range to be produced for the project.

3.4.1.3 Evaluation of Demonstration Stockpile at Source

The Contractor shall notify the Contracting Officer when stockpiles are ready for evaluation. The Contractor's approved Quality Control Plan (QCP) supervisor and all QCP inspectors shall accompany the Contracting Officer's Representative (COR) during the Government's evaluation of the demonstration stockpiles. The Contractor shall arrange to have individual stones turned as necessary to accommodate the COR's evaluation. The COR will mark rejected stones with a red "X" and such stones shall be removed to the reject stockpile or to a crusher if one is available. If more than 5% unacceptable stones are found within a stockpile, the entire stockpile

will be rejected by the Government and a replacement stockpile will be created for re-evaluation. If the replacement stockpile is rejected, the Contractor shall revise and resubmit its Quality Control Plan (QCP) and shall create another replacement demonstration stockpile for evaluation. If the third demonstration stockpile for a particular size range at a single source is found unacceptable, the source will be disapproved for such size rang and a new source shall be submitted for approval. The Contractor may, of its own accord, choose a replacement source at the time a first or second demonstration stockpile is found unacceptable. The replacement of demonstration stockpiles or stone sources shall be at no additional cost to the Government and with no change in the time of completion.

3.4.1.4 Borderline Material Quality

If the COR's evaluation of a demonstration stockpile results in not being able to determine by visual examination whether the material is acceptable or unacceptable, the COR will select at least one but not more than three representative stones from the demonstration stockpile to be prepared for shipment a commercial laboratory for testing in accordance with paragraph EVALUATION TESTING OF STONE. Where specified sizes are in excess of 900 kg. the Contractor shall cut or break off a representative piece, weighing approximately 900 kg each, from each of the selected stones. For specified stone sizes of less than 900 kg but more than 230 kg, individual samples shall be the size of the largest stone specified for the size range. Samples of stone groupings with a maximum size less than 230 kg shall contain at least two (2) stones representative of the higher limit of the stone weights specified. In addition, the sample shall be representative of the gradation specified and the minimum weight of the total sample shall be not less than 230 kg. The sampling and testing procedures shall be repeated for each strata being quarried. The Contractor shall ship the samples to the laboratory as specified in paragraph EVALUATION TESTING OF STONE. If the laboratory testing reveals the materials are unacceptable, the Contractor shall submit a replacement source for approval and proceed with the demonstration stockpile procedures new.

3.4.1.5 Approval of Demonstration Stockpile at Source

At the time the COR finds the contents of a demonstration stockpile to be acceptable, either through visual examination or through laboratory testing, the Contractor will be notified in writing that the source, the QCP plan and QCP staff are approved, whereupon the Contractor may proceed with production of materials for the project provided they are consistent with demonstration stockpiles.

3.4.1.6 Placement Control

The Contractor shall establish and maintain quality control for all work performed at the job site under this section to assure compliance with contract requirements. He shall maintain records of his quality control tests, inspections and corrective actions. Quality control measures shall cover all construction operations including, but not limited to, the placement of all materials to the slope and grade lines shown and in accordance with this section.

3.5 BEDDING LAYERS, FILTER LAYERS, AND SAND FILL

3.5.1 General

The Contractor shall perform gradation tests to assure compliance with contract requirements and shall maintain detailed records. The bedding material, filter materials and/or sand fill shall be sampled in accordance with ASTM D 75 and tested in accordance with ASTM C 136. The Contractor shall perform the tests before and after surveys of each layer of stone protection material placed.

3.5.2 Reporting

Reporting shall be in accordance with paragraph GRADATION TEST.

3.6 DELIVERY

3.6.1 Waybills and Delivery Tickets for Truck Transport

Copies of waybills or delivery tickets shall be submitted to the Contracting Officer. The Contractor shall furnish the scale tickets for each load of material weighed; these tickets shall include tare weight, identification mark of each vehicle weighed, date, time, and location of the loading. A master log of all vehicle loading(s) shall be furnished for each day of loading operation. The Contractor shall file with the Contracting Officer the master log of loadings, certified waybills and/or certified tickets as part of the Daily Report of Operations. 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.

3.6.2 Scale Tickets and Records for Barge Transportation

Copies of Scale Tickets and/or Records of weights, including displacement weight date, shall be submitted to the Contracting Officer's Representative for each load of material delivered to the site. The Contracting Officer's Representative will determine from the displacement weight date, the weight of stone shipped by barge and will certify displacement weight records. Each scale ticket and/or record shall include the gross, rate, dunnage, and net weight of stone. The weight of dunnage for each load will be determined, recorded, and certified by the Contracting Officer's Representative. Deliveries and numbered scale tickets and/or records shall be recorded on an approved system to maintain delivery control. Copies of scale tickets and/or records shall be delivered to the Contracting Officer's Representative as part of the Daily Report of Operations. Prior to the final payment, the Contractor shall submit the certified scale tickets and/or certified records for stone used in the construction to the Contracting Officer.

3.6.3 Rejected Stone

Any and all stone which does not meet the specifications herein shall be considered rejected and shall be removed off of the job at the Contractors

expense.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 02 - SITE WORK

SECTION 02500

STATION MARKINGS

-- End of Section Table of Contents --

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; Canc. Notice 1) Paint, Traffic and Airfield Marking, Waterborne (Metric)

1.2 SUBMITTALS

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

SD-03 Product Data

Composition Requirements; G, RE.

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, 6 inches high, 3 inches wide, and 3/4-inch width of line. Markings on concrete walls shall be horizontal with the bottom of the marking not lower than 2 feet 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)

3.3.2 Tabulation

Location of Marking Wall	Station*	Text of Marking	Location of Marking Wall	Station*	Text of Marking
R	39+04.661	10000	R	54+89.625	15200
R	39+35.141	10100	R	55+20.105	15300
R	39+65.621	10200	R	55+50.585	15400
R	39+96.102	10300	R	55+81.065	15500
R	40+26.582	10400	R	56+11.545	15600
R	40+57.062	10500	R	56+42.025	15700
R	40+87.542	10600	R	56+72.505	15800
R	41+18.022	10700	R	57+02.985	15900
R	41+48.502	10800	R	57+33.465	16000
R	41+78.982	10900	R	57+63.945	16100
R	42+09.462	11000	R	57+94.425	16200

R	42+39.942	11100	R	58+24.905	16300
R	42+70.422	11200	R	58+55.385	16400
R	43+00.902	11300	R	58+85.865	16500
R	43+31.382	11400	R	59+16.345	16600
R	43+61.862	11500	R	59+46.825	16700
R	43+92.342	11600	R	59+77.306	16800
R	44+22.822	11700	R	60+07.786	16900
R	44+53.302	11800	R	60+38.266	17000
R	44+83.783	11900	R	60+68.746	17100
R	45+14.263	12000	R	60+99.226	17200
R	45+44.743	12100	R	61+29.706	17300
R	45+75.223	12200	R	61+60.186	17400
R	46+05.703	12300	R	61+90.666	17500
R	46+36.183	12400	R	62+21.146	17600
R	46+66.663	12500	R	62+51.626	17700
R	46+97.143	12600	R	62+82.106	17800
R	47+27.623	12700	R	63+12.586	17900
R	47+58.103	12800	R	63+43.066	18000
R	47+88.583	12900	R	63+73.546	18100
R	48+19.063	13000	R	64+04.026	18200
R	48+49.543	13100	R	64+34.506	18300
R	48+80.023	13200	R	64+64.986	18400
R	49+10.503	13300	R	64+95.467	18500
R	49+40.983	13400	R	65+25.947	18600
R	49+71.464	13500	R	65+56.427	18700
R	50+01.944	13600	R	65+86.907	18800
R	50+32.424	13700	R	66+17.387	18900
R	50+62.904	13800	R	66+47.867	19000
R	50+93.384	13900	R	66+78.347	19100
R	51+23.864	14000	R	67+08.827	19200
R	51+54.344	14100	R	67+39.307	19300
R	51+84.824	14200	R	67+69.787	19400
R	52+15.304	14300	R	68+00.267	19500
R	52+45.784	14400	R	68+30.747	19600
R	52+76.264	14500	R	68+61.227	19700
R	53+06.744	14600	R	68+91.707	19800
R	53+37.224	14700	R	69+22.187	19900
R	53+67.704	14800	R	69+52.667	20000
R	53+98.184	14900	R	69+83.148	20100
R	54+28.664	15000	R	70+00.000	20155.29
R	54+59.144	15100			

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

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 02 - SITE WORK

SECTION 02630

STORM-DRAINAGE SYSTEM

-- End of Section Table of Contents --

SECTION 02630

STORM-DRAINAGE SYSTEM

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 346/346R	(1990) Standard Specification for Cast-in-Place Nonreinforced Concrete Pipe and Recommendations

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO HB-16	(1996) Standard Specifications for Highway Bridges
AASHTO M 167	(1994) Corrugated Steel Structural Plate, Zinc Coated, for Field Bolted Pipe
AASHTO M 190	(1995) Bituminous Coated Corrugated Metal Culvert Pipe and Pipe Arches
AASHTO M 198	(1998) Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible Watertight Gaskets
AASHTO M 219	(1992; R 1995) Aluminum Alloy Structural Plate for Field Bolted Conduits
AASHTO M 243	(1996) Field Applied Coating of Corrugated Metal Structural Plate for Pipe, Pipe-Arches, and Arches
AASHTO M 294	(1998) Corrugated Polyethylene Pipe, 300- to 1200- mm Diameter
AASHTO MP7	(1997) Corrugated Polyethylene Pipe, 1350 and 1500 mm Diameter

AMERICAN RAILWAY ENGINEERING & MAINTENANCE-OF-WAY ASSOCIATION (AREMA)

AREMA Manual	(1999) Manual for Railway Engineering (4 Vol.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 48M	(1994el) Gray Iron Castings (Metric)
ASTM A 123/A 123M	(2000) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 536	(1999el) Ductile Iron Castings
ASTM A 716	(1995) Ductile Iron Culvert Pipe
ASTM A 742/A 742M	(1998) Steel Sheet, Metallic Coated and Polymer Precoated for Corrugated Steel Pipe
ASTM A 760/A 760M	(1997) Corrugated Steel Pipe, Metallic-Coated for Sewers and Drains
ASTM A 762/A 762M	(1998) Corrugated Steel Pipe, Polymer Precoated for Sewers and Drains
ASTM A 798/A 798M	(1997a) Installing Factory-Made Corrugated Steel Pipe for Sewers and Other Applications
ASTM A 807	(1997) Installing Corrugated Steel Structural Plate Pipe for Sewers and Other Applications
ASTM A 849	(1997) Post-Applied Coatings, Pavings, and Linings for Corrugated Steel Sewer and Drainage Pipe
ASTM A 929/A 929M	(1997) Steel Sheet, Metallic-Coated by the Hot-Dip Process for Corrugated Steel Pipe
ASTM B 26/B 26M	(1999) Aluminum-Alloy Sand Castings
ASTM B 745/B 745M	(1997) Corrugated Aluminum Pipe for Sewers and Drains
ASTM C 12	(1998el) Installing Vitrified Clay Pipe Lines
ASTM C 14M	(1999) Concrete Sewer, Storm Drain, and Culvert Pipe (Metric)
ASTM C 32	(1999el) Sewer and Manhole Brick (Made from Clay or Shale)
ASTM C 55	(1999) Concrete Brick

ASTM C 62	(1997a) Building Brick (Solid Masonry Units Made from Clay or Shale)
ASTM C 76M	(2000) Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe (Metric)
ASTM C 139	(1999) Concrete Masonry Units for Construction of Catch Basins and Manholes
ASTM C 231	(1997e1) Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 270	(2000) Mortar for Unit Masonry
ASTM C 425	(2000) Compression Joints for Vitrified Clay Pipe and Fittings
ASTM C 443	(1998) Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets
ASTM C 443M	(1998) Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets (Metric)
ASTM C 478M	(1997) Precast Reinforced Concrete Manhole Sections (Metric)
ASTM C 506M	(1999) Reinforced Concrete Arch Culvert, Storm Drain, and Sewer Pipe (Metric)
ASTM C 507M	(1999) Reinforced Concrete Elliptical Culvert, Storm Drain, and Sewer Pipe (Metric)
ASTM C 655	(2000) Reinforced Concrete D-Load Culvert, Storm Drain, and Sewer Pipe
ASTM C 700	(2000) Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated
ASTM C 789	(1998) Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers
ASTM C 828	(1998) Low-Pressure Air Test of Vitrified Clay Pipe Lines
ASTM C 850	(1998) Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers with Less Than 2 Ft. of Cover Subjected to Highway Loadings
ASTM C 877M	(1994) External Sealing Bands for

	Noncircular Concrete Sewer, Storm Drain, and Culvert Pipe (Metric)
ASTM C 923	(1998) Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Materials
ASTM C 924M	(1998) Concrete Pipe Sewer Lines by Low-Pressure Air Test Method (Metric)
ASTM C 1103M	(1994) Joint Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines (Metric)
ASTM D 1056	(1998) Flexible Cellular Materials - Sponge or Expanded Rubber
ASTM D 1171	(1994) Rubber Deterioration - Surface Ozone Cracking Outdoors or Chamber (Triangular Specimens)
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 1751	(1999) Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D 1752	(1984; R 1996el) Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
ASTM D 1784	(1999a) Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
ASTM D 2167	(1994) Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D 2321	(1989; R 1995) Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
ASTM D 2922	(1996el) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	(1988; R 1996el) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow

	Depth)
ASTM D 3034	(1998) Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM D 3212	(1996a) Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
ASTM D 3350	(1999) Polyethylene Plastics Pipe and Fittings Materials
ASTM F 477	(1999) Elastomeric Seals (Gaskets) for Joining Plastic Pipe
ASTM F 679	(1995) Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings
ASTM F 714	(2000) Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter
ASTM F 794	(1999) Poly(Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter
ASTM F 894	(1998a) Polyethylene (PE) Large Diameter Profile Wall Sewer and Drain Pipe
ASTM F 949	(2000) Poly(Vinyl Chloride) (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings
ASTM F 1417	(1992; R 1998) Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air

1.2 MEASUREMENT AND PAYMENT

1.2.1 Pipe Culverts and Storm Drains

The length of pipe installed will be measured along the centerlines of the pipe from end to end of pipe without deductions for diameter of manholes. Pipe will be paid for at the contract unit price for the number of linear meters of culverts or storm drains placed in the accepted work.

1.2.2 Manholes and Inlets

The quantity of manholes and inlets will be measured as the total number of manholes and inlets of the various types of construction, complete with frames and gratings or covers and, where indicated, with fixed side-rail ladders, constructed to the depth of 7 meters, in the accepted work. The depth of manholes and inlets will be measured from the top of grating or cover to invert of outlet pipe. Manholes and inlets constructed to depths greater than the depth specified above will be paid for as units at the

contract unit price for manholes and inlets, plus an additional amount per linear meter for the measured depth beyond a depth of 7 meters.

1.2.3 Walls and Headwalls

Walls and headwalls will be measured by the number of cubic meters of reinforced concrete, plain concrete, or masonry used in the construction of the walls and headwalls. Wall and headwalls will be paid for at the contract unit price for the number of walls and headwalls constructed in the completed work.

1.2.4 Flared End Sections

Flared end sections will be measured by the unit. Flared end sections will be paid for at the contract unit price for the various sizes in the accepted work.

1.2.5 Sheeting and Bracing

Payment will be made for that sheeting and bracing ordered to be left in place, based on the number of square meters of sheeting and bracing remaining below the surface of the ground.

1.2.6 Excavation, Rock and/or Cemented Materials

Payment will be made for the number of cubic meters of material acceptably excavated, as specified and defined in paragraph EXCAVATION in Section 02316 EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS measured in the original position, and computed by allowing actual width of rock excavation with the following limitations: maximum rock excavation width, 750 mm for pipe of 300 mm or less nominal diameter; maximum rock excavation width, 400 mm greater than outside diameter of pipe of more than 300 mm nominal diameter. Measurement will include authorized overdepth excavation. Payment will also include all necessary drilling and blasting, and all incidentals necessary for satisfactory excavation and disposal of authorized rock excavation. No separate payment will be made for backfill material required to replace rock excavation; this cost shall be included in the Contractor's unit price bid per cubic meter for rock excavation. In rock excavation for manholes and other appurtenances, 300 mm will be allowed outside the wall lines of the structures.

1.2.7 Backfill Replacing Unstable Material

Payment will be made for the number of cubic meters of select granular material required to replace unstable material for foundations under pipes or drainage structures, which will constitute full compensation for this backfill material, including removal and disposal of unstable material and all excavating, hauling, placing, compacting, and all incidentals necessary to complete the construction of the foundation satisfactorily.

1.2.8 Pipe Placed by Jacking

Payment will be made for the number of linear meters of jacked pipe accepted in the completed work measured along the centerline of the pipe in

place.

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 following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Placing Pipe; G, RE.

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

SD-04 Samples

Pipe for Culverts and Storm Drains; G, RE.

Samples of the following materials, before work is started: Concrete Pipe; Horizontal or Vertical Elliptical pipe; clay pipe; Reinforced Concrete Pipe; nonreinforced pipe; cast-in-place pipe/conduit; PVC/PE Pipe; Ductile Iron Pipe; steel pipe.

SD-07 Certificates

Resin Certification; G, RE.

Pipeline Testing; G, RE.

Hydrostatic Test on Watertight Joints; G, RE.

Determination of Density; G, RE.

Frame and Cover for Gratings; G, RE.

Certified copies of test reports demonstrating conformance to applicable pipe specifications, before pipe is installed. Certification on the ability of frame and cover or gratings to carry the imposed live load.

1.4 DELIVERY, STORAGE, AND HANDLING

1.4.1 Delivery and Storage

Materials delivered to site shall be inspected for damage, unloaded, and stored with a minimum of handling. Materials shall not be stored directly on the ground. The inside of pipes and fittings shall be kept free of dirt and debris. Before, during, and after installation, plastic pipe and fittings shall be protected from any environment that would result in damage or deterioration to the material. The Contractor shall have a copy of the manufacturer's instructions available at the construction site at all times and shall follow these instructions unless directed otherwise by

the Contracting Officer. Solvents, solvent compounds, lubricants, elastomeric gaskets, and any similar materials required to install plastic pipe shall be stored in accordance with the manufacturer's recommendations and shall be discarded if the storage period exceeds the recommended shelf life. Solvents in use shall be discarded when the recommended pot life is exceeded.

1.4.2 Handling

Materials shall be handled in a manner that ensures delivery to the trench in sound, undamaged condition. Pipe shall be carried to the trench, not dragged.

PART 2 PRODUCTS

2.1 PIPE FOR CULVERTS AND STORM DRAINS

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

2.1.1 Concrete Pipe

ASTM C 76M, **Class III and Class IV**, or ASTM C 655, D-Load.

2.1.1.1 Reinforced Arch Culvert and Storm Drainpipe

ASTM C 506M, Class A-III.

2.1.1.2 Reinforced Elliptical Culvert and Storm Drainpipe

ASTM C 507M. Horizontal elliptical pipe shall be Class HE-II. Vertical elliptical pipe shall be Class VE-II.

2.1.1.3 Nonreinforced Pipe

ASTM C 14M, Class 2.

2.1.1.4 Cast-In-Place Nonreinforced Conduit

ACI 346/346R, except that testing shall be the responsibility of and at the expense of the Contractor. In the case of other conflicts between ACI 346/346R and project specifications, requirements of ACI 346/346R shall govern.

2.1.2 Clay Pipe

Standard or extra strength, as indicated, conforming to ASTM C 700.

2.1.3 Corrugated Steel Pipe

ASTM A 760/A 760M, zinc or aluminum (Type 2) coated pipe of either:

a. Type II pipe with annular 68 by 13 mm corrugations.

b. Type IIR pipe with helical 19 by 19 by 190 mm corrugations.

2.1.3.1 Fully Bituminous Coated

AASHTO M 190 Type A and ASTM A 760/A 760M zinc or aluminum (Type 2) coated pipe of either:

a. Type II pipe with annular 68 by 13 mm corrugations.

b. Type IIR pipe with helical 19 by 19 by 190 mm corrugations.

2.1.3.2 Half Bituminous Coated, Part Paved

AASHTO M 190 Type B and ASTM A 760/A 760M zinc or aluminum (Type 2) coated Type II pipe with annular 68 by 13 mm corrugations.

2.1.3.3 Fully Bituminous Coated, Part Paved

AASHTO M 190 Type C and ASTM A 760/A 760M zinc or aluminum (Type 2) coated Type II pipe with annular 68 by 13 mm corrugations.

2.1.3.4 Fully Bituminous Coated, Fully Paved

AASHTO M 190 Type D and ASTM A 760/A 760M zinc or aluminum (Type 2) coated Type II pipe with annular 68 by 13 mm corrugations.

2.1.3.5 Concrete-Lined

ASTM A 760/A 760M zinc coated Type I corrugated steel pipe with annular 68 by 13 mm corrugations and a concrete lining in accordance with ASTM A 849.

2.1.3.6 Polymer Precoated

ASTM A 762/A 762M corrugated steel pipe fabricated from ASTM A 742/A 742M Grade 250/250 polymer precoated sheet of either:

a. Type II pipe with annular 68 by 13 mm corrugations.

b. Type IIR pipe with helical 19 by 19 by 190 mm corrugations.

2.1.3.7 Polymer Precoated, Part Paved

ASTM A 762/A 762M Type II corrugated steel pipe and AASHTO M 190 Type B (modified), paved invert only, fabricated from ASTM A 742/A 742M Grade 250/250 polymer precoated sheet with annular 68 by 13 mm corrugations.

2.1.3.8 Polymer Precoated, Fully Paved

ASTM A 762/A 762M Type II corrugated steel pipe and AASHTO M 190 Type D (modified), fully paved only, fabricated from ASTM A 742/A 742M Grade 250/250 polymer precoated sheet with annular 68 by 13 mm corrugations.

2.1.4 Corrugated Aluminum Alloy Pipe

ASTM B 745/B 745M corrugated aluminum alloy pipe of either:

a. Type II pipe with annular corrugations.

b. Type IIR pipe with helical corrugations.

2.1.4.1 Aluminum Fully Bituminous Coated

AASHTO M 190 Type A and ASTM B 745/B 745M corrugated aluminum alloy pipe of either:

a. Type II pipe with annular corrugations.

b. Type IIR pipe with helical corrugations.

2.1.4.2 Aluminum Fully Bituminous Coated, Part Paved

AASHTO M 190 Type C and ASTM B 745/B 745M corrugated aluminum alloy pipe of either:

a. Type II pipe with annular corrugations.

b. Type IIR pipe with helical corrugations.

2.1.5 Structural Plate, Steel Pipe, Pipe Arches and Arches

Assembled with galvanized steel nuts and bolts, from galvanized corrugated steel plates conforming to AASHTO M 167. Pipe coating, when required, shall conform to the requirements of AASHTO M 190 Type A. Thickness of plates shall be as indicated.

2.1.6 Structural Plate, Aluminum Pipe, Pipe Arches and Arches

Assembled with either aluminum alloy, aluminum coated steel, stainless steel or zinc coated steel nuts and bolts. Nuts and bolts, and aluminum alloy plates shall conform to AASHTO M 219. Pipe coating, when required, shall conform to the requirements of AASHTO M 190, Type A. Thickness of plates shall be as indicated.

2.1.7 Ductile Iron Culvert Pipe

ASTM A 716.

2.1.8 PVC Pipe

The pipe manufacturer's resin certification, indicating the cell classification of PVC used to manufacture the pipe, shall be submitted prior to installation of the pipe.

2.1.8.1 Type PSM PVC Pipe

ASTM D 3034, Type PSM, maximum SDR 35, produced from PVC certified by the compounder as meeting the requirements of ASTM D 1784, minimum cell class

12454-B.

2.1.8.2 Profile PVC Pipe

ASTM F 794, Series 46, produced from PVC certified by the compounder as meeting the requirements of ASTM D 1784, minimum cell class 12454-B.

2.1.8.3 Smooth Wall PVC Pipe

ASTM F 679 produced from PVC certified by the compounder as meeting the requirements of ASTM D 1784, minimum cell class 12454-B.

2.1.8.4 Corrugated PVC Pipe

ASTM F 949 produced from PVC certified by the compounder as meeting the requirements of ASTM D 1784, minimum cell class 12454-B.

2.1.9 PE Pipe

The pipe manufacturer's resin certification indicating the cell classification of PE used to manufacture the pipe shall be submitted prior to installation of the pipe. The minimum cell classification for polyethylene plastic shall apply to each of the seven primary properties of the cell classification limits in accordance with ASTM D 3350.

2.1.9.1 Smooth Wall PE Pipe

ASTM F 714, maximum DR of 21 for pipes 80 to 600 mm in diameter and maximum DR of 26 for pipes 650 to 1200 mm in diameter. Pipe shall be produced from PE certified by the resin producer as meeting the requirements of ASTM D 3350, minimum cell class 335434C.

2.1.9.2 Corrugated PE Pipe

AASHTO M 294, Type S or D, for pipes 300 to 1200 mm and AASHTO MP7, Type S or D, for pipes 1350 to 1500 mm produced from PE certified by the resin producer as meeting the requirements of ASTM D 3350, minimum cell class in accordance with AASHTO M 294. Pipe walls shall have the following properties:

Nominal Size (mm)	Minimum Wall Area (square mm/m)	Minimum Moment of Inertia of Wall Section (mm to the 4th/mm)
300	3200	390
375	4000	870
450	4900	1020
600	6600	1900
750	8300	2670
900	9500	3640
1050	9900	8900
1200	10900	8900

Nominal Size (mm)	Minimum Wall Area (square mm/m)	Minimum Moment of Inertia of Wall Section (mm to the 4th/mm)
1350	12000	13110
1500	13650	13110

2.1.9.3 Profile Wall PE Pipe

ASTM F 894, RSC 160, produced from PE certified by the resin producer as meeting the requirements of ASTM D 3350, minimum cell class 334433C. Pipe walls shall have the following properties:

		Minimum Moment Of Inertia of Wall Section (mm to the 4th/mm)	
Nominal Size (mm)	Minimum Wall Area (square mm/m)	Cell Class 334433C	Cell Class 335434C
450	6300	850	620
525	8800	1150	840
600	9900	1330	970
675	12500	2050	1490
750	12500	2050	1490
825	14800	2640	2160
900	17100	3310	2700
1050	16500	4540	3720
1200	18700	5540	4540

2.2 DRAINAGE STRUCTURES

2.2.1 Flared End Sections

Sections shall be of a standard design fabricated from zinc coated steel sheets meeting requirements of ASTM A 929/A 929M.

2.2.2 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.

2.3 MISCELLANEOUS MATERIALS

2.3.1 Concrete

Unless otherwise specified, concrete and reinforced concrete shall conform

to the requirements for 25 MPa concrete under Section 03301 CAST-IN-PLACE STRUCTURAL CONCRETE. The concrete mixture shall have air content by volume of concrete, based on measurements made immediately after discharge from the mixer, of 5 to 7 percent when maximum size of coarse aggregate exceeds 37.5 mm. Air content shall be determined in accordance with ASTM C 231. The concrete covering over steel reinforcing shall not be less than 25 mm thick for covers and not less than 40 mm thick for walls and flooring. Concrete covering deposited directly against the ground shall have a thickness of at least 75 mm between steel and ground. Expansion-joint filler material shall conform to ASTM D 1751, or ASTM D 1752, or shall be resin-impregnated fiberboard conforming to the physical requirements of ASTM D 1752.

2.3.2 Mortar

Mortar for pipe joints, connections to other drainage structures, and brick or block construction shall conform to ASTM C 270, Type M, except that the maximum placement time shall be 1/2 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.

2.3.3 Precast Concrete Segmental Blocks

Precast concrete segmental block shall conform to ASTM C 139, not more than 200 mm (8 inches) thick, not less than 200 mm (8 inches) long, and of such shape that joints can be sealed effectively and bonded with cement mortar.

2.3.4 Brick

Brick shall conform to ASTM C 62, Grade SW; ASTM C 55, Grade S-I or S-II; or ASTM C 32, Grade MS. Mortar for jointing and plastering shall consist of one part portland cement and two parts fine sand. Lime may be added to the mortar in a quantity not more than 25 percent of the volume of cement. The joints shall be filled completely and shall be smooth and free from surplus mortar on the inside of the structure. Brick structures shall be plastered with 10 mm of mortar over the entire outside surface of the walls. For square or rectangular structures, brick shall be laid in stretcher courses with a header course every sixth course. For round structures, brick shall be laid radially with every sixth course a stretcher course.

2.3.5 Precast Reinforced Concrete Manholes

Precast reinforced concrete manholes shall conform to ASTM C 478M. Joints between precast concrete risers and tops shall be full-bedded in cement mortar and shall be smoothed to a uniform surface on both interior and exterior of the structure.

2.3.6 Prefabricated Corrugated Metal Manholes

Manholes shall be of the type and design recommended by the manufacturer. Manholes shall be complete with frames and cover, or frames and gratings.

2.3.7 Frame and Cover for Gratings

Frame and cover for gratings shall be cast gray iron, ASTM A 48M, Class 35B; cast ductile iron, ASTM A 536, Grade 65-45-12; or cast aluminum, ASTM B 26/B 26M, Alloy 356.OT6. Weight, shape, size, and waterway openings for grates and curb inlets shall be as indicated on the plans.

2.3.8 Joints

2.3.8.1 Flexible Watertight Joints

a. Materials: Flexible watertight joints shall be made with plastic or rubber-type gaskets for concrete pipe and with factory-fabricated resilient materials for clay 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. Factory-fabricated resilient joint materials shall conform to ASTM C 425. 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 m (54 inches).

b. Test Requirements: Watertight joints shall be tested and shall meet test requirements of paragraph HYDROSTATIC TEST ON WATERTIGHT JOINTS. Rubber gaskets shall comply with the oil resistant gasket requirements of ASTM C 443M. Certified copies of test results shall be delivered to the Contracting Officer before gaskets or jointing materials are installed. Alternate types of watertight joint may be furnished, if specifically approved.

2.3.8.2 External Sealing Bands

Requirements for external sealing bands shall conform to ASTM C 877M.

2.3.8.3 Flexible Watertight, Gasketed Joints

a. Gaskets: When infiltration or exfiltration is a concern for pipe lines, the couplings may be required to have gaskets. The closed-cell expanded rubber gaskets shall be a continuous band approximately 178 mm (7 inches) wide and approximately 10 mm (3/8 inch) thick, meeting the requirements of ASTM D 1056, Type 2 B3, and shall have a quality retention rating of not less than 70 percent when tested for weather resistance by ozone chamber exposure, Method B of ASTM D 1171. Rubber O-ring gaskets shall be 21 mm (13/16 inch) in diameter for pipe diameters of 914 mm (36 inches) or smaller and 22 mm (7/8 inch) in diameter for larger pipe having 13 mm (1/2 inch) deep end corrugation. Rubber O-ring gaskets shall be 35 mm (1-3/8 inches) in diameter for pipe having 25 mm (1 inch) deep end corrugations. O-rings shall meet the requirements of AASHTO M 198 or ASTM C 443. Flexible plastic gaskets shall conform to requirements of AASHTO M 198, Type B.

b. Connecting Bands: Connecting bands shall be of the type, size and sheet thickness of band, and the size of angles, bolts, rods and lugs as indicated or where not indicated as specified in the applicable standards or specifications for the pipe. Exterior rivet heads in the longitudinal seam under the connecting band shall be countersunk or the rivets shall be omitted and the seam welded. Watertight joints shall be tested and shall meet the test requirements of paragraph HYDROSTATIC TEST ON WATERTIGHT JOINTS.

2.3.8.4 PVC Plastic Pipes

Joints shall be solvent cement or elastomeric gasket type in accordance with the specification for the pipe and as recommended by the pipe manufacturer.

2.3.8.5 Smooth Wall PE Plastic Pipe

Pipe shall be joined using butt fusion method as recommended by the pipe manufacturer.

2.3.8.6 Corrugated PE Plastic Pipe

Water tight joints shall be made using a PVC or PE coupling and rubber gaskets as recommended by the pipe manufacturer. Rubber gaskets shall conform to ASTM F 477. Soil tight joints shall conform to the requirements in AASHTO HB-16, Division II, Section 26.4.2.4. (e) for soil tightness and shall be as recommended by the pipe manufacturer.

2.3.8.7 Profile Wall PE Plastic Pipe

Joints shall be gasketed or thermal weld type with integral bell in accordance with ASTM F 894.

2.3.8.8 Ductile Iron Pipe

Couplings and fittings shall be as recommended by the pipe manufacturer.

2.4 STEEL LADDER

Steel ladder shall be provided where the depth of the manhole exceeds 3.66 m (12 feet). These ladders shall be not less than 406 mm (16 inches) in width, with 19 mm (3/4 inch) diameter rungs spaced 305 mm (12 inches) apart. The two stringers shall be a minimum 10 mm (3/8 inch) thick and 63 mm (2-1/2 inches) wide. Ladders and inserts shall be galvanized after fabrication in conformance with ASTM A 123/A 123M.

2.5 DOWNSPOUT BOOTS

Boots used to connect exterior downspouts to the storm-drainage system shall be of gray cast iron conforming to ASTM A 48M, Class 30B or 35B. Shape and size shall be as indicated.

2.6 RESILIENT CONNECTORS

Flexible, watertight connectors used for connecting pipe to manholes and inlets shall conform to ASTM C 923.

2.7 HYDROSTATIC TEST ON WATERTIGHT JOINTS

2.7.1 Concrete, Clay, PVC and PE Pipe

A hydrostatic test shall be made on the watertight joint types as proposed. Only one sample joint of each type needs testing; however, if the sample joint fails because of faulty design or workmanship, an additional sample joint may be tested. During the test period, gaskets or other jointing material shall be protected from extreme temperatures which might adversely affect the performance of such materials. Performance requirements for joints in reinforced and nonreinforced concrete pipe shall conform to AASHTO M 198 or ASTM C 443M. Test requirements for joints in clay pipe shall conform to ASTM C 425. Test requirements for joints in PVC and PE plastic pipe shall conform to ASTM D 3212.

2.7.2 Corrugated Steel and Aluminum Pipe

A hydrostatic test shall be made on the watertight joint system or coupling band type proposed. The moment strength required of the joint is expressed as 15 percent of the calculated moment capacity of the pipe on a transverse section remote from the joint by the AASHTO HB-16 (Division II, Section 26). The pipe shall be supported for the hydrostatic test with the joint located at the point which develops 15 percent of the moment capacity of the pipe based on the allowable span in meters for the pipe flowing full or 54,233 Newton meters (40,000 foot-pounds), whichever is less. Performance requirements shall be met at an internal hydrostatic pressure of 69 kPa (10 psi) for a 10 minute period for both annular corrugated metal pipe and helical corrugated metal pipe with factory reformed ends.

PART 3 EXECUTION

3.1 EXCAVATION FOR PIPE CULVERTS, STORM 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 600 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. Contractor shall not overexcavate. Where trench widths are exceeded, redesign with a resultant increase in cost of stronger pipe or special installation procedures will be necessary. Cost of this redesign and increased cost of pipe or installation shall be borne by the Contractor without additional cost to the Government.

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 13 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. 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 BACKFILLING. 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

The bedding surface for the pipe shall provide a firm foundation of uniform density throughout the entire length of the pipe.

3.2.1 Concrete Pipe Requirements

When no bedding class is specified or detailed on the drawings, concrete pipe shall be bedded 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 not more than the length, depth, and width required for properly making the particular type of joint.

3.2.2 Clay Pipe Requirements

Bedding for clay pipe shall be as specified by ASTM C 12.

3.2.3 Corrugated Metal Pipe

Bedding for corrugated metal pipe and pipe arch shall be in accordance with ASTM A 798/A 798M. It is not required to shape the bedding to the pipe geometry. However, for pipe arches, the Contractor shall either shape the bedding to the relatively flat bottom arc or fine grade the foundation to a shallow v-shape. Bedding for corrugated structural plate pipe shall meet requirements of ASTM A 807.

3.2.4 Ductile Iron Pipe

Bedding for ductile iron pipe shall be as shown on the drawings.

3.2.5 Plastic Pipe

Bedding for PVC and PE pipe shall meet the requirements of ASTM D 2321. Bedding, haunching, and initial backfill shall be either Class IB or II material.

3.3 PLACING PIPE

Each pipe shall be thoroughly examined before being laid; defective or damaged pipe shall not be used. Plastic pipe shall be protected from exposure to direct sunlight prior to laying, if necessary to maintain adequate pipe stiffness and meet installation deflection requirements. Pipelines shall be laid to the grades and alignment indicated. Proper facilities shall be provided for lowering sections of pipe into trenches. Lifting lugs in vertically elongated metal pipe shall be placed in the same vertical plane as the major axis of the pipe. Pipe shall not be laid in water, and pipe shall not 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. Deflection of installed flexible pipe shall not exceed the following limits:

TYPE OF PIPE	MAXIMUM ALLOWABLE DEFLECTION (%)
Corrugated Steel and Aluminum Alloy	5
Concrete-Lined Corrugated Steel	3
Ductile Iron Culvert	3
Plastic	7.5

Not less than 30 days after the completion of backfilling, the Government may perform a deflection test on the entire length of installed flexible pipe using a mandrel or other suitable device. Installed flexible pipe showing deflections greater than those indicated above shall be retested by a run from the opposite direction. If the retest also fails, the suspect pipe shall be replaced at no cost to the Government.

3.3.1 Concrete, Clay, PVC, Ribbed PVC and Ductile Iron 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.

3.3.2 Elliptical and Elliptical Reinforced Concrete Pipe

The manufacturer's reference lines, designating the top of the pipe, shall be within 5 degrees of a vertical plane through the longitudinal axis of the pipe, during placement. Damage to or misalignment of the pipe shall be prevented in all backfilling operations.

3.3.3 Corrugated PE Pipe

Laying shall be with the separate sections joined firmly on a bed shaped to line and grade and shall follow manufacturer's recommendations.

3.3.4 Corrugated Metal Pipe and Pipe Arch

Laying shall be with the separate sections joined firmly together, with the outside laps of circumferential joints pointing upstream, and with longitudinal laps on the sides. Part paved pipe shall be installed so that the centerline of bituminous pavement in the pipe, indicated by suitable markings on the top at each end of the pipe sections, coincides with the specified alignment of pipe. Fully paved steel pipe or pipe arch shall have a painted or otherwise applied label inside the pipe or pipe arch indicating sheet thickness of pipe or pipe arch. Any unprotected metal in the joints shall be coated with bituminous material as specified in AASHTO M 190 or AASHTO M 243. Interior coating shall be protected against damage from insertion or removal of struts or tie wires. Lifting lugs shall be used to facilitate moving pipe without damage to exterior or interior coatings. During transportation and installation, pipe or pipe arch and coupling bands shall be handled with care to preclude damage to the coating, paving or lining. Damaged coatings, pavings and linings shall be repaired in accordance with the manufacturer's recommendations prior to placing backfill. Pipe on which coating, paving or lining has been damaged to such an extent that satisfactory field repairs cannot be made shall be removed and replaced. Vertical elongation, where indicated, shall be accomplished by factory elongation. Suitable markings or properly placed lifting lugs shall be provided to ensure placement of factory elongated pipe in a vertical plane.

3.3.5 Structural-Plate Steel

Structural plate shall be installed in accordance with ASTM A 807. Structural plate shall be assembled in accordance with instructions furnished by the manufacturer. Instructions shall show the position of each plate and the order of assembly. Bolts shall be tightened progressively and uniformly, starting at one end of the structure after all plates are in place. The operation shall be repeated to ensure that all bolts are tightened to meet the torque requirements of 270 Newton meters (200 foot-pounds) plus or minus 68 Newton meters (50 foot-pounds). Any power wrenches used shall be checked by the use of hand torque wrenches or long-handled socket or structural wrenches for amount of torque produced. Power wrenches shall be checked and adjusted frequently as needed, according to type or condition, to ensure proper adjustment to supply the required torque.

3.3.6 Structural-Plate Aluminum

Structural plate shall be assembled in accordance with instructions furnished by the manufacturer. Instructions shall show the position of each plate and the order of assembly. Bolts shall be tightened progressively and uniformly, starting at one end of the structure after all plates are in place. The operation shall be repeated to ensure that all

bolts are torqued to a minimum of 136 Newton meters (100 foot-pounds) on aluminum alloy bolts and a minimum of 203 Newton meters (150 foot-pounds) on galvanized steel bolts. Any power wrenches used shall be checked by the use of hand torque wrenches or long-handled socket or structural wrenches for the amount of torque produced. Power wrenches shall be checked and adjusted as frequently as needed, according to type or condition, to ensure that they are in proper adjustment to supply the required torque.

3.3.7 Multiple Culverts

Where multiple lines of pipe are installed, adjacent sides of pipe shall be at least half the nominal pipe diameter or 1 meter apart, whichever is less.

3.3.8 Jacking Pipe Through Fills

Methods of operation and installation for jacking pipe through fills shall conform to requirements specified in Volume 1, Chapter 1, Part 4 of AREMA Manual.

3.4 JOINTING

3.4.1 Concrete and Clay Pipe

3.4.1.1 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 thoroughly cleaned with a wet brush and the lower portion of the bell filled with mortar as required 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.

3.4.1.2 Cement-Mortar Oakum Joint for Bell-and-Spigot Pipe

A closely twisted gasket shall be made of jute or oakum of the diameter required to support the spigot end of the pipe at the proper grade and to make the joint concentric. Joint packing shall be in one piece of sufficient length to pass around the pipe and lap at top. This gasket shall be thoroughly saturated with neat cement grout. The bell of the pipe shall be thoroughly cleaned with a wet brush, and the gasket shall be laid in the bell for the lower third of the circumference and covered with mortar. The spigot of the pipe shall be thoroughly cleaned with a wet brush, inserted in the bell, and carefully driven home. A small amount of mortar shall be inserted in the annular space for the upper two-thirds of the circumference. The gasket shall be lapped at the top of the pipe and driven home in the annular space with a caulking tool. The remainder of the annular space shall be filled completely with mortar and beveled at an angle of approximately 45 degrees with the outside of the bell. If mortar is not sufficiently stiff to prevent appreciable slump before setting, the

outside of the joint thus made shall be wrapped with cheesecloth. Placing of this type of joint shall be kept at least five joints behind laying operations.

3.4.1.3 Cement-Mortar Diaper Joint for Bell-and-Spigot Pipe

The pipe shall be centered so that the annular space is uniform. The annular space shall be caulked with jute or oakum. Before caulking, the inside of the bell and the outside of the spigot shall be cleaned.

a. Diaper Bands: Diaper bands shall consist of heavy cloth fabric to hold grout in place at joints and shall be cut in lengths that extend one-eighth of the circumference of pipe above the spring line on one side of the pipe and up to the spring line on the other side of the pipe. Longitudinal edges of fabric bands shall be rolled and stitched around two pieces of wire. Width of fabric bands shall be such that after fabric has been securely stitched around both edges on wires, the wires will be uniformly spaced not less than 200 mm apart. Wires shall be cut into lengths to pass around pipe with sufficient extra length for the ends to be twisted at top of pipe to hold the band securely in place; bands shall be accurately centered around lower portion of joint.

b. Grout: Grout shall be poured between band and pipe from the high side of band only, until grout rises to the top of band at the spring line of pipe, or as nearly so as possible, on the opposite side of pipe, to ensure a thorough sealing of joint around the portion of pipe covered by the band. Silt, slush, water, or polluted mortar grout forced up on the lower side shall be forced out by pouring, and removed.

c. Remainder of Joint: The remaining unfilled upper portion of the joint shall be filled with mortar and a bead formed around the outside of this upper portion of the joint with a sufficient amount of additional mortar. The diaper shall be left in place. Placing of this type of joint shall be kept at least five joints behind actual laying of pipe. No backfilling around joints shall be done until joints have been fully inspected and approved.

3.4.1.4 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 thoroughly 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 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 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.

3.4.1.5 Cement-Mortar Diaper Joint for Tongue-and-Groove Pipe

The joint shall be of the type described for cement-mortar tongue-and-groove joint in this paragraph, except that the shallow excavation directly beneath the joint shall not be filled with mortar until after a gauze or cheesecloth band dipped in cement mortar has been wrapped around the outside of the joint. The cement-mortar bead at the joint shall be at least 15 mm, thick and the width of the diaper band shall be at least 200 mm. The diaper shall be left in place. Placing of this type of joint shall be kept at least five joints behind the actual laying of the pipe. Backfilling around the joints shall not be done until the joints have been fully inspected and approved.

3.4.1.6 Plastic Sealing Compound Joints for Tongue-and-Grooved Pipe

Sealing compounds shall follow the recommendation of the particular manufacturer in regard to special installation requirements. Surfaces to receive lubricants, primers, or adhesives shall be dry and clean. Sealing compounds shall be affixed to the pipe not more than 3 hours prior to installation of the pipe, and shall be protected from the sun, blowing dust, and other deleterious agents at all times. Sealing compounds shall be inspected before installation of the pipe, and any loose or improperly affixed sealing compound shall be removed and replaced. The pipe shall be aligned with the previously installed pipe, and the joint pulled together. If, while making the joint with mastic-type sealant, a slight protrusion of the material is not visible along the entire inner and outer circumference of the joint when the joint is pulled up, the pipe shall be removed and the joint remade. After the joint is made, all inner protrusions shall be cut off flush with the inner surface of the pipe. If nonmastic-type sealant material is used, the "Squeeze-Out" requirement above will be waived.

3.4.1.7 Flexible Watertight 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.

3.4.1.8 External Sealing Band Joint for Noncircular Pipe

Surfaces to receive sealing bands shall be dry and clean. Bands shall be installed in accordance with manufacturer's recommendations.

3.4.2 Corrugated Metal Pipe

3.4.2.1 Field Joints

Transverse field joints shall be designed so that the successive connection of pipe sections will form a continuous line free of appreciable irregularities in the flow line. In addition, the joints shall meet the general performance requirements described in ASTM A 798/A 798M. Suitable transverse field joints which satisfy the requirements for one or more of the joint performance categories can be obtained with the following types of connecting bands furnished with suitable band-end fastening devices: corrugated bands, bands with projections, flat bands, and bands of special design that engage factory reformed ends of corrugated pipe. The space between the pipe and connecting bands shall be kept free from dirt and grit so that corrugations fit snugly. The connecting band, while being tightened, shall be tapped with a soft-head mallet of wood, rubber or plastic, to take up slack and ensure a tight joint. The annular space between abutting sections of part paved, and fully paved pipe and pipe arch, in sizes 750 mm (30 inches) or larger, shall be filled with a bituminous material after jointing. Field joints for each type of corrugated metal pipe shall maintain pipe alignment during construction and prevent infiltration of fill material during the life of the installations. The type, size, and sheet thickness of the band and the size of angles or lugs and bolts shall be as indicated or where not indicated, shall be as specified in the applicable standards or specifications for the pipe.

3.4.2.2 Flexible Watertight, Gasketed Joints

Installation shall be as recommended by the gasket manufacturer for use of lubricants and cements and other special installation requirements. The gasket shall be placed over one end of a section of pipe for half the width of the gasket. The other half shall be doubled over the end of the same pipe. When the adjoining section of pipe is in place, the doubled-over half of the gasket shall then be rolled over the adjoining section. Any unevenness in overlap shall be corrected so that the gasket covers the end of pipe sections equally. Connecting bands shall be centered over adjoining sections of pipe, and rods or bolts placed in position and nuts tightened. Band Tightening: The band shall be tightened evenly, even tension being kept on the rods or bolts, and the gasket; the gasket shall seat properly in the corrugations. Watertight joints shall remain uncovered for a period of time designated, and before being covered, tightness of the nuts shall be measured with a torque wrench. If the nut has tended to loosen its grip on the bolts or rods, the nut shall be retightened with a torque wrench and remain uncovered until a tight, permanent joint is assured.

3.5 DRAINAGE STRUCTURES

3.5.1 Manholes and Inlets

Construction shall be of reinforced concrete, plain concrete, brick, precast reinforced concrete, precast concrete segmental blocks, prefabricated corrugated metal, or bituminous coated corrugated metal; complete with frames and covers or gratings; and with fixed galvanized steel ladders where indicated. Pipe studs and junction chambers of prefabricated corrugated metal manholes shall be fully bituminous-coated and paved when the connecting branch lines are so treated. Pipe connections to concrete manholes and inlets shall be made with flexible,

watertight connectors.

3.5.2 Walls and Headwalls

Construction shall be as indicated.

3.6 STEEL LADDER INSTALLATION

Ladder shall be adequately anchored to the wall by means of steel inserts spaced not more than 1.83 m (6 feet) vertically, and shall be installed to provide at least 152 mm (6 inches) of space between the wall and the rungs. The wall along the line of the ladder shall be vertical for its entire length.

3.7 BACKFILLING

3.7.1 Backfilling Pipe in Trenches

After the pipe has been properly bedded, selected material from excavation or borrow, 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. The fill shall be thoroughly compacted 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 300 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 millimeters. Tests for density shall be made as necessary to ensure conformance to the compaction requirements specified below. Where it is necessary, in the opinion of the Contracting Officer, that sheeting or portions of bracing used be left in place, 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 below. The fill material shall be uniformly spread in layers longitudinally on both sides of the 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 m, whichever is less. After the backfill has reached at least 300 mm above the top of the pipe, the remainder of the fill shall be placed and thoroughly compacted in layers not exceeding 150 mm.

3.7.3 Movement of Construction Machinery

When compacting by rolling or 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

construction shall be at the Contractor's risk. Any damaged pipe shall be repaired or replaced.

3.7.4 Compaction

3.7.4.1 General Requirements

Cohesionless materials include gravels, gravel-sand mixtures, sands, and gravelly sands. Cohesive materials include clayey and silty gravels, gravel-silt mixtures, clayey and silty sands, sand-clay mixtures, clays, silts, and very fine sands. When results of compaction tests for moisture-density relations are recorded on graphs, cohesionless soils will show straight lines or reverse-shaped moisture-density curves, and cohesive soils will show normal moisture-density curves.

3.7.4.2 Minimum Density

Backfill over and around the pipe and backfill around and adjacent to drainage structures shall be compacted at the approved moisture content to the following applicable minimum density, which will be determined as specified below.

a. Under airfield and heliport pavements, paved roads, streets, parking areas, and similar-use pavements including adjacent shoulder areas, the density shall be not less than 90 percent of maximum density for cohesive material and 95 percent of maximum density for cohesionless material, up to the elevation where requirements for pavement subgrade materials and compaction shall control.

b. Under unpaved or turfed traffic areas, density shall not be less than 90 percent of maximum density for cohesive material and 95 percent of maximum density for cohesionless material.

c. Under nontraffic areas, density shall be not less than that of the surrounding material.

3.7.5 Determination of Density

Testing shall be the responsibility of the Contractor and performed at no additional cost to the Government. Testing shall be performed by an approved commercial testing laboratory or by the Contractor subject to approval. Tests shall be performed in sufficient number to ensure that specified density is being obtained. Laboratory tests for moisture-density relations shall be made in accordance with ASTM D 1557 except that mechanical tampers may be used provided the results are correlated with those obtained with the specified hand tamper. Field density tests shall be determined in accordance with ASTM D 2167 or ASTM D 2922. When ASTM D 2922 is used, the calibration curves shall be checked and adjusted, if necessary, using the sand cone method as described in paragraph Calibration of the referenced publications. ASTM D 2922 results in a wet unit weight of soil and when using this method ASTM D 3017 shall be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gauges shall be checked along with density calibration checks

as described in ASTM D 3017 or ASTM D 2922. Test results shall be furnished the Contracting Officer. The calibration checks of both the density and moisture gauges shall be made at the beginning of a job on each different type of material encountered and at intervals as directed.

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 vitrified clay pipes shall conform to ASTM C 828. 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.

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SECTION TABLE OF CONTENTS

DIVISION 02 - SITE WORK

SECTION 02722

AGGREGATE BASE COURSE

-- End of Section Table of Contents --

SECTION 02722

AGGREGATE BASE COURSE

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 117	(1995) Materials Finer Than 75 micrometer (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 127	(1988; R 1993el) Specific Gravity and Absorption of Coarse Aggregate
ASTM C 128	(1997) Specific Gravity and Absorption of Fine Aggregate
ASTM C 131	(1996) Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 136	(1996a) Sieve Analysis of Fine and Coarse Aggregates
ASTM D 75	(1987; R 1997) Sampling Aggregates
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 2487	(2000) Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 4318	(2000) Liquid Limit, Plastic Limit, and

	Plasticity Index of Soils
ASTM E 11	(1995) Wire-Cloth Sieves for Testing Purposes

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

NDOT T230C	(Rev C) Method of Test For Determining the Percent of Fractured Faces

1.2 DEFINITIONS

For the purposes of this specification, the following definitions apply.

1.2.1 Aggregate Base

Aggregate base course (ABC) is well graded, durable aggregate uniformly moistened and mechanically stabilized by compaction.

1.2.2 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.

1.3 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 following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Plant, Equipment, and Tools.

List of proposed equipment to be used in performance of construction work, including descriptive data.

Waybills and Delivery Tickets; G, RE.

Copies of waybills and delivery tickets during the progress of the work. Before the final statement is allowed, the Contractor shall file certified waybills and certified delivery tickets for all aggregates actually used.

SD-06 Test Reports

Sampling and testing; G, RE.

Field Density Tests; G, RE.

Calibration curves and related test results prior to using the

device or equipment being calibrated. Copies of field test results within 24 hours after the tests are performed. Certified copies of test results for approval not less than 30 days before material is required for the work.

1.4 SAMPLING AND TESTING

Sampling and testing shall be the responsibility of the Contractor. Sampling and testing shall be performed by a testing laboratory approved in accordance with Section 01451 CONTRACTOR QUALITY CONTROL. Work requiring testing will not be permitted until the testing laboratory has been inspected and approved. The materials shall be tested to establish compliance with the specified requirements; testing shall be performed at the specified frequency. The Contracting Officer may specify the time and location of the tests. Copies of test results shall be furnished to the Contracting Officer within 24 hours of completion of the tests.

1.4.1 Sampling

Samples for laboratory testing shall be taken in conformance with ASTM D 75. When deemed necessary, the sampling will be observed by the Contracting Officer.

1.4.2 Tests

The following tests shall be performed in conformance with the applicable standards listed.

1.4.2.1 Sieve Analysis

Sieve analysis shall be made in conformance with ASTM C 117 and ASTM C 136. Sieves shall conform to ASTM E 11. Particle-size analysis of the soils shall also be completed in conformance with ASTM D 422.

1.4.2.2 Liquid Limit and Plasticity Index

Liquid limit and plasticity index shall be determined in accordance with ASTM D 4318.

1.4.2.3 Moisture-Density Determinations

The maximum density and optimum moisture content shall be determined in accordance with ASTM D 1557.

1.4.2.4 Field Density Tests

Density shall be field measured in accordance with ASTM D 1556. For the method presented in ASTM D 1556 the base plate as shown in the drawing shall be used.

1.4.2.5 Wear Test

Wear tests shall be made on ABC course material in conformance with ASTM C 131.

1.4.2.6 Fractured Faces

The percentage fractured faces will be determined in accordance with NDOT T230C.

1.4.3 Testing Frequency

1.4.3.1 Initial Tests

One of each of the following tests shall be performed on the proposed material prior to commencing construction to demonstrate that the proposed material meets all specified requirements when furnished. If materials from more than one source are going to be utilized, this testing shall be completed for each source.

a. Sieve Analysis including 0.02 mm size material.

b. Liquid limit and plasticity index.

c. Moisture-density relationship.

d. Wear.

1.4.3.2 In Place Tests

Each of the following tests shall be performed on samples taken from the placed and compacted ABC. Samples shall be taken and tested at the rates indicated.

a. Density tests shall be performed on every lift of material placed and at a frequency of one set of tests for every 250 square meters, or portion thereof, of completed area.

b. Sieve Analysis including 0.02 mm size material shall be performed for every 500 metric tons, or portion thereof, of material placed.

c. Liquid limit and plasticity index tests shall be performed at the same frequency as the sieve analysis.

1.5 WEATHER LIMITATIONS

Construction shall be done when the atmospheric temperature is above 2 degrees C. When the temperature falls below 2 degrees C, the Contractor shall protect all completed areas by approved methods against detrimental effects of freezing. Completed areas damaged by freezing, rainfall, or other weather conditions shall be corrected to meet specified requirements.

1.6 PLANT, EQUIPMENT, AND TOOLS

All plant, equipment, and tools used in the performance of the work will be subject to approval before the work is started and shall be maintained in satisfactory working condition at all times. The equipment shall be adequate and shall have the capability of producing the required

compaction, meeting grade controls, thickness control, and smoothness requirements as set forth herein.

PART 2 PRODUCTS

2.1 AGGREGATES

The ABC shall consist of clean, sound, durable particles of crushed stone, crushed gravel, angular sand, or other approved material. ABC shall be free of lumps of clay, organic matter, and other objectionable materials or coatings. The portion retained on the 4.75 mm sieve shall be known as coarse aggregate; that portion passing the 4.75 mm sieve shall be known as fine aggregate.

2.1.1 Coarse Aggregate

Coarse aggregates shall be angular particles of uniform density. When the coarse aggregate is supplied from more than one source, aggregate from each source shall meet the specified requirements and shall be stockpiled separately.

a. Crushed Gravel: Crushed gravel shall be manufactured by crushing gravels, and shall meet all the requirements specified below.

b. Crushed Stone: Crushed stone shall consist of freshly mined quarry rock, and shall meet all the requirements specified below.

2.1.1.1 Aggregate Base Course

ABC coarse aggregate shall not show more than 50 percent loss when subjected to the Los Angeles abrasion test in accordance with ASTM C 131. The amount of flat and elongated particles shall not exceed 30 percent. A flat particle is one having a ratio of width to thickness greater than 3; an elongated particle is one having a ratio of length to width greater than 3. In the portion retained on each sieve specified, the crushed aggregates shall contain at least 50 percent by weight of crushed pieces having two or more freshly fractured faces with the area of each face being at least equal to 75 percent of the smallest midsectional area of the piece. When two fractures are contiguous, the angle between planes of the fractures must be at least 30 degrees in order to count as two fractured faces. Crushed gravel shall be manufactured from gravel particles 50 percent of which, by weight, are retained on the maximum size sieve listed in TABLE 1.

2.1.2 Fine Aggregate

Fine aggregates shall be angular particles of uniform density. When the fine aggregate is supplied from more than one source, aggregate from each source shall meet the specified requirements.

2.1.2.1 Aggregate Base Course

ABC fine aggregate shall consist of screenings, angular sand, crushed recycled concrete fines, or other finely divided mineral matter processed or naturally combined with the coarse aggregate.

2.1.3 Gradation Requirements

The specified gradation requirements shall apply to the completed base course. The aggregates shall have a maximum size of 25 mm and shall be continuously well graded within the limits specified in TABLE 1. Sieves shall conform to ASTM E 11.

TABLE 1. GRADATION OF AGGREGATES

Sieve Designation	Percentage by Weight Passing Square-Mesh Sieve
25.0 mm	100
19.0 mm	90-100
4.75 mm	35-65
1.18 mm	15-40
0.075 mm	2-10

NOTE 1: Particles having diameters less than 0.02 mm shall not be in excess of 3 percent by weight of the total sample tested.

NOTE 2: The values are based on aggregates of uniform specific gravity. If materials from different sources are used for the coarse and fine aggregates, they shall be tested in accordance with ASTM C 127 and ASTM C 128 to determine their specific gravities. If the specific gravities vary by more than 10 percent, the percentages passing the various sieves shall be corrected as directed by the Contracting Officer.

2.1.4 Liquid Limit and Plasticity Index

Liquid limit and plasticity index requirements shall apply to the completed course and shall also apply to any component that is blended to meet the required gradation. The portion of any component or of the completed course passing the 0.425 mm sieve shall be either nonplastic or have a liquid limit not greater than 25 and a plasticity index not greater than 5.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

When the ABC is constructed in more than one layer, the previously constructed layer shall be cleaned of loose and foreign matter by sweeping with power sweepers or power brooms, except that hand brooms may be used in areas where power cleaning is not practicable. Adequate drainage shall be provided during the entire period of construction to prevent water from collecting or standing on the working area. Line and grade stakes shall be provided as necessary for control. Grade stakes shall be in lines parallel to the centerline of the area under construction and suitably spaced for string lining.

3.2 OPERATION OF AGGREGATE SOURCES

Aggregates shall be obtained from offsite sources.

3.3 STOCKPILING MATERIAL

Prior to stockpiling of material, storage sites shall be cleared and leveled by the Contractor. All materials, including approved material available from excavation and grading, shall be stockpiled in the manner and at the locations designated. Aggregates shall be stockpiled on the cleared and leveled areas designated by the Contracting Officer to prevent segregation. Materials obtained from different sources shall be stockpiled separately. Waybills and Delivery tickets are required for each load.

3.4 PREPARATION OF UNDERLYING COURSE

Prior to constructing the ABC, the underlying course or subgrade shall be cleaned of all foreign substances. At the time of construction of the ABC, the underlying course shall contain no frozen material. The surface of the underlying course or subgrade shall meet specified compaction and surface tolerances. The underlying course shall conform to Section 02300 EARTHWORK. Ruts or soft yielding spots in the underlying courses, areas having inadequate compaction, and deviations of the surface from the requirements set forth herein shall be corrected by loosening and removing soft or unsatisfactory material and by adding approved material, reshaping to line and grade, and recompacting to specified density requirements. For cohesionless underlying courses containing sands or gravels, as defined in ASTM D 2487, the surface shall be stabilized prior to placement of the ABC. Stabilization shall be accomplished by mixing ABC into the underlying course and compacting by approved methods. The stabilized material shall be considered as part of the underlying course and shall meet all requirements of the underlying course. The finished underlying course shall not be disturbed by traffic or other operations and shall be maintained by the Contractor in a satisfactory condition until the ABC is placed.

3.5 INSTALLATION

3.5.1 Mixing the Materials

The coarse and fine aggregates shall be mixed in a stationary plant, or in a traveling plant or bucket loader on an approved paved working area. The Contractor shall make adjustments in mixing procedures or in equipment as directed to obtain true grades, to minimize segregation or degradation, to obtain the required water content, and to insure a satisfactory ABC meeting all requirements of this specification.

3.5.2 Placing

The mixed material shall be placed on the prepared subgrade in a single layer of uniform thickness with an approved spreader. No layer shall exceed 200 mm or less than 75mm when compacted. The layer shall be so placed that when compacted it will be true to the grades or levels required with the least possible surface disturbance.

3.5.3 Grade Control

The finished and completed ABC shall conform to the lines, grades, and cross sections shown. Underlying material(s) shall be excavated and prepared at sufficient depth for the required ABC thickness so that the finished ABC with the subsequent surface course will meet the designated grades.

3.5.4 Edges of Base Course

Additionally, approved fill material shall be placed along the outer edges of ABC in sufficient quantities to compact to the thickness of the course being constructed allowing at least a 300 mm width of this material to be rolled and compacted. If this base course material is to be placed adjacent to another pavement section, then the layers for both of these sections shall be placed and compacted along this edge at the same time.

3.5.5 Compaction

Each layer of the ABC shall be compacted **to 100% or as specified on the drawings** with approved compaction equipment. Water content shall be maintained during the compaction procedure to within plus or minus 5 percent of the optimum water content determined from laboratory tests as specified in paragraph SAMPLING AND TESTING. Rolling shall begin at the outside edge of the surface and proceed to the center, overlapping on successive trips at least one-half the width of the roller. Alternate trips of the roller shall be slightly different lengths. Speed of the roller shall be such that displacement of the aggregate does not occur. In all places not accessible to the rollers, the mixture shall be compacted with hand-operated power tampers. The Contractor shall make such adjustments in compacting or finishing procedures as may be directed to obtain true grades, to minimize segregation and degradation, to reduce or increase water content, and to ensure a satisfactory ABC. Any materials that are found to be unsatisfactory shall be removed and replaced with satisfactory material or reworked, as directed, to meet the requirements of this specification.

3.5.6 Thickness

Compacted thickness of the aggregate course shall be as indicated. No individual layer shall exceed 200 mm nor be less than 75 mm in compacted thickness. The total compacted thickness of the ABC course shall be within 13 mm of the thickness indicated. Where the measured thickness is more than 13 mm deficient, such areas shall be corrected by scarifying, adding new material of proper gradation, reblading, and recompacting as directed. Where the measured thickness is more than 13 mm thicker than indicated, the course shall be considered as conforming to the specified thickness requirements. Average job thickness shall be the average of all thickness measurements taken for the job, but shall be within 6 mm of the thickness indicated. The total thickness of the ABC course shall be measured at intervals in such a manner as to ensure one measurement for each 500 square meters of base course. Measurements shall be made in 75 mm diameter test holes penetrating the base course.

3.5.7 Finishing

The surface of the top layer of ABC shall be finished after final compaction by cutting any overbuild to grade and rolling with a steel-wheeled roller. Thin layers of material shall not be added to the top layer of base course to meet grade. If the elevation of the top layer of ABC is 13 mm or more below grade, then the top layer should be scarified to a depth of at least 75 mm and new material shall be blended in and compacted to bring to grade. Adjustments to rolling and finishing procedures shall be made as directed to minimize segregation and degradation, obtain grades, maintain moisture content, and insure an acceptable base course. Should the surface become rough, corrugated, uneven in texture, or traffic marked prior to completion, the unsatisfactory portion shall be scarified, reworked and recompacted or it shall be replaced as directed.

3.5.8 Smoothness

The surface of the top layer shall show no deviations in excess of 10 mm when tested with a 3.05 meter straightedge. Deviations exceeding this amount shall be corrected by removing material and replacing with new material, or by reworking existing material and compacting it to meet these specifications.

3.6 TRAFFIC

Completed portions of the ABC course may be opened to limited traffic, provided there is no marring or distorting of the surface by the traffic. Heavy equipment shall not be permitted except when necessary to construction, and then the area shall be protected against marring or damage to the completed work.

3.7 MAINTENANCE

The ABC shall be maintained in a satisfactory condition until the full pavement section is completed and accepted. Maintenance shall include immediate repairs to any defects and shall be repeated as often as necessary to keep the area intact. Any area of ABC that is damaged shall be reworked or replaced as necessary to comply with this specification.

3.8 DISPOSAL OF UNSATISFACTORY MATERIALS

Any unsuitable materials that must be removed shall be disposed of as directed. No additional payments will be made for materials that must be replaced.

-- End of Section --

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SECTION TABLE OF CONTENTS

DIVISION 02 - SITE WORK

SECTION 02741

HOT-MIX ASPHALT (HMA) FOR ROADS

-- End of Section Table of Contents --

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.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 117	(1995) Materials Finer Than 75 micrometer (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 131	(1996) Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 136	(1996a) Sieve Analysis of Fine and Coarse Aggregates
ASTM C 150	(1999a) Portland Cement
ASTM C 566	(1997) Total Evaporable Moisture Content of Aggregate by Drying
ASTM D 140	(2000) Sampling Bituminous Materials
ASTM D 422	(1963; R 1998) Particle-Size Analysis of Soils
ASTM D 995	(1995b) Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures
ASTM D 1461	(1985; R 1994) Moisture or Volatile Distillates in Bituminous Paving Mixtures
ASTM D 1559	(1989) Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus
ASTM D 2172	(1995) Quantitative Extraction of Bitumen from Bituminous Paving Mixtures
ASTM D 2489	(2000) Degree of Particle Coating of Bituminous-Aggregate Mixtures

ASTM D 2950	(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	(2000) 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
ASTM D 6307	(1998) Asphalt Content of Hot Mix Asphalt by Ignition Method

ASPHALT INSTITUTE (AI)

AI MS-2	(1997) Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types

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

NDOT T230C	(Rev C) Method of Test For Determining the Percent of Fractured Faces

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; G, RE.

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

QC Monitoring; G, RE.

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.

Grain size in mm	Percent Finer
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

The combined aggregate gradation shall conform to the gradation specified in Table 2, 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

Sieve Size, mm	Percent Passing by Mass
12.5	100
9.5	90-100
4.75	55-85
2.36	32-67

Table 2. Aggregate Gradation

Sieve Size, mm	Percent Passing by Mass
0.30	7-27
0.075	2-10

Table 2A. Aggregate Gradation - General Paving For Public Roads

Sieve Size	Percent Passing (by weight)
25.0 mm	100
19.0 mm	90-100
12.5 mm	78-94
9.5 mm	68-84
4.75 mm	50-65
2.36 mm	30-49
0.30 mm	7-25
0.075 mm	2-9

2.2 ASPHALT CEMENT BINDER

Asphalt cement binder shall conform to ASTM D 3381 Table 2, Viscosity Grade AC-40. 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. Samples of the asphalt cement binder specified shall be submitted for approval not less than 14 days before start of the test section.

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-2 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-2.

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

Test Property	50 Blow Mix
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 two tests to determine asphalt content will be performed per 1000 metric tons of asphaltic concrete produced by one of the following methods: the extraction method in accordance with ASTM D 2172, Method A or B, the ignition method in accordance with the ASTM D 6307. For the extraction method, the weight of ash, as described in ASTM D 2172, shall be determined as part of the first extraction test performed at the beginning of plant production; and as part of every tenth extraction test performed thereafter, for the duration of plant production. The last weight of ash value obtained shall be used in the calculation of the asphalt content for the mixture.

3.9.3.2 Aggregate Gradation

Aggregate gradations shall be determined for each 1000 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.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 02 - SITE WORK

SECTION 02821

FENCING AND RAILING

-- End of Section Table of Contents --

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.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 116	**(1995) Zinc-Coated (Galvanized) Steel Woven Wire Fence Fabric**
ASTM A 123/A 123M	(2000) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 153/A 153M	(2000) 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 780	(2000) Repair of Damaged and Uncoated Areas of Hot-Dipped Galvanized Coatings
ASTM A 824	(1995) Metallic-Coated Steel Marcelled Tension Wire for Use With Chain Link Fence
ASTM B 32	(1996) Solder Metal
ASTM C 94/C 94M	(2000) Ready-Mixed Concrete
ASTM C 270	(2000) 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	(1994) Industrial and Commercial Swing Gates
ASTM F 1043	(2000) Strength and Protective Coatings on Metal Industrial Chain-Link Fence Framework
ASTM F 1083	(1997) Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures
ASTM F 1184	(1994) Industrial and Commercial Horizontal Slide Gates

UNDERWRITERS LABORATORIES (UL)

UL 467	(1993; Rev thru Aug 1996) Grounding and Bonding Equipment

1.2 SUBMITTALS

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

SD-07 Certificates

Chain Link Fence; G, RE.

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. Fabric height shall be 1.8 m as shown. Fabric shall be twisted and barbed on the top selvage and knuckled on the bottom selvage.

2.1.2 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 **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.

2.4 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 (1-21/32 inch), 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

ASTM F 626. 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.

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.

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 meters (10 feet). 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 meters (500 feet). 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 FENCE

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 (18 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 457 mm (18 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. 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.

3.4 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 (6 feet) in height. A center brace or 2 diagonal truss rods shall be installed on 3.66 m (12 foot) 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 (6 feet) 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 305 mm of the installed fabric. Bottom tension wire shall be installed within the bottom 152 mm (6 inches) 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 (15 inch) 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 (15 inch) 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. Padlocks shall be attached to gates or gate posts with chains. Hinge pins, and hardware shall be welded or otherwise secured to prevent removal.

3.9 GROUNDING

Except as indicated below, 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 electricallsy continuous with the fencing.

Metal fences and metal hand rail system (pipe safety railing) crossed by overhead powerlines in excess of 600 volts shall be grounded. Fences and metal hand rail system 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.

3.10 POST AND CABLE RAILING 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.

-- End of Section --

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SECTION TABLE OF CONTENTS

DIVISION 03 - CONCRETE

SECTION 03301

CAST-IN-PLACE STRUCTURAL CONCRETE

-- End of Section Table of Contents --

SECTION 03301

CAST-IN-PLACE STRUCTURAL 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 117/117R	(1990; Errata) Standard Tolerances for Concrete Construction and Materials
ACI 211.1	(1991) Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
ACI 214	(1977; R 1997) Recommended Practice for Evaluation of Strength Test Results of Concrete
ACI 305R	(1999) Hot Weather Concreting
ACI 318M	(1995) Metric Building Code Requirements for Structural Concrete and Commentary

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 31/C 31M	(2000) Making and Curing Concrete Test Specimens in the Field
ASTM C 33	(1999ae1) Concrete Aggregates
ASTM C 39/C 39M	(1999) Compressive Strength of Cylindrical Concrete Specimens
ASTM C 40	(1999) Organic Impurities in Fine Aggregates for Concrete
ASTM C 42/C 42M	(1999) Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
ASTM C 87	(1983; R 1995el) Effect of Organic Impurities in Fine Aggregate on Strength of Mortar
ASTM C 94/C 94M	(2000) Ready-Mixed Concrete

ASTM C 127	(1988; R 1993el) Specific Gravity and Absorption of Coarse Aggregate
ASTM C 128	(1997) Specific Gravity and Absorption of Fine Aggregate
ASTM C 136	(1996a) Sieve Analysis of Fine and Coarse Aggregates
ASTM C 143/C 143M	(2000) Slump of Hydraulic Cement Concrete
ASTM C 150	(1999a) Portland Cement
ASTM C 172	(1999) Sampling Freshly Mixed Concrete
ASTM C 192/C 192M	(2000) Making and Curing Concrete Test Specimens in the Laboratory
ASTM C 231	(1997e1) Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 260	(2000) Air-Entraining Admixtures for Concrete
ASTM C 309	(1998a) Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 494/C 494M	(1999a) Chemical Admixtures for Concrete
ASTM C 566	(1997) Total Evaporable Moisture Content of Aggregate by Drying
ASTM C 597	(1983; R 1997) Pulse Velocity Through Concrete
ASTM C 618	(2000) Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
ASTM C 803/C 803M	(1997el) Penetration Resistance of Hardened Concrete
ASTM C 805	(1997) Rebound Number of Hardened Concrete
ASTM C 881	(1999) Epoxy-Resin-Base Bonding Systems for Concrete
ASTM C 1059	(1999) Latex Agents for Bonding Fresh to Hardened Concrete
ASTM C 1064/C 1064M	(1999) Temperature of Freshly Mixed Portland Cement Concrete

ASTM C 1077	(1998) Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
ASTM C 1107	(1999) Packaged Dry, Hydraulic-Cement Grout(Nonshrink)
ASTM D 75	(1987; R 1997) Sampling Aggregates

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE CRD-C 94	(1995) Surface Retarders
COE CRD-C 100	(1975) Method of Sampling Concrete Aggregate and Aggregate Sources, and Selection of Material for Testing
COE CRD-C 104	(1980) Method of Calculation of the Fineness Modulus of Aggregate
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
COE CRD-C 521	(1981) Standard Test Method for Frequency and Amplitude of Vibrators for Concrete

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

NIST HB 44	(1997) NIST Handbook 44: Specifications, Tolerances, and other Technical Requirements for Weighing and Measuring Devices

NATIONAL READY-MIXED CONCRETE ASSOCIATION (NRMCA)

NRMCA CPMB 100	(1996) Concrete Plant Standards

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-03 Product Data

Concrete Mixture Proportioning.

Concrete mixture proportions shall be determined by the Contractor and submitted for review. The concrete mixture quantities of all ingredients per cubic meter and nominal maximum coarse aggregate size that will be used in the manufacture of each quality of concrete shall be stated. Proportions shall indicate the mass of cement, pozzolan and ground granulated blast-furnace (GGBF) slag when used, and water; the mass of aggregates in a saturated surface-dry condition; and the quantities of admixtures. The submission shall be accompanied by test reports from a laboratory complying with ASTM C 1077 which show that proportions thus selected will produce concrete of the qualities indicated. No substitution shall be made in the source or type of materials used in the work without additional tests to show that the quality of the new materials and concrete are satisfactory.

Batch Plant.

Capacity.

The Contractor shall submit batch plant data to the Contracting Officer for review for conformance with applicable specifications.

Concrete Mixers.

Conveying Equipment.

Placing Equipment.

All concrete mixers, conveying equipment, and placing equipment and methods shall be submitted for review by the Contracting Officer for conformance with paragraph CAPACITY.

Tests and Inspections.

Testing Technicians.

Concrete Transportation Construction Inspector (CTCI).

The Contractor shall submit statements that the concrete testing technicians and the concrete inspectors meet the specified requirements. The individuals who perform the inspection of concrete construction shall have demonstrated a knowledge and ability equivalent to the ACI minimum guidelines for certification of Concrete Transportation Construction Inspector (CTCI).

Construction Joint Treatment; G, RE.

The method and equipment proposed for joint cleanup and waste disposal shall be submitted for review and approval.

Curing and Protection; G, RE.

The curing medium and methods to be used shall be submitted for review and approval.

Cold-Weather Placing; G, RE.

If concrete is to be placed under cold-weather conditions, the proposed materials, methods, and protection shall be submitted for approval.

Hot-Weather Placing; G, RE.

If concrete is to be placed under hot-weather conditions, the proposed materials and methods shall be submitted for review and approval.

Finishing; G, RE.

The proposed materials and methods to be used for finishing concrete shall be submitted for review and approval.

SD-04 Samples

Aggregates; G, RE.

Cementitious Materials, Admixtures, and Curing Compound; G, RE.

Samples of materials for government testing and approval shall be submitted as required in paragraph PRECONSTRUCTION SAMPLING AND TESTING.

SD-06 Test Reports

Quality of Aggregates; G, RE.

Aggregate quality tests shall be submitted at least 30 days prior to start of concrete placement.

Mixer Uniformity.

The results of the initial mixer uniformity tests shall be submitted at least 5 days prior to the initiation of placing.

Test Results and Inspection Reports.

Test results and inspection reports shall be submitted daily and weekly as required in paragraph REPORTS.

SD-07 Certificates

Cementitious Materials.

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. Certification and mill test reports shall be from samples taken from the particular lot 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. Material not meeting specifications shall be promptly removed from the site of work.

Chemical Admixtures.

Chemical Admixtures (air-entraining, accelerating, water reducing or retarding admixtures) shall be certified for compliance with all specification requirements.

Membrane-Forming Curing Compound.

Membrane-Forming Curing Compound shall be certified for compliance with all specification requirements.

Epoxy Resin.

Latex Bonding Compound.

Epoxy Resin and Latex Bonding Compound shall be certified for compliance with all specification requirements.

Nonshrink Grout.

Descriptive literature of the Nonshrink Grout proposed for use shall be furnished together with a certificate from the manufacturer stating that it is suitable for the application or exposure for which it is being considered.

1.3 GOVERNMENT TESTING AND SAMPLING

The Government will sample and test aggregates and concrete to determine compliance with the specifications. The Contractor shall provide facilities and labor as may be necessary for procurement of representative test samples. Samples of aggregates will be obtained at the point of batching in accordance with ASTM D 75. Concrete will be sampled in accordance with ASTM C 172.

1.3.1 Preconstruction Sampling and Testing

1.3.1.1 Aggregates

The aggregate sources listed in Section 2.1.2 for aggregates have been tested and at the time testing was performed were capable of producing materials of a quality required for this project provided suitable processing is performed. The Contractor may furnish materials from a listed source or from a source not listed. Samples from any source of coarse aggregate and any source of fine aggregate selected by the Contractor, consisting of not less than 70 kg of each size coarse aggregate and 35 kg of fine aggregate taken under the supervision of the Contracting

Officer in accordance with COE CRD-C 100 shall be delivered to a local materials testing laboratory within 15 days after notice to proceed. Sampling and shipment of samples shall be at the Contractor's expense. Sixty days will be required to complete evaluation of the aggregates. Testing will be performed by and at the expense of the Government in accordance with the applicable COE CRD-C or ASTM test methods. The cost of testing one source for each size of aggregate will be borne by the Government. If the Contractor selects more than one source for each aggregate size or selects a substitute source for any size aggregate after the original source was tested, the cost of that additional testing will be borne by the Contractor. Tests to which aggregate may be subjected are listed in paragraph QUALITY. The material from the proposed source shall meet the quality requirements of this paragraph. The Government's test data and other information on aggregate quality of those sources listed at the end of this section are included in the Design Memorandum and are available for review in the district office. Testing of aggregates by the Government does not relieve the Contractor of the requirements outlined in paragraph TESTS AND INSPECTIONS.

1.3.1.2 Cementitious Materials, Admixtures, and Curing Compound

At least 60 days in advance of concrete placement, the Contractor shall notify the Contracting Officer of the sources for cementitious materials, admixtures, and curing compound, along with sampling location, brand name, type, and quantity to be used in the manufacture and/or curing of the concrete.

1.3.2 Construction Testing by the Government

Sampling and testing will be performed by and at the expense of the Government except as otherwise specified. No material shall be used until notice has been given by the Contracting Officer that test results are satisfactory.

1.3.2.1 Chemical Admixtures Storage

Chemical admixtures that have been in storage at the project site for longer than 6 months or that have been subjected to freezing shall be retested at the expense of the Contractor when directed by the Contracting Officer and shall be rejected if test results are not satisfactory. Chemical admixtures will be accepted based on compliance with the requirements of paragraph CHEMICAL ADMIXTURES.

1.3.2.2 Cement and Pozzolan

If cement or pozzolan is to be obtained from more than one source, the initial notification shall state the estimated amount to be obtained from each source and the proposed schedule of shipments.

a. Prequalified Cement Sources - Cement shall be delivered and used directly from a mill of a producer designated as a qualified source. Samples of cement for check testing will be taken at the project site or concrete-producing plant by a representative of the Contracting Officer for testing at the expense of the Government. A list of

prequalified cement sources is available from Director, U.S. Army Corps of Engineers, Engineer Research and Development Center - Structures Laboratory, 3909 Halls Ferry Road, Vicksburg, MS 39180-6199, ATTN: CEERD-SC.

b. Prequalified Pozzolan Sources - Pozzolan shall be delivered and used directly from a producer designated as a qualified source. Samples of pozzolan for check testing will be taken at the project site by a representative of the Contracting Officer for testing at the expense of the Government. A list of prequalified pozzolan sources is available from the Director, U.S. Army Corps of Engineers, Engineer Research and Development Center - Structures Laboratory, 3909 Halls Ferry Road, Vicksburg, MS 39180-6199, ATTN: CEERD-SC.

1.3.2.3 Concrete Strength

Compressive strength test specimens will be made by the Government and cured in accordance with ASTM C 31/C 31M and tested in accordance with ASTM C 39/C 39M. The strength of the concrete will be considered satisfactory so long as the average of all sets of three consecutive test results equals or exceeds the specified compressive strength f'c and no individual test result falls below the specified strength f'c by more than 3.5 MPa. A "test" is defined as the average of two companion cylinders, or if only one cylinder is tested, the results of the single cylinder test. Additional analysis or testing, including nondestructive testing, taking cores and/or load tests may be required at the Contractor's expense when the strength of the concrete in the structure is considered potentially deficient.

a. Investigation of Low-Strength Test Results - When any strength test of standard-cured test cylinders falls below the specified strength requirement by more than 3.5 MPa or if tests of field-cured cylinders indicate deficiencies in protection and curing, steps shall be taken to assure that the load-carrying capacity of the structure is not jeopardized. Nondestructive testing in accordance with ASTM C 597, ASTM C 803/C 803M, or ASTM C 805 may be permitted by the Contracting Officer to estimate the relative strengths at various locations in the structure as an aid in evaluating concrete strength in place or for selecting areas to be cored. Such tests shall not be used as a basis for acceptance or rejection.

b. Testing of Cores - When the strength of concrete in place is considered potentially deficient, cores shall be obtained and tested in accordance with ASTM C 42/C 42M. At least three representative cores shall be taken from each member or area of concrete in place that is considered potentially deficient. The location of cores will be determined by the Contracting Officer to least impair the performance of the structure. Concrete in the area represented by the core testing will be considered adequate if the average strength of the cores is equal to at least 85 percent of the specified strength requirement and if no single core is less than 75 percent of the specified strength requirement.

c. Load Tests - If the core tests are inconclusive or impractical to obtain or if structural analysis does not confirm the safety of the

structure, load tests may be directed by the Contracting Officer in accordance with the requirements of ACI 318M. Concrete work evaluated by structural analysis or by results of a load test shall be corrected in a manner satisfactory to the Contacting Officer. All investigations, testing, load tests, and correction of deficiencies will be performed and approved by the Contracting Officer at the expense of the Contractor, except that if all concrete is in compliance with the plans and specifications, the cost of investigations, testing, and load tests will be at the expense of the Government.

1.4 DESIGN REQUIREMENTS

1.4.1 Concrete Strength

Specified compressive strength f'c shall be 30 MPa at 28 days for all concrete structures.

1.4.2 Maximum Water-Cement (W/C) Ratio

Maximum W/C shall be 0.45 for all concrete structures.

1.5 CONSTRUCTION TOLERANCES

1.5.1 General

The definitions of the terms used in the following tables shall be as defined in ACI 117/117R. Level and grade tolerance measurements of slabs shall be made as soon as possible after finishing. When forms or shoring are used, the measurements shall be made prior to removal. Tolerances are not cumulative. The most restrictive tolerance controls. Tolerances shall not extend the structure beyond legal boundaries. Except as specified otherwise, plus tolerance increases the amount or dimension to which it applies, or raises a level alignment, and minus tolerance decreases the amount or dimension to which it applied, or lowers a level alignment. A tolerance without sign means plus or minus. Where only one signed tolerance is specified, there is no limit in the other direction.

TOLERANCE FOR FINISHED FORMED CONCRETE SURFACES

(1) Vertical alignment

Formed surfaces slope with respect to the specified plane

All conditions ..... 10 mm in 3000 mm

(2) Abrupt variation
The offset between concrete surfaces for the following classes of surface:

Class A ..... 3 mm
Class B ..... 6 mm
Class C ..... 6 mm

TOLERANCE FOR FINISHED FORMED CONCRETE SURFACES

Class D ..... 25 mm

(3) Gradual variation

Surface finish tolerances as measured by placing a freestanding (unleveled), 1.5 m straightedge for plane surface or curved template for curved surface anywhere on the surface and allowing it to rest upon two high spots within 72 hr after concrete placement. The gap at any point between the straightedge or template and the surface shall not exceed:

Class A ..... 3 mm
Class B ..... 6 mm
Class C ..... 13 mm
Class D ..... 25 mm

TOLERANCES FOR CHANNEL LINING

(1) Lateral alignment

Alignment of tangents ..... 50 mm
Alignment of curves ..... 100 mm
Width of section at any height ..... 0.0025W + 25 mm

(2) Level alignment

Profile grade ..... 25 mm
Surface of invert ..... 6 mm
Height of lining ..... 0.005H + 25 mm

(3) Cross-sectional dimensions

Thickness of lining cross section: 10 percent specified thickness provided average thickness is maintained as determined by daily batch volumes.

1.5.2 Appearance

Permanently exposed surfaces shall be cleaned, if stained or otherwise discolored, by a method that does not harm the concrete and that is approved by the Contracting Officer.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Cementitious Materials

Cementitious materials shall be portland cement, or portland-pozzolan cement, and shall conform to appropriate specifications listed below.

2.1.1.1 Portland Cement

ASTM C 150, Type V low alkali.

2.1.1.2 High-Early-Strength Portland Cement

ASTM C 150, Type III, with C_3A limited to 8 percent low alkali, used only when specifically approved in writing.

2.1.1.3 Pozzolan, Other than Silica Fume

Pozzolan shall conform to ASTM C 618, Class F, with the optional requirements for multiple factor, drying shrinkage, and uniformity of Table 2A.

2.1.2 Aggregates

2.1.2.1 General

Concrete aggregates may be furnished from any source capable of meeting the quality requirements of ASTM C 33. No guarantee is given or implied that any of the listed sources are currently capable of producing aggregates that meet the requirements of ASTM C 33. Fine and coarse aggregates shall conform to the grading requirements of ASTM C 33. The nominal maximum size shall be as listed in paragraph NOMINAL MAXIMUM-SIZE COARSE AGGREGATE. Where the use of highway department gradations are permitted, proposed gradations shall be submitted for approval.

2.1.2.2 Concrete Aggregate Sources

a. List of Sources - The concrete aggregates sources may be selected from the following list:

Nevada Ready Mix	Lone Mountain Pit
CSR Materials	Buffalo Road Pit
Hanson Aggregates	Henderson

b. Selection of Source - After the award of the contract, the Contractor shall designate in writing only one source or combination of sources from which he proposes to furnish aggregates. If the Contractor proposes to furnish aggregates from a source or from sources not listed at the end of this section, he may designate only a single source or single combination of sources for aggregates. Regardless of the source, selected samples for acceptance testing shall be provided as required by paragraph GOVERNMENT TESTING AND SAMPLING. If a source for coarse or fine aggregates so designated by the Contractor does not meet the quality requirements stated in paragraph QUALITY, the Contractor may not submit for approval other non-listed sources but shall furnish the coarse or fine aggregate, as the case may be, from

sources listed above at no additional cost to the Government.

2.1.3 Chemical Admixtures

Chemical admixtures to be used, when required or permitted, shall conform to the appropriate specification listed.

2.1.3.1 Air-Entraining Admixture

The air-entraining admixture shall conform to ASTM C 260 and shall consistently cause the concrete to have an air content in the specified ranges under field conditions.

2.1.3.2 Accelerating Admixture

Accelerators shall meet the requirements of ASTM C 494/C 494M, Type C or E, except that calcium chloride or admixtures containing calcium chloride shall not be used.

2.1.3.3 Water-Reducing or Retarding Admixture

a. Water-Reducing or Retarding Admixtures: ASTM C 494/C 494M, Type A, B, or D, except that the 6-month and 1-year compressive strength tests are waived.

b. High-Range Water Reducing Admixture: ASTM C 494/C 494M, Type F or G except that the 6-month and 1-year strength requirements shall be waived. The admixture may be used only when approved by the Contracting Officer, such approval being contingent upon particular mixture control as described in the Contractor's Quality Control Plan.

2.1.4 Curing Materials

2.1.4.1 Membrane-Forming Curing Compound

The membrane-forming curing compound shall conform to ASTM C 309, Type 2, except a styrene acrylate or chlorinated rubber compound meeting Class B requirements shall be used for surfaces that are to be painted or are to receive bituminous roofing, or waterproofing, or floors that are to receive adhesive applications of resilient flooring. The curing compound selected shall be compatible with any subsequent paint, roofing, coating, or flooring specified. Nonpigmented compound shall contain a fugitive dye and shall have the reflective requirements in ASTM C 309 waived.

2.1.4.2 Burlap

Burlap used for curing shall conform to COE CRD-C 318.

2.1.5 Water

Water for mixing and curing shall be fresh, clean, potable, and free of injurious amounts of oil, acid, salt, or alkali, except that nonpotable water may be used if it meets the requirements of COE CRD-C 400.

2.1.6 Nonshrink Grout

Nonshrink grout shall conform to ASTM C 1107 and shall be a commercial formulation suitable for the application proposed.

2.1.7 Latex Bonding Compound

Latex bonding compound agents for bonding fresh to hardened concrete shall conform to ASTM C 1059.

2.1.8 Epoxy Resin

Epoxy resin for use in repairs shall conform to ASTM C 881, Type III, Grade I or II.

2.2 CONCRETE MIXTURE PROPORTIONING

2.2.1 Quality of Mixture

For each portion of the structure, mixture proportions shall be selected so that the strength and W/C requirements listed in paragraph DESIGN REQUIREMENTS are met.

2.2.2 Nominal Maximum-Size Coarse Aggregate

Nominal maximum-size coarse aggregate shall be 37.5 mm except 19.0 mm nominal maximum-size coarse aggregate shall be used when any of the following conditions exist: the narrowest dimension between sides of forms is less than 190 mm, the depth of the slab is less than 100 mm, or the minimum clear spacing between reinforcing is less than 55 mm.

2.2.3 Air Content

Air content as delivered to the forms and as determined by ASTM C 231 shall be between 4 and 7 percent except that when the nominal maximum-size coarse aggregate is 19.0 mm, it shall be between 4-1/2 and 7-1/2 percent.

2.2.4 Slump

The slump shall be determined in accordance with ASTM C 143/C 143M and shall be within the range of 25 mm to 100 mm. Where placement by pump is approved, the slump shall not exceed 150 mm.

2.2.5 Concrete Proportioning

Trial batches and testing requirements for various qualities of concrete specified shall be the responsibility of the Contractor. Samples of aggregates shall be obtained in accordance with the requirements of ASTM D 75. Samples of materials other than aggregate shall be representative of those proposed for the project and shall be accompanied by the manufacturer's test reports indicating compliance with applicable specified requirements. Trial mixtures having proportions, consistencies, and air content suitable for the work shall be made based on methodology described in ACI 211.1, using at least three different water-cement ratios, which

will produce a range of strength encompassing those required for the work. The maximum water-cement ratios required in paragraph MAXIMUM WATER-CEMENT RATIO will be converted to a weight ratio of water to cement plus pozzolan by mass, as described in ACI 211.1. If pozzolan is used in the concrete mixture, the minimum pozzolan content shall be 15 percent of the total cementitious material. Trial mixtures shall be proportioned for maximum permitted slump and air content with due consideration to the approved conveying and placement method. The temperature of concrete in each trial batch shall be reported. For each water-cement ratio, at least three test cylinders for each test age shall be made and cured in accordance with ASTM C 192/C 192M. They shall be tested at 7 days and at the design age specified in paragraph DESIGN REQUIREMENTS in accordance with ASTM C 39/C 39M. From these test results, a curve will be plotted showing the relationship between water-cement ratio and strength.

2.2.6 Required Average Compressive Strength

In meeting the strength requirements specified in paragraph CONCRETE STRENGTH, the selected mixture proportion shall produce a required average compressive strength f'cr exceeding the specified strength f'c by the amount indicated below.

2.2.6.1 Average Compressive Strength from Test Records

Where a concrete production facility has test records, a standard deviation shall be established in accordance with the applicable provisions of ACI 214. Test records from which a standard deviation is calculated shall represent materials, quality control procedures, and conditions similar to those expected, shall represent concrete produced to meet a specified strength or strengths (f'c) within 6.89 MPa of that specified for proposed work, and shall consist of at least 30 consecutive tests. A strength test shall be the average of the strengths of two cylinders made from the same sample of concrete and tested at 28 days or at another test age designated for determination of f'c.

Required average compressive strength f'cr used as the basis for selection of concrete proportions shall be the larger of the equations that follow using the standard deviation as determined above:

$$f'cr = f'c + 1.34S$$
$$f'cr = f'c + 2.33S - 3.45 \text{ MPa}$$

Where S = standard deviation

Where a concrete production facility does not have test records meeting the requirements above but does have a record based on 15 to 29 consecutive tests, a standard deviation shall be established as the product of the calculated standard deviation and a modification factor from the following table:

NUMBER OF TESTS*	MODIFICATION FACTOR FOR STANDARD DEVIATION Use tabulation in paragraph DETERMINING REQUIRED AVERAGE STRENGTH
less than 15	
15	1.16
20	1.08
25	1.03
30 or more	1.00

*Interpolate for intermediate numbers of tests.

2.2.6.2 Average Compressive Strength without Previous Test Records

When a concrete production facility does not have sufficient field strength test records for calculation of the standard deviation, the required average strength f'cr shall be determined as follows:

If the specified compressive strength f'c is less than 20.7 MPa,

f'cr = f'c + 6.89 MPa

If the specified compressive strength f'c is 20.7 to 34.5 MPa,

f'cr = f'c + 8.27 MPa

If the specified compressive strength f'c is over 34.5 MPa,

f'cr = f'c + 9.65 MPa

PART 3 EXECUTION

3.1 EQUIPMENT

3.1.1 Capacity

The batching, mixing, conveying, and placing equipment shall have a capacity of at least 100 cubic meters per hour.

3.1.2 Batch Plant

Batch plant shall conform to the requirements of NRMCA CPMB 100 and as specified; however, rating plates attached to batch plant equipment are not required.

3.1.2.1 Batching Equipment

The batching controls shall be, semiautomatic. The semiautomatic batching system shall be provided with interlocks such that the discharge device cannot be actuated until the indicated material is within the applicable tolerance. The batching system shall be equipped with an accurate recorder or recorders that meet the requirements of NRMCA CPMB 100. Separate bins or compartments shall be provided for each size group of aggregate and cement, and pozzolan. Aggregates shall be weighed either in separate weigh

batchers with individual scales or cumulatively in one weigh batcher on one scale. Aggregate shall not be weighed in the same batcher with cement or pozzolan. If both cement and pozzolan are used, they may be batched cumulatively provided that the portland cement is batched first. If measured by mass, the mass of the water shall not be weighed cumulatively with another ingredient. Water batcher filling and discharging valves shall be so interlocked that the discharge valve cannot be opened before the filling valve is fully closed. An accurate mechanical device for measuring and dispensing each admixture shall be provided. Each dispenser shall be interlocked with the batching and discharging operation of the water so that each admixture is separately batched and discharged automatically in a manner to obtain uniform distribution throughout the batch in the specified mixing period. Admixtures shall not be combined prior to introduction in water. The plant shall be arranged so as to facilitate the inspection of all operations at all times. Suitable facilities shall be provided for obtaining representative samples of aggregates from each bin or compartment. All filling ports for cementitious materials bins or silos shall be clearly marked with a permanent sign stating the contents.

3.1.2.2 Scales

The equipment for batching by mass shall conform to the applicable requirements of NIST HB 44, except that the accuracy shall be plus or minus 0.2 percent of 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 devices. Tests shall be made at the frequency required in paragraph TESTS AND INSPECTIONS, and in the presence of a government inspector.

3.1.2.3 Batching Tolerances

a. Weighing Tolerances

MATERIAL	PERCENT OF REQUIRED MASS
Cementitious materials	0 to plus 2
Aggregate	plus or minus 2
Water	plus or minus 1
Chemical admixture	0 to plus 6

b. Volumetric Tolerances - For volumetric batching equipment, the following tolerances shall apply to the required volume of material being batched:

Water: ..... Plus or minus 1 percent.
Chemical admixtures: ..... Zero to plus 6 percent.

3.1.2.4 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. An electric moisture meter complying with the provisions of COE CRD-C 143 shall be provided for measuring moisture in the

fine aggregate. The sensing element shall be arranged so that the measurement is made near the batcher charging gate of the sand bin or in the sand batcher.

3.1.3 Concrete Mixers

The concrete mixers shall not be charged in excess of the capacity recommended by the manufacturer. The mixers shall be operated at the drum or mixing blade speed designated by the manufacturer. The mixers shall be maintained in satisfactory operating condition, and the mixer drums shall be kept free of hardened concrete. Should any mixer at any time produce unsatisfactory results, its use shall be promptly discontinued until it is repaired.

3.1.3.1 Stationary Mixers

Concrete plant mixers shall be tilting, nontilting, horizontal-shaft, vertical-shaft, or pugmill and shall be provided with an acceptable device to lock the discharge mechanism until the required mixing time has elapsed. The mixing time and uniformity shall conform to all the requirements in ASTM C 94/C 94M applicable to central-mixed concrete.

3.1.3.2 Truck Mixers

Truck mixers, the mixing of concrete therein, and concrete uniformity shall conform to the requirements of ASTM C 94/C 94M. A truck mixer may be used either for complete mixing (transit-mixed) or to finish the partial mixing done in a stationary mixer (shrink-mixed). Each truck shall be equipped with two counters from which it will be possible to determine the number of revolutions at mixing speed and the number of revolutions at agitating speed.

3.1.4 Conveying Equipment

The conveying equipment shall conform to the following requirements.

3.1.4.1 Buckets

The interior hopper slope shall be not less than 58 degrees from the horizontal, the minimum dimension of the clear gate opening shall be at least five times the nominal maximum-size aggregate, and the area of the gate opening shall not be less than 0.2 square meter. The maximum dimension of the gate opening shall not be greater than twice the minimum dimension. The bucket gates shall be essentially grout tight when closed and may be manually, pneumatically, or hydraulically operated except that buckets larger than 1.5 cubic meters shall not be manually operated. The design of the bucket shall provide means for positive regulation of the amount and rate of deposit of concrete in each dumping position.

3.1.4.2 Transfer Hoppers

Concrete may be charged into nonagitating hoppers for transfer to other conveying devices. Transfer hoppers shall be capable of receiving concrete directly from delivery vehicles and have conical-shaped discharge features.

The transfer hopper shall be equipped with a hydraulically operated gate and with a means of external vibration to effect complete discharge. Concrete shall not be held in nonagitating transfer hoppers more than 30 minutes.

3.1.4.3 Trucks

Truck mixers operating at agitating speed or truck agitators used for transporting plant-mixed concrete shall conform to the requirements of ASTM C 94/C 94M. Nonagitating equipment may be used for transporting plant-mixed concrete over a smooth road when the hauling time is less than 15 minutes. Bodies of nonagitating equipment shall be smooth, watertight, metal containers specifically designed to transport concrete, shaped with rounded corners to minimize segregation, and equipped with gates that will permit positive control of the discharge of the concrete.

3.1.4.4 Chutes

When concrete can be placed directly from a truck mixer, agitator, or nonagitating equipment, the chutes attached to this equipment by the manufacturer may be used. A discharge deflector shall be used when required by the Contracting Officer. Separate chutes and other similar equipment will not be permitted for conveying concrete.

3.1.4.5 Belt Conveyors

Belt conveyors shall be designed and operated to assure a uniform flow of concrete from mixer to final place of deposit without segregation of ingredients or loss of mortar and shall be provided with positive means for preventing segregation of the concrete at the transfer points and the point of placing. Belt conveyors shall be constructed such that the idler spacing shall not exceed 900 mm. The belt speed shall be a minimum of 90 m per minute and a maximum of 230 m per minute. If concrete is to be placed through installed horizontal or sloping reinforcing bars, the conveyor shall discharge concrete into a pipe or elephant trunk that is long enough to extend through the reinforcing bars.

3.1.4.6 Concrete Pumps

Concrete may be conveyed by positive displacement pump when approved. The pumping equipment shall be piston or squeeze pressure. The pipeline shall be rigid steel pipe or heavy-duty flexible hose. The inside diameter of the pipe shall be at least three times the nominal maximum-size coarse aggregate in the concrete mixture to be pumped but not less than 100 mm. Aluminum pipe shall not be used.

3.1.5 Vibrators

Vibrators of the proper size, frequency, and amplitude shall be used for the type of work being performed in conformance with the following requirements:

APPLICATION	HEAD DIAMETER mm	FREQUENCY VPM	AMPLITUDE mm
Thin walls, beams, etc.	32 to 64	9,000 to 13,500	0.5 to 1.0
General construction	50 to 88	8,000 to 12,000	0.6 to 1.2

The frequency and amplitude shall be determined in accordance with COE CRD-C 521.

3.2 PREPARATION FOR PLACING

3.2.1 Embedded Items

Before placement of concrete, care shall be taken to determine that all embedded items are firmly and securely fastened in place as indicated on the drawings, or required. Embedded items shall be free of oil and other foreign matter such as loose coatings or rust, paint, and scale. The embedding of wood in concrete will be permitted only when specifically authorized or directed. Voids in sleeves, inserts, and anchor slots shall be filled temporarily with readily removable materials to prevent the entry of concrete into voids. Welding, including tack welding, will not be permitted on embedded metals within 600 mm of the surface of the concrete.

3.2.2 Concrete on Earth Foundations

Earth surfaces upon which concrete is to be placed shall be clean, damp, and free from debris, frost, ice, and standing or running water. Prior to placement of concrete, the earth foundation shall have been satisfactorily compacted in accordance with Section 02300 EARTHWORK.

3.2.3 Concrete on Rock Foundations

Rock surfaces upon which concrete is to be placed shall be clean, free from oil, standing or running water, ice, mud, drummy rock, coating, debris, and loose, semidetached, or unsound fragments. Joints in rock shall be cleaned to a satisfactory depth, as determined by the Contracting Officer, and to firm rock on the sides. Immediately before the concrete is placed, all rock surfaces shall be cleaned thoroughly by the use of air-water jets or sandblasting as described in paragraph CONSTRUCTION JOINT TREATMENT. All rock surfaces shall be kept continuously wet for at least 24 hours immediately prior to placing concrete thereon. All approximately horizontal surfaces shall be covered, immediately before the concrete is placed, with a layer of mortar proportioned similar to that in the concrete mixture. The mortar shall be covered with concrete before the time of initial setting of the mortar.

3.2.4 Construction Joint Treatment

Construction joint treatment shall conform to the following requirements.

3.2.4.1 Joint Preparation

Concrete surfaces to which additional concrete is to be bonded shall be

prepared for receiving the next lift or adjacent concrete by cleaning with either air-water cutting, sandblasting, high-pressure water jet, or other approved method. Air-water cutting will not be permitted on formed surfaces or surfaces congested with reinforcing steel. Regardless of the method used, the resulting surfaces shall be free from all laitance and inferior concrete so that clean, well bonded coarse aggregate is exposed uniformly throughout the lift surface. The edges of the coarse aggregate shall not be undercut. The surface shall be washed clean again as the last operation prior to placing the next lift. There shall be no standing water on the surface upon which concrete is placed.

3.2.4.2 Air-Water Cutting

Air-water cutting of a construction joint shall be performed at the proper time and only on horizontal construction joints. The air pressure used in the jet shall be 620 to 760 kPa, and the water pressure shall be just sufficient to bring the water into effective influence of the air pressure. When approved by the Contracting Officer, a retarder complying with the requirements of COE CRD-C 94 may be applied to the surface of the lift to prolong the period of time during which air-water cutting is effective. Prior to receiving approval, the Contractor shall furnish samples of the material to be used and shall demonstrate the method to be used in applications. After cutting, the surface shall be washed and rinsed as long as there is any trace of cloudiness of the wash water. Where necessary to remove accumulated laitance, coatings, stains, debris, and other foreign material, high-pressure water jet or sandblasting will be required as the last operation before placing the next lift.

3.2.4.3 High-Pressure Water Jet

A stream of water under a pressure of not less than 20.7 MPa may be used for cleaning. Its use shall be delayed until the concrete is sufficiently hard so that only the surface skin or mortar is removed and there is no undercutting of coarse-aggregate particles. If the water jet is incapable of a satisfactory cleaning, the surface shall be cleaned by sandblasting.

3.2.4.4 Wet Sandblasting

This method may be used when the concrete has reached sufficient strength to prevent undercutting of the coarse aggregate particles. The surface of the concrete shall then be washed thoroughly to remove all loose materials.

3.2.4.5 Waste Disposal

The method used in disposing of waste water employed in cutting, washing, and rinsing of concrete surfaces shall be such that the waste water does not stain, discolor, or affect exposed surfaces of the structures, or damage the environment of the project area. The method of disposal shall be subject to approval.

3.3 PLACING

3.3.1 Placing Procedures

The surfaces of horizontal construction joints shall be kept continuously wet for the first 12 hours during the 24-hour period prior to placing concrete. Surfaces may be dampened immediately before placement if necessary. Concrete placement will not be permitted when, in the opinion of the Contracting Officer, weather conditions prevent proper placement and consolidation. Concrete shall be deposited as close as possible to its final position in the forms and, in so depositing, there shall be no vertical drop greater than 1.5 m except where suitable equipment is provided to prevent segregation and where specifically authorized. Depositing of the concrete shall be so regulated that it may be effectively consolidated in horizontal layers 600 mm or less in thickness with a minimum of lateral movement. The amount deposited in each location shall be that which can be readily and thoroughly consolidated. Sufficient placing capacity shall be provided so that concrete placement can be kept plastic and free of cold joints while concrete is being placed. Concrete shall be placed by methods that will prevent segregation or loss of ingredients. Any concrete transferred from one conveying device to another shall be passed through a hopper that is conical in shape. The concrete shall not be dropped vertically more than 1.5 m, except where a properly designed and sized elephant truck with rigid drop chute bottom section is provided to prevent segregation and where specifically authorized. In no case will concrete be discharged to free-fall through reinforcing bars. **All concrete shall be placed from the low elevation end to the higher elevation end (up slope) unless otherwise approved by the Contracting Officer.**

3.3.2 Placement by Pump

When concrete is to be placed by pump, the nominal maximum-size coarse aggregate shall not be reduced to accommodate the pumps. The distance to be pumped shall not exceed limits recommended by the pump manufacturer. The concrete shall be supplied to the concrete pump continuously. When pumping is completed, concrete remaining in the pipeline shall be ejected without contamination of concrete in place. After each operation, equipment shall be thoroughly cleaned, and flushing water shall be wasted outside of the forms. Grout used to lubricate the pumping equipment at the beginning of the placement will not be incorporated into the placement.

3.3.3 Time Interval Between Mixing and Placing

Concrete shall be placed within 30 minutes after discharge into nonagitating equipment. When concrete is truck-mixed or when a truck mixer or agitator is used for transporting concrete mixed by a concrete plant mixer, the concrete shall be delivered to the site of the work, and discharge shall be completed within 1-1/2 hours or before the drum has revolved 300 revolutions, whichever comes first after the introduction of the mixing water to the cement and aggregates or the introduction of the cement to the aggregates. When the length of haul makes it impossible to deliver truck-mixed concrete within these time limits, batching of cement and a portion of the mixing water shall be delayed until the truck mixer is at or near the construction site.

3.3.4 Cold-Weather Placing

When cold-weather placing of concrete is likely to be subjected to freezing temperatures before the expiration of the curing period, it shall be placed in accordance with procedures previously submitted in accordance with paragraph SUBMITTALS. The ambient temperature of the space adjacent to the concrete placement and surfaces to receive concrete shall be above 0 degrees C. The placing temperature of the concrete having a minimum dimension less than 300 mm shall be between 12 and 24 degrees C when measured in accordance with ASTM C 1064/C 1064M. The placing temperature of the concrete having a minimum dimension greater than 300 mm shall be between 10 and 20 degrees C. Heating of the mixing water or aggregates will be required to regulate the concrete-placing temperatures. Materials entering the mixer shall be free from ice, snow, or frozen lumps. Salt, chemicals, or other materials shall not be mixed with the concrete to prevent freezing.

3.3.5 Hot-Weather Placing

Concrete shall be properly placed and finished with procedures previously submitted in accordance with paragraph SUBMITTALS. The concrete-placing temperature shall not exceed 30 degrees C when measured in accordance with ASTM C 1064/C 1064M. Cooling of the mixing water and aggregates, or both, may be required to obtain an adequate placing temperature. A retarder meeting the requirements of paragraph WATER-REDUCING OR RETARDING ADMIXTURE may be used to facilitate placing and finishing. Steel forms and reinforcement shall be cooled prior to concrete placement when steel temperatures are greater than 50 degrees C. Conveying and placing equipment shall be cooled if necessary to maintain proper concrete-placing temperature.

3.3.6 Consolidation

Immediately after placement, each layer of concrete, including flowing concrete, shall be consolidated by internal vibrating equipment. Vibrators shall not be used to transport concrete within the forms. Hand spading may be required, if necessary, with internal vibrating along formed surfaces permanently exposed to view. Form or surface vibrators shall not be used unless specifically approved. The vibrator shall be inserted vertically at uniform spacing over the entire area of placement. The distance between insertions shall be approximately 1-1/2 times the radius of action of the vibrator. The vibrator shall penetrate rapidly to the bottom of the layer and at least 150 mm into the preceding unhardened layer if such exists. It shall be held stationary until the concrete is consolidated and then withdrawn slowly.

3.4 FINISHING

The ambient temperature of spaces adjacent to surfaces being finished shall be not less than 5 degrees C. In hot weather when the rate of evaporation of surface moisture, as determined by use of Figure 2.1.5 of ACI 305R, may reasonably be expected to exceed 1.0 kilogram per square meter per hour. Provisions for windbreaks, shading, fog spraying, or wet covering with a light-colored material shall be made in advance of placement, and such protective measures shall be taken as quickly as finishing operations will allow. All unformed surfaces that are not to be covered by additional

concrete or backfill shall have a float finish. Additional finishing shall be as specified below and shall be true to the elevation shown in the drawings. Surfaces to receive additional concrete or backfill shall be brought to the elevation shown on the drawings and left true and regular. Exterior surfaces shall be sloped for drainage unless otherwise shown in the drawing or as directed. Joints shall be carefully made with a jointing or edging tool. The finished surfaces shall be protected from stains or abrasions. Grate tampers or jitterbugs shall not be used.

3.4.1 Unformed Surfaces

3.4.1.1 Float Finish

Surfaces shall be screeded and darbied or bullfloated to bring the surface to the required finish level with no coarse aggregate visible. No water, cement, or mortar shall be added to the surface during the finishing operation. The concrete, while still green but sufficiently hardened to bear a man's weight without deep imprint, shall be floated to a true and even plane. Floating may be performed by use of suitable hand floats or power-driven equipment. Hand floats shall be made of magnesium or aluminum.

3.4.1.2 Trowel Finish

A trowel finish shall be applied to the top of channel walls. Concrete surfaces shall be finished with a float finish, and after surface moisture has disappeared, the surface shall be troweled to a smooth, even, dense finish free from blemishes including trowel marks.

3.4.1.3 Broom Finish

A broom finish shall be applied to the face and surfaces of concrete channel inverts, and sidewalls. The concrete surface shall be screeded and floated finish plane with no coarse aggregate visible. After surface moisture disappears, the surface shall be broomed or brushed screeded and fine hair-broom or fiber bristle brushed in a direction transverse to that of the channel centerline for all invert side slope areas, or as directed.

3.4.2 Formed Surfaces

Unless another finish is specified, surfaces shall be left with the texture imparted by the forms except that defective surfaces shall be repaired as described in paragraph FORMED SURFACE REPAIR.

Uniform color of the concrete shall be maintained by use of only one mixture without changes in materials or proportions for any structure or portion of structure that is exposed to view or on which a special finish is required. The form panels used to produce the finish shall be orderly in arrangement. Forms shall not be reused if there is any evidence of surface wear or defects that would impair the quality of the surface.

3.4.3 Formed Surface Repair

After removal of forms, all ridges, lips, and bulges on surfaces permanently exposed shall be removed. All repairs shall be completed

within 48 hours after form removal.

3.4.3.1 Class A Finishes

Surfaces listed in Section 03101 FORMWORK FOR CONCRETE and as shown to have class A finishes shall have surface defects repaired as follows: defective areas, voids, and honeycombs smaller than 10,000 square millimeters in area and less than 13 mm deep and bug holes exceeding 13 mm in diameter shall be chipped and filled with dry-packed mortar. Holes left by removal of tie rods shall be reamed and filled with dry-packed mortar as specified in paragraph MATERIAL AND PROCEDURE FOR REPAIRS. Defective and unsound concrete areas larger than described shall be defined by 13 mm deep dovetailed saw cuts in a rectangular pattern with lines parallel to the formwork, the defective concrete removed by chipping, and the void repaired with replacement concrete. The prepared area shall be brush-coated with an epoxy resin meeting the requirements of paragraph EPOXY RESIN, a latex bonding agent meeting the requirements of paragraph LATEX BONDING COMPOUND, or a neat cement grout after dampening the area with water. The void shall be filled with replacement concrete in accordance with paragraph MATERIAL AND PROCEDURE FOR REPAIRS.

3.4.3.2 Class D Finish

Surfaces listed in Section 03101 FORMWORK FOR CONCRETE and as shown to have class D finish shall have surface defects repaired as follows: defective areas, voids, and honeycombs greater than 30,000 square millimeters in area or more than 50 mm deep shall be defined by 13 mm deep dovetailed saw cuts in a rectangular pattern, the defective concrete removed by chipping and the void repaired with replacement concrete. The prepared area shall be brush-coated with an epoxy resin meeting the requirements of paragraph EPOXY RESIN, a latex bonding agent meeting the requirements of paragraph LATEX BONDING COMPOUND, or a neat cement grout after dampening the area with water. The void shall be filled with replacement concrete in accordance with paragraph MATERIAL AND PROCEDURE FOR REPAIRS.

3.4.3.3 Material and Procedure for Repairs

The cement used in the dry-packed mortar or replacement concrete shall be a blend of the cement used for production of project concrete and white portland cement properly proportioned so that the final color of the mortar or concrete will match adjacent concrete. Trial batches shall be used to determine the proportions required to match colors. Dry-packed mortar shall consist of one part cement to two and one-half parts fine aggregate. The fine aggregate shall be that used for production of project concrete. The mortar shall be remixed over a period of at least 30 minutes without addition of water until it obtains the stiffest consistency that will permit placing. Mortar shall be thoroughly compacted into the prepared void by tamping, rodding, ramming, etc. and struck off to match adjacent concrete. Replacement concrete shall be produced using project materials and shall be proportioned by the Contracting Officer. It shall be thoroughly compacted into the prepared void by internal vibration, tamping, rodding, ramming, etc. and shall be struck off and finished to match adjacent concrete. Forms shall be used to confine the concrete. If an expanding agent is used in the repair concrete, the repair shall be

thoroughly confined on all sides including the top surface. Metal tools shall not be used to finish permanently exposed surfaces. The repaired areas shall be cured for 7 days. The temperature of the in situ concrete, adjacent air, and replacement mortar or concrete shall be above 5 degrees C during placement, finishing, and curing. Other methods and materials for repair may be used only when approved in writing by the Contracting Officer. Repairs of the so called "plaster-type" will not be permitted.

3.5 CURING AND PROTECTION

3.5.1 Duration

Concrete shall be cured by an approved method for a period of 7 days.

Immediately after placement, concrete shall be protected from premature drying, extremes in temperatures, rapid temperature change, and mechanical damage. All materials and equipment needed for adequate curing and protection shall be available and at the placement site prior to the start of concrete placement. Concrete shall be protected from the damaging effects of rain for 12 hours and from flowing water for 14 days. No fire or excessive heat including welding shall be permitted near or in direct contact with concrete or concrete embedments at any time.
Text

3.5.2 Moist Curing

Moist-cured concrete shall be maintained continuously, not periodically, wet for the entire curing period. If water or curing materials stain or discolor concrete surfaces that are to be permanently exposed, they shall be cleaned as required in paragraph APPEARANCE. Where wooden form sheathing is left in place during curing, the sheathing shall be kept wet at all times. Where steel forms are left in place during curing, the forms shall be carefully broken loose from the hardened concrete and curing water continuously applied into the void so as to continuously saturate the entire concrete surface. Horizontal surfaces may be moist cured by ponding, by covering with a minimum uniform thickness of 50 mm of continuously saturated sand, or by covering with saturated nonstaining burlap or cotton mats. Horizontal construction joints may be allowed to dry for 12 hours immediately prior to the placing of the following lift.

3.5.3 Membrane-Forming Curing Compound

Concrete may be cured with an approved membrane-forming curing compound in lieu of moist curing except that membrane curing will not be permitted on any surface containing protruding steel reinforcement.

3.5.3.1 Pigmented Curing Compound

A pigmented curing compound meeting the requirements of the above paragraph MEMBRANE-FORMING CURING COMPOUND may be used on surfaces that will not be exposed to view when the project is completed.

3.5.3.2 Nonpigmented Curing Compound

A nonpigmented curing compound containing a fugitive dye may be used on surfaces that will be exposed to view when the project is completed. Concrete cured with nonpigmented curing compound must be shaded from the sun for the first 3 days when the ambient temperature is 32 degrees C or higher.

3.5.3.3 Application

The curing compound shall be applied to formed surfaces immediately after the forms are removed and prior to any patching or other surface treatment except the cleaning of loose sand, mortar, and debris from the surface. The surfaces shall be thoroughly moistened with water, and the curing compound applied as soon as free water disappears. The curing compound shall be applied to unformed surfaces as soon as free water has disappeared and bleeding has stopped. The curing compound shall be applied in a two-coat continuous operation by approved motorized power-spraying equipment operating at a minimum pressure of 500 kPa, at a uniform coverage of not more than 10 square meters per liter for each coat, and the second coat shall be applied perpendicular to the first coat. Concrete surfaces that have been subjected to rainfall within 3 hours after curing compound has been applied shall be resprayed by the method and at the coverage specified. All concrete surfaces on which the curing compound has been applied shall be adequately protected for the duration of the entire curing period from pedestrian and vehicular traffic and from any other cause that will disrupt the continuity of the curing membrane.

3.5.4 Evaporation Retardant

Sheet curing shall not be used on vertical or near-vertical surfaces. All surfaces shall be thoroughly wetted and be completely covered with waterproof paper or polyethylene-coated burlap having the burlap thoroughly water-saturated before placing. Covering shall be laid with light-colored side up. Covering shall be lapped not less than 300 mm and securely weighted down or shall be lapped not less than 100 mm and 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 the 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.

3.5.5 Cold-Weather Curing and Protection

When the daily outdoor low temperature is less than 0 degrees C, the temperature of the concrete shall be maintained above 5 degrees C for the first 7 days after placing. In addition, during the period of protection removal, the air temperature adjacent to the concrete surfaces shall be controlled so that concrete near the surface will not be subjected to a temperature differential of more than 15 degrees C as determined by observation of ambient and concrete temperatures indicated by suitable temperatures measuring devices furnished by the Government as required and installed adjacent to the concrete surface and 50 mm inside the surface of the concrete. The installation of the thermometers shall be made by the Contractor at such locations as may be directed.

3.6 SETTING OF POSTS, BASE PLATES, AND BEARING PLATES

3.6.1 Setting of Posts and Plates

After being plumbed and properly positioned, posts, column base plates, bearing plates for beams and similar structural members, and machinery and equipment base plates shall be provided with full bearing with nonshrink grout. The space between the top of concrete or masonry-bearing surface and the bottom of the plate shall be approximately 1/24 of the width of the plate, but not less than 13 mm for plates less than 300 mm wide. Concrete surfaces shall be rough, clean, and free of oil, grease, and laitance, and they shall be damp. Metal surfaces shall be clean and free of oil, grease, and rust.

3.6.2 Nonshrink Grout Application

Nonshrink grout shall conform to the requirements of paragraph NONSHRINK GROUT. Water content shall be the minimum that will provide a flowable mixture and fill the space to be grouted without segregation, bleeding, or reduction of strength.

3.6.2.1 Mixing and Placing of Nonshrink Grout

Mixing and placing shall be in conformance with the material manufacturer's instructions and as specified. Ingredients shall be thoroughly dry-mixed before adding water. After adding water, the batch shall be mixed for 3 minutes. Batches shall be of size to allow continuous placement of freshly mixed grout. Grout not used within 30 minutes after mixing shall be discarded. The space between the top of the concrete or masonry-bearing surface and the plate shall be filled solid with the grout. Forms shall be of wood or other equally suitable material for retaining the grout and shall be removed after the grout has set. If grade "A" grout as specified in ASTM C 1107 is used, all surfaces shall be formed to provide restraint. The placed grout shall be worked to eliminate voids; however, overworking and breakdown of the initial set shall be avoided. Grout shall not be retempered or subjected to vibration from any source. Where clearances are unusually small, placement shall be under pressure with a grout pump. Temperature of the grout, and of surfaces receiving the grout, shall be maintained at 20 to 30 degrees C until after setting.

3.6.2.2 Treatment of Exposed Surfaces

After the grout has set, those types containing metallic aggregate shall have the exposed surfaces cut back 25 mm and immediately covered with a parge coat of mortar proportioned by mass of one part portland cement, two parts sand, and sufficient water to make the mixture placeable. The parge coat shall have a smooth, dense finish. The exposed surface of other types of nonshrink grout shall have a smooth, dense finish.

3.6.2.3 Curing

Grout and parge coats shall be cured in conformance with paragraph CURING AND PROTECTION.

3.7 TESTS AND INSPECTIONS

Tests and inspections shall conform to the following requirements. Test Results and Inspection Reports are to be submitted to the Government as required.

3.7.1 General

The Contractor shall perform the inspections and tests 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 concreting operation is out of control, concrete placement shall cease. The laboratory performing the tests shall be on site and shall conform with ASTM C 1077. The individuals who sample and test concrete or the constituents of concrete as required in this specification shall have demonstrated a knowledge and ability to perform the necessary test procedures equivalent to the ACI minimum guidelines for certification of Concrete Field Testing Technicians, Grade I. The individuals who perform the inspection of concrete construction shall have demonstrated a knowledge and ability equivalent to the ACI minimum guidelines for certification of Concrete Transportation Construction Inspector (CTCI). The Government will inspect the laboratory, equipment, and test procedures prior to start of concreting operations and at least once per year thereafter for conformance with ASTM C 1077.

3.7.2 Testing and Inspection Requirements

3.7.2.1 Fine Aggregate

a. Grading - At least once during each shift when the concrete plant is operating, there shall be one sieve analysis and fineness modulus determination in accordance with ASTM C 136 and COE CRD-C 104 for the fine aggregate or for each size range of fine aggregate if it is batched in more than one size or classification. The location at which samples are taken may be selected by the Contractor as the most advantageous for control. However, the Contractor is responsible for delivering fine aggregate to the mixer within specification limits.

b. Corrective Action for Fine Aggregate Grading - When the amount passing on any sieve is outside the specification limits, the fine 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.

c. Moisture Content Testing - When in the opinion of the Contracting Officer the electric moisture meter is not operating satisfactorily, there shall be at least four tests for moisture content in accordance with ASTM C 566 during each 8-hour period of mixing plant operation. The times for the tests shall be selected randomly within the 8-hour period. An additional test shall be made whenever the slump is shown to be out of control or excessive variation in workability is reported by the placing foreman. When the electric moisture meter is operating satisfactorily, at least two direct measurements of moisture content

shall be made per week to check the calibration of the meter. The results of tests for moisture content shall be used to adjust the added water in the control of the batch plant.

d. Moisture Content Corrective Action - Whenever the moisture content of the fine aggregate changes by 0.5 percent or more, the scale settings for the fine-aggregate batcher and water batcher shall be adjusted (directly or by means of a moisture compensation device) if necessary to maintain the specified slump.

3.7.2.2 Coarse Aggregate

a. Grading - At least once during each shift in which the concrete plant is operating, there shall be a sieve analysis in accordance with ASTM C 136 for each size of coarse aggregate. 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. A test record of samples of aggregate taken at the same locations shall show the results of the current test as well as the average results of the five most recent tests including the current test. The Contractor may adopt limits for control which are coarser than the specification limits for samples taken at locations other than as delivered to the mixer to allow for degradation during handling.

b. Corrective Action for Grading - When the amount passing any sieve is outside the specification limits, the coarse aggregate shall be immediately resampled and retested. If the second sample fails on any sieve, that fact shall be reported to the Contracting Officer. Where two consecutive averages of five tests are outside specification limits, the operation shall be considered out of control and shall be reported to the Contracting Officer. Concreting shall be stopped and immediate steps shall be taken to correct the grading.

c. Coarse Aggregate Moisture Content - A test for moisture content of each size group of coarse aggregate shall be made at least twice per week. When two consecutive readings for smallest size coarse aggregate differ by more than 1.0 percent, frequency of testing shall be increased to that specified above for fine aggregate, until the difference falls below 1.0 percent.

d. Coarse Aggregate Moisture Corrective Action - Whenever the moisture content of any size of coarse aggregate changes by 0.5 percent or more, the scale setting for the coarse aggregate batcher and the water batcher shall be adjusted if necessary to maintain the specified slump.

3.7.2.3 Quality of Aggregates

a. Frequency of Quality Tests - Thirty days prior to the start of concrete placement the Contractor shall perform all tests for aggregate quality listed below. In addition, after the start of concrete placement, the Contractor shall perform tests for aggregate quality in accordance with the frequency schedule shown below. Samples tested

after the start of concrete placement shall be taken immediately prior to entering the concrete mixer.

PROPERTY	FREQUENCY FINE AGGREGATE	FREQUENCY COARSE AGGREGATE	TEST
Specific Gravity	Every 3 months	Every 3 months	ASTM C 127 ASTM C 128
Absorption	Every 3 months	Every 3 months	ASTM C 127 ASTM C 128
Impurities	Every 3 months	Not applicable	ASTM C 40 ASTM C 87

b. Corrective Action for Aggregate Quality - If the result of a quality test fails to meet the requirements for quality immediately prior to start of concrete placement, production procedures or materials shall be changed and additional tests shall be performed until the material meets the quality requirements prior to proceeding with either mixture proportioning studies or starting concrete placement. After concrete placement commences, whenever the result of a test for quality fails the requirements, the test shall be rerun immediately. If the second test fails the quality requirement, the fact shall be reported to the Contracting Officer and immediate steps taken to rectify the situation.

3.7.2.4 Scales

a. Weighing Accuracy - The accuracy of the scales shall be checked by test weights prior to start of concrete operations and at least once every 3 months for conformance with the applicable requirements of paragraph BATCHING EQUIPMENT. Such tests shall also be made as directed whenever there are variations in properties of the fresh concrete 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 dispensed admixtures are operating properly.

c. Scales Corrective Action - When either 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.

3.7.2.5 Batch-Plant Control

The measurement of all constituent materials including cementitious materials, each size of aggregate, water, and admixtures shall be

continuously controlled. The aggregate weights and amount of added water shall be adjusted as necessary to compensate for free moisture in the aggregates. The amount of air-entraining agent shall be adjusted to control air content within specified limits. A report shall be prepared indicating type and source of cement used, type and source of pozzolan or slag used, amount and source of admixtures used, aggregate source, the required aggregate and water weights per cubic meter, amount of water as free moisture in each size of aggregate, and the batch aggregate and water weights per cubic meter for each class of concrete batched during plant operation.

3.7.2.6 Concrete Mixture

a. Air Content Testing - Air content tests shall be made when test specimens are fabricated. In addition, at least two tests for air content shall be made on randomly selected batches of each separate concrete mixture produced during each 8-hour period of concrete production. Additional tests shall be made when excessive variation in workability is reported by the placing foreman or Government quality assurance representative. Tests shall be made in accordance with ASTM C 231. Test results shall be plotted on control charts which shall at all times be readily available to the Government. Copies of the current control charts shall be kept in the field by the Contractor's quality control representatives and results plotted as tests are made. When a single test result reaches either the upper or lower action limit a second test shall immediately be made. The results of the two tests shall be averaged and this average used as the air content of the batch to plot on both the control chart for air content and the control chart for range, and for determining the need for any remedial action. The result of each test, or average as noted in the previous sentence, shall be plotted on a separate chart for each mixture on which an "average line" is set at the midpoint of the specified air content range from paragraph AIR CONTENT. An upper warning limit and a lower warning limit line shall be set 1.0 percentage point above and below the average line. An upper action limit and a lower action limit line shall be set 1.5 percentage points above and below the average line, respectively. The range between each two consecutive tests shall be plotted on a control chart for range where an upper warning limit is set at 2.0 percentage points and up upper action limit is set at 3.0 percentage points. Samples for air content may be taken at the mixer, however, the Contractor is responsible for delivering the concrete to the placement site at the stipulated air content. If the Contractor's materials or transportation methods cause air content loss between the mixer and the placement, correlation samples shall be taken at the placement site as required by the Contracting Officer and the air content at the mixer controlled as directed.

b. Air Content Corrective Action - Whenever points on the control chart for percent air reach either warning limit, an adjustment shall immediately be made in the amount of air-entraining admixture batched. As soon as is practical after each adjustment, another test shall be made to verify the result of the adjustment. Whenever a point on the control chart range reaches the warning limit, the admixture dispenser shall be recalibrated to ensure that it is operating accurately and

with good reproducibility. Whenever a point on either control chart reaches an action limit line, the air content shall be considered out of control and the concreting operation shall immediately be halted until the air content is under control. Additional air content tests shall be made when concreting is restarted. All this shall be at no extra cost to the Government.

c. Slump Testing - In addition to slump tests which shall be made when test specimens are fabricated, at least four slump tests shall be made on randomly selected batches in accordance with ASTM C 143/C 143M for each separate concrete mixture produced during each 8-hour or less period of concrete production each day. Also, additional tests shall be made when excessive variation in workability is reported by the placing foreman or Government's quality assurance representative. Test results shall be plotted on control charts which shall at all times be readily available to the Government. Copies of the current control charts shall be kept in the field by the Contractor's quality control representatives and results plotted as tests are made. When a single slump test reaches or goes beyond either the upper or lower action limit, a second test shall immediately be made on the same batch of concrete. The results of the two tests shall be averaged and this average used as the slump of the batch to plot on both the control chart for percent air and the chart for range, and for determining the need for any remedial action. An upper warning limit shall be set at 13 mm below the maximum allowable slump on separate control charts for percent air used for each type of mixture as specified in paragraph SLUMP, and an upper action limit line and lower action limit line shall be set at the maximum and minimum allowable slumps, respectively, as specified in the same paragraph. The range between each consecutive slump test for each type of mixture shall be plotted on a single control chart for range on which an upper action limit is set at 50 mm. Samples for slump shall be taken at the mixer, however, the Contractor is responsible for delivering the concrete to the placement site at the stipulated slump. If the Contractor's materials or transportation methods cause slump loss between mixer and the placement, correlation samples shall be taken at the placement site as required by the Contracting Officer and the slump at the mixer controlled as directed.

d. Slump Corrective Action - Whenever points on the control chart for slump reach the upper warning limit, an adjustment shall be immediately made in the batch weights of water and fine aggregate. The adjustments are to be made so that the total water content does not exceed that amount allowed by the maximum W/C specified, based upon aggregates which are in a saturated surface-dry condition. When a single slump reaches the upper or lower action limit, no further concrete shall be delivered to the placing site until proper adjustments have been made. Immediately after each adjustment, another test shall be made to verify the correctness of the adjustment. Whenever two consecutive slump tests, made during a period when there was no adjustment of batch weights, produce a point on the control chart for range at or above the upper action limit, the concreting operation shall immediately be halted and the Contractor shall take appropriate steps to bring the slump under control. Also, additional slump tests shall be made as directed. All this shall be at no additional cost to the Government.

e. Temperature - The temperature of the concrete shall be measured when compressive strength specimens are fabricated. Measurement shall be in accordance with ASTM C 1064/C 1064M. The temperature shall be reported along with the compressive strength data.

f. Compressive-Strength Specimens - At least one set of test specimens shall be made each day on each different concrete mixture placed during the day. Additional sets of test cylinders shall be made, as directed by the Contracting Officer, when the mixture proportions are changed or when low strengths have been detected. A random sampling plan shall be developed by the Contractor and approved by the Contracting Officer prior to the start of construction. The plan shall assure that sampling is done in a completely random and unbiased manner. A set of test specimens for concrete with a 28-day specified strength per paragraph DESIGN REQUIREMENTS shall consist of four cylinders, two to be tested at 7 days and two at 28 days. A set of test specimens for concrete with a 90-day strength per specified paragraph DESIGN REQUIREMENTS shall consist of six cylinders, two tested at 7 days, two at 28 days, and two at 90 days. Test specimens shall be molded and cured in accordance with ASTM C 31/C 31M and tested in accordance with ASTM C 39/C 39M. All compressive-strength tests shall be reported immediately to the Contracting Officer. Quality control charts shall be kept for individual strength tests, moving average for strength, and moving average for range for each mixture. The charts shall be similar to those found in ACI 214.

3.7.2.7 Inspection Before Placing

Foundation or construction joints, forms, and embedded items shall be inspected for quality by the Contractor in sufficient time prior to each concrete placement to certify to the Contracting Officer that they are ready to receive concrete. The results of each inspection shall be reported in writing.

3.7.2.8 Placing

a. Placing Inspection - The placing foreman shall supervise all placing operations, shall determine that the correct quality of concrete or grout is placed in each location as directed and shall be responsible for measuring and recording concrete temperatures and ambient temperature hourly during placing operations, weather conditions, time of placement, yardage placed, and method of placement.

b. Placing Corrective Action - The placing foreman shall not permit batching and placing to begin until he has verified that an adequate number of vibrators in working order and with competent operators are available. Placing shall not be continued if any pile of concrete is inadequately consolidated. If any batch of concrete fails to meet the temperature requirements, immediate steps shall be taken to improve temperature controls.

3.7.2.9 Vibrators

a. Vibrator Testing and Use - The frequency and amplitude of each vibrator shall be determined in accordance with COE CRD-C 521 prior to initial use and at least once a month when concrete is being placed. Additional tests shall be made as directed when a vibrator does not appear to be adequately consolidating the concrete. The frequency shall be determined at the same time the vibrator is operating in concrete with the tachometer held against the upper end of the vibrator head while almost submerged and just before the vibrator is withdrawn from the concrete. The amplitude shall be determined with the head vibrating in air. Two measurements shall be taken, one near the tip and another near the upper end of the vibrator head and these results averaged. The make, model, type, and size of the vibrator and frequency and amplitude results shall be reported in writing.

b. Vibrator Corrective Action - Any vibrator not meeting the requirements of paragraph VIBRATORS shall be immediately removed from service and repaired or replaced.

3.7.2.10 Curing

a. Moist-Curing Inspections - At least once each shift, and once 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 such areas shall be extended by one (1) day.

c. Membrane-Curing Inspection - No curing compound shall be applied until the Contractor's authorized representative has verified that the compound is properly mixed and ready for spraying. At the end of each operation, he shall estimate the quantity of compound used by measurement of the container and the area of concrete surface covered and compute the rate of coverage in square meters per liter. He shall note whether or not coverage is uniform.

d. Membrane-Curing Corrective Action - When the coverage rate of the curing compound is less than that specified or when the coverage is not uniform, the entire surface shall be sprayed again.

e. Sheet-Curing Inspection - At least once each shift and once per day on nonwork days, an inspection shall be made of all areas being cured using material sheets. The condition of the covering and the tightness of the laps and tapes shall be noted and recorded.

f. Sheet-Curing Corrective Action - When a daily inspection report lists any tears, holes, or laps or joints that are not completely closed, the tears and holes shall promptly be repaired or the sheets replaced, the joints closed, and the required curing period for those areas shall be extended by one (1) day.

3.7.2.11 Cold-Weather Protection and Sealed Insulation Curing

At least once each shift and once per day on nonwork days, an inspection shall be made of all areas subject to cold-weather protection. The protection system shall be inspected for holes, tears, unsealed joints, or other deficiencies that could result in damage to the concrete. Special attention shall be taken at edges, corners, and thin sections. Any deficiencies shall be noted, corrected, and reported.

3.7.2.12 Cold-Weather Protection Corrective Action

When a daily inspection report lists any holes, tears, unsealed joints, or other deficiencies, the deficiency shall be corrected immediately and the period of protection extended 1 day.

3.7.2.13 Mixer Uniformity

a. Stationary Mixers - Prior to the start of concrete placing and once every 6 months when concrete is being placed, or once for every 57,000 cubic meters of concrete placed, whichever results in the longest time interval, uniformity of concrete mixing shall be determined in accordance with ASTM C 94/C 94M.

b. Truck Mixers - Prior to the start of concrete placing and at least once every 6 months when concrete is being placed, uniformity of concrete shall be determined in accordance with ASTM C 94/C 94M. The truck mixers shall be selected randomly for testing. When satisfactory performance is found in one truck mixer, the performance of mixers of substantially the same design and condition of the blades may be regarded as satisfactory.

3.7.2.14 Mixer Uniformity Corrective Action

When a mixer fails to meet mixer uniformity requirements, either the mixer shall be removed from service on the work, the mixing time shall be increased, batching sequence changed, batch size reduced, or adjustments shall be made to the mixer until compliance is achieved.

3.7.3 Reports

All results of tests or inspections conducted shall be reported informally as they are completed and in writing daily. A weekly report shall be prepared for the updating of control charts covering the entire period from the start of the construction season through the current week. 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 failures and the action taken shall be confirmed in writing in the routine reports. The Contracting Officer has the right to examine all test and inspection records.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 05 - METALS

SECTION 05502

MISCELLANEOUS METAL

-- End of Section Table of Contents --

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 SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 36/A 36M	(2000) Carbon Structural Steel
ASTM A 53/A 53M	(1999b) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 123	(2000) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 320/A 320M	(2000) Alloy Steel Bolting Materials for Low-Temperature Service
ASTM A 467	(1998) Machine and Coil Chain
ASTM A 500	(1999) Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A 582/A 582M	(1995b) Free-Machining Stainless Steel Bars
ASTM A 588/A 588M	(2000) High-Strength Low-Alloy Structural Steel with 50 ksi (3345 MPa) Minimum Yield Point to 4 in. (100 mm) Thick
ASTM A 653	(2000) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 702	(1989; R 1994e1) Steel Fence Posts and Assemblies, Hot Wrought
ASTM A 780	(2000) Repair of Damaged and Uncoated Areas of Hot-Dipped Galvanized Coatings
ASTM A 924/A 924M	(1999) General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process

ASTM B 32	(1996) Solder Metal
ASTM C 881	(1999) Epoxy-Resin-Base Bonding Systems for Concrete
ASTM F 626	(1996a) Fence Fittings
ASTM F 836M	(1998) Style 1 Stainless Steel Metric Nuts
ASTM F 844	(2000) Washers, Steel, Plain (Flat), Unhardened for General Use
ASTM F 1083	(1997) Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1	(2000) Structural Welding Code - Steel

ASME INTERNATIONAL (ASME)

ASME B18.2.1	(1996) Square and Hex Bolts and Screws (Inch Series)
ASME B18.2.2	(1987; R 1993) Square and Hex Nuts (Inch Series)

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

CID A-A-1923	(Rev A) Shield, Expansion (Lag, Machine and Externally Threaded Wedge Bolt Anchors)

1.2 SUBMITTALS

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

SD-02 Shop Drawings

Miscellaneous Metal Items; G, RE.

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 safely railing, metal fences and gates.

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. 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, 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.

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.

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.

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 confirm 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 confirm 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, motar and grout shall conform to the requirements of Section 03301 CAST-IN-PLACE STRUCTURAL CONCRETE.

2.1.9 Steel Safety Railing, Including Carbon Steel Inserts

Steel safety railing, including inserts in concrete, shall be steel pipe conforming to ASTM A 53/A 53M or structural tubing conforming to ASTM A 500, Grade A or B of equivalent strength. Steel railings shall be 38 mm nominal size. Railings shall be hot-dip galvanized. Pipe collars shall be hot-dip galvanized steel.

a. Joint posts, rail, and corners shall be fabricated by one of the following methods:

(1) Flush type rail fittings of commercial standard, welded and ground smooth with railing splice locks secured with 10 mm hexagonal recessed-head setscrews.

(2) Mitered and welded joints by fitting post to top rail and intermediate rail to post, mitering corners, groove welding joints, and grinding smooth. Railing splices shall be butted and reinforced by a tight fitting interior sleeve not less than 150 mm long.

(3) Railings may be bent at corners in lieu of jointing, provided bends are made in suitable jigs and the pipe is not crushed.

2.1.10 Chain Safety Gate

Safety chains shall be galvanized welded steel, proof coil chain tested in accordance with ASTM A 467, 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.

2.1.11 Wall ladder Rungs

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.

2.1.12 Metal Fences and Gate Materials

Metal fence and gate materials (fence posts, gate posts, pickets, and cross pieces shall be galvanized square tubes to the sizes shown on the drawings and in accordance with applicable portions of ASTM A 500 and/or ASTM F 1083 and ASTM A 702. **The metal gate components shall be galvanized after fabrication.** Care shall be taken to deform picket tubes to the details shown on the drawings without "breaking" the steel. Any tube deformations that demonstrate visible cracking or weaking shall be cause for rejection. The metal gate components shall be galvanized. Galvanizing coatings shall conform to ASTM A 123. 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. Accessories shall be standard commercial or in accordance with ASTM F 626.

2.1.13 Restrictor Plate Materials

Steel plate and tube shall conform to ASTM A 588/A 588M. Threaded rod shall conform to ASTM A 582M. Nut shall conform to ASTM F 836M. Lock Washer and Washer shall conform to ASTM F 844. Epoxy shall conform to ASTM C 881.

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.

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 shall include pipe safely railings.

3.2 INSTALLATION OF PIPE GUARDS

Pipe guards shall be set vertically in concrete piers. Piers shall be constructed of, and the hollow cores of the pipe filled with, concrete specified in SECTION 03301 CAST-IN-PLACE STRUCTURAL CONCRETE.

3.3 PIPE SAFETY RAILING AND GATES

Pipe Safety Railing and gates shall be galvanized after fabrication in the shop. Care shall be taken to deform pipe without "breaking" the steel. Any pipe deformations that demonstrate visible cracking or weaking may be cause for rejection. The pipe gate components shall be galvanized. Welded, cut, damaged, and deformed area of galvanizing metal shall be neatly coated with Grade 50B solder conforming to ASTM B 32. The Contractor shall grease pipe thoroughly with grease immediately after installation of chains at each gate opening. The Contractor shall examine and certify the operation of all safety pipe railing not sooner then 30 days after installation.

3.3.1 Attachment of Handrails

Splices, where required, shall be made at expansion joints. Removable sections shall be installed as indicated.

3.3.1.1 Installation of Steel Handrails

Installation shall be in pipe sleeves embedded in concrete and filled with molten lead or sulphur with anchorage covered with standard pipe collar pinned to post. Rail ends shall be secured by steel pipe flanges.

3.3.1.2 Mounting of Safety Chains

Safety chains shall be mounted 900 mm and 610 mm above the floor.

3.4 METAL FENCES AND GATES

3.4.1 GENERAL INSTALLATION FOR METAL FENCES AND GATES

Metal fences and gates shall be installed to the lines and grades indicated. The area on either side of the metal fence line shall be cleared to the extent indicated. Line posts shall be spaced equidistant at intervals not exceeding 2.5 meters (8.2 feet). 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.

3.4.2 EXCAVATION FOR METAL FENCES AND GATES

Metal fence and gate post holes 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.

3.4.3 INSTALLATION FOR METAL FENCE POST

3.4.3.1 Posts for Metal Fences and Gates

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.

3.4.4 CROSS MEMBERS

3.4.4.1 Top Cross Member

Top rail shall be supported at each post by welding as shown in the drawings.

3.4.4.2 Bottom Cross Member

The bottom cross member shall be supported at each post by welding as shown in the drawings.

3.4.5 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.

3.4.6 METAL GATE INSTALLATION

Metal 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.

3.4.7 GROUNDING FOR METAL FENCES AND GATES

Except as indicated below, 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 electricallsy continuous with the fencing.

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.

3.4.8 OPERATION FOR METAL FENCES AND GATES

The Contractor shall examine and certify the operation of all metal fences and gates not sooner then 30 days after installation.

3.5 RESTRICTOR PLATE FOR FLAMINGO DETENTION BASIN OUTLET

Restrictor plate for Flamingo Detention Basin Outlet shall be fabricated in the shop as per the drawings. The restrictor plate shall be installed as shown in the drawings.

-- End of Section --

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