



CONTRA COSTA
transportation
authority

NOTICE TO BIDDERS

AND

SPECIAL PROVISIONS

FOR

BALFOUR INTERCHANGE

PROJECT

**ON ROUTE 4 IN CONTRA COSTA COUNTY IN THE CITY OF BRENTWOOD FROM 1.1 MILES NORTH
OF BALFOUR ROAD TO 0.6 MILES SOUTH OF BALFOUR ROAD**

CCTA Contract No. XXX

Bid book dated: 7/21/2014

Caltrans Standard Specifications dated 2010

Project plans approved: X/XX/2015

Caltrans Standard Plans dated 2010

Dated 7/21/2014

SN-000. Special Notice Heading.
Do not add. Inserted by boilerplate merge.

SPECIAL NOTICES

SN-039. This special notice is automatically inserted in all projects to alert contractors of the new HMA requirements. Delete after December 31, 2014.

- The Department has revised its HMA specifications to the Superpave design method. See section 39 of the RSS.

TABLE OF CONTENTS

ORGANIZATION	27
DIVISION I GENERAL PROVISIONS	27
1 GENERAL	28
2 BIDDING	29
3 CONTRACT AWARD AND EXECUTION	32
4 SCOPE OF WORK	44
5 CONTROL OF WORK	45
6 CONTROL OF MATERIALS	53
7 LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC	56
8 PROSECUTION AND PROGRESS	59
9 PAYMENT	61
DIVISION II GENERAL CONSTRUCTION	65
10 GENERAL	65
12 TEMPORARY TRAFFIC CONTROL	68
13 WATER POLLUTION CONTROL	110
14 ENVIRONMENTAL STEWARDSHIP	121
15 EXISTING FACILITIES	135
DIVISION III GRADING	143
16 CLEARING AND GRUBBING	143
19 EARTHWORK	143
21 EROSION CONTROL	147
25 AGGREGATE SUBBASES	150
26 AGGREGATE BASES	153
29 TREATED PERMEABLE BASES	156
DIVISION V SURFACINGS AND PAVEMENTS	157
39 HOT MIX ASPHALT	157
DIVISION VI STRUCTURES	171
47 EARTH RETAINING SYSTEMS	171
48 TEMPORARY STRUCTURES	175
49 PILING	176
50 PRESTRESSING CONCRETE	180
51 CONCRETE STRUCTURES	181

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

56	SIGNS.....	185
	DIVISION VII DRAINAGE	186
68	SUBSURFACE DRAINS.....	187
	DIVISION VIII MISCELLANEOUS CONSTRUCTION.....	188
72	SLOPE PROTECTION	188
73	CONCRETE CURBS AND SIDEWALKS.....	193
76	WELLS	194
78	CITY OF BRENTWOOD WATER LINE AND SEWER LINE WORK	202
79	CONTRA COSTA WATER DISTRICT WORK – LOS VAQUEROS PIPELINE MODIFICATIONS ...	204
	DIVISION IX TRAFFIC CONTROL FACILITIES.....	279
83	RAILINGS AND BARRIERS.....	279
84	TRAFFIC STRIPES AND PAVEMENT MARKINGS	286
86	ELECTRICAL SYSTEMS.....	288
	DIVISION X MATERIALS	325
90	CONCRETE	325
	REVISED STANDARD SPECIFICATIONS	328

USE WITH 2010 STANDARDS.

Except for structures plans, do not include the Standard Plans List in the project plans. Division of Engineering Services, Office Engineer will add RSP sheets in the project plans, except for an AADD project, the District will add RSP sheets in the project plans. Sheet numbers are included on the Title Sheet Index under the heading, "Revised Standard Plans."

Instructions for editing: Click in the left margin to select Standard Plan sheets to be included (the entire row must be selected). Use "StrikeHide no initials" key to select or undo a previous selection.

STANDARD PLANS LIST

The standard plan sheets applicable to this Contract include those listed below. The applicable revised standard plans (RSPs) listed below are ~~available at included in the project plans.~~ http://www.dot.ca.gov/hq/esc/oe/construction_standards.html

ABBREVIATIONS, LINES, SYMBOLS AND LEGEND

A10A	Abbreviations (Sheet 1 of 2)
RSP A10B	Abbreviations (Sheet 2 of 2)
A10C	Lines and Symbols (Sheet 1 of 3)
A10D	Lines and Symbols (Sheet 2 of 3)
A10E	Lines and Symbols (Sheet 3 of 3)
A10F	Legend - Soil (Sheet 1 of 2)
A10G	Legend - Soil (Sheet 2 of 2)
A10H	Legend - Rock

~~PAVEMENT MARKERS, TRAFFIC LINES, AND PAVEMENT MARKINGS~~

A20A	Pavement Markers and Traffic Lines, Typical Details
A20B	Pavement Markers and Traffic Lines, Typical Details
RSP A20C	Pavement Markers and Traffic Lines, Typical Details
A20D	Pavement Markers and Traffic Lines, Typical Details
RSP A24A	Pavement Markings - Arrows
A24B	Pavement Markings - Arrows and Symbols
RSP A24C	Pavement Markings - Symbols and Numerals
A24D	Pavement Markings - Words
RSP A24E	Pavement Markings - Words, Limit and Yield Lines
RSP A24F	Pavement Markings - Crosswalks

RUMBLE STRIP

A40A	Shoulder Rumble Strip Details - Rolled-In Indentations
A40B	Shoulder Rumble Strip Details - Ground-In Indentations

EXCAVATION AND BACKFILL

A62A	Excavation and Backfill - Miscellaneous Details
A62B	Limits of Payment for Excavation and Backfill - Bridge Surcharge and Wall
A62C	Limits of Payment for Excavation and Backfill - Bridge
A62D	Excavation and Backfill - Concrete Pipe Culverts
RSP A62DA	Excavation and Backfill - Concrete Pipe Culverts - Indirect Design Method

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CTA Contract No. XXX**

A62E	Excavation and Backfill - Cast In-Place Reinforced Concrete Box and Arch Culverts
A62F	Excavation and Backfill - Metal and Plastic Culverts
A62G	Excavation and Backfill - Precast Reinforced Concrete Box Culverts
PORTABLE CONCRETE BARRIER	
A63A	Portable Concrete Barrier (Type 60K)
A63B	Portable Concrete Barrier (Type 60K)
OBJECT MARKERS, DELINEATORS, CHANNELIZERS AND BARRICADES	
A73A	Object Markers
A73B	Markers
A73C	Delineators, Channelizers and Barricades
SURVEY MONUMENTS	
A74	Survey Monuments
CONCRETE BARRIER TYPE 60 SERIES	
A76A	Concrete Barrier Type 60
A76B	Concrete Barrier Type 60
RSP A76C	Concrete Barrier Type 60F
A76D	Concrete Barrier Type 60G
A76E	Concrete Barrier Type 60G
A76F	Concrete Barrier Type 60GE
A76G	Concrete Barrier Type 60S
A76H	Concrete Barrier Type 60S
RSP A76I	Concrete Barrier Type 60SF
CONCRETE BARRIER WILDLIFE PASSAGEWAY	
A76J	Concrete Barrier - Wildlife Passageway (Type S)
A76K	Concrete Barrier - Wildlife Passageway (Type M)
A76L	Concrete Barrier - Wildlife Passageway (Type L)
MIDWEST GUARDRAIL SYSTEM STANDARD RAILING SECTIONS	
RSP A77L1	Midwest Guardrail System Standard Railing Section (Wood Post with Wood Block)
RSP A77L2	Midwest Guardrail System Standard Railing Section (Steel Post with Notched Wood or Notched Recycled Plastic Block)
RSP A77L3	Metal Beam Guard Railing Reconstruct Installation
RSP A77M1	Midwest Guardrail System Standard Hardware
RSP A77N1	Midwest Guardrail System Wood Post and Wood Block Details
RSP A77N2	Midwest Guardrail System Steel Post and Notched Wood Block Details
RSP A77N3	Midwest Guardrail System Typical Line Post Embedment and Hinge Point Offset Details
RSP A77N4	Midwest Guardrail System Typical Railing Delineation and Dike Positioning Details
MIDWEST GUARDRAIL SYSTEM TYPICAL VEGETATION CONTROL	
RSP A77N5	Midwest Guardrail System Typical Vegetation Control Standard Railing Section
RSP A77N6	Midwest Guardrail System Typical Vegetation Control for Terminal System End Treatments
RSP A77N7	Midwest Guardrail System Typical Vegetation Control at Structure Approach
RSP A77N8	Midwest Guardrail System Typical Vegetation Control at Fixed Object
RSP A77N9	Midwest Guardrail System Typical Vegetation Control at Fixed Object
RSP A77N10	Midwest Guardrail System Typical Vegetation Control at Fixed Object

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

	MIDWEST GUARDRAIL SYSTEM TYPICAL LAYOUTS FOR EMBANKMENTS
RSP A77P1	Midwest Guardrail System Typical Layouts for Embankments
RSP A77P2	Midwest Guardrail System Typical Layouts for Embankments
RSP A77P3	Midwest Guardrail System Typical Layouts for Embankments
RSP A77P4	Midwest Guardrail System Typical Layouts for Embankments
RSP A77P5	Midwest Guardrail System Typical Layouts for Embankments
RSP A77P6	Midwest Guardrail System Typical Layouts for Embankments
	MIDWEST GUARDRAIL SYSTEM TYPICAL LAYOUTS FOR STRUCTURES
RSP A77Q1	Midwest Guardrail System Typical Layouts for Structure Approach
RSP A77Q2	Midwest Guardrail System Typical Layouts for Structure Approach and Between Structures
RSP A77Q3	Midwest Guardrail System Typical Layouts for Structure Approach
RSP A77Q4	Midwest Guardrail System Typical Layouts for Structure Departure
RSP A77Q5	Midwest Guardrail System Typical Layouts for Structure Departure
	MIDWEST GUARDRAIL SYSTEM TYPICAL LAYOUTS FOR FIXED OBJECTS
RSP A77R1	Midwest Guardrail System Typical Layouts for Fixed Objects Between Separate Roadbeds (Two-Way Traffic)
RSP A77R2	Midwest Guardrail System Typical Layouts for Fixed Objects Between Separate Roadbeds (One-Way Traffic)
RSP A77R3	Midwest Guardrail System Typical Layouts for Roadside Fixed Objects
RSP A77R4	Midwest Guardrail System Typical Layouts for Roadside Fixed Objects
RSP A77R5	Midwest Guardrail System Typical Layouts for Roadside Fixed Objects
RSP A77R6	Midwest Guardrail System Typical Layouts for Roadside Fixed Objects
RSP A77R7	Midwest Guardrail System Typical Layouts for Roadside Fixed Objects
RSP A77R8	Midwest Guardrail System Typical Layouts for Roadside Fixed Objects
	MIDWEST GUARDRAIL SYSTEM END ANCHORAGE AND RAIL TENSIONING ASSEMBLY
RSP A77S1	Midwest Guardrail System End Anchor Assembly (Type SFT)
RSP A77S2	Midwest Guardrail System Rail Tensioning Assembly
RSP A77S3	Metal Railing Anchor Cable and Anchor Plate Details
RSP A77T1	Metal Railing End Anchor Assembly (Type CA)
RSP A77T2	Midwest Guardrail System Buried Post End Anchor
	MIDWEST GUARDRAIL SYSTEM CONNECTION DETAILS AND TRANSITION RAILING TO BRIDGE RAILINGS, ABUTMENTS AND WALLS
RSP A77U1	Midwest Guardrail System Connections to Bridge Railings without Sidewalks Details No. 1
RSP A77U2	Midwest Guardrail System Connections to Bridge Railings without Sidewalks Details No. 2
RSP A77U3	Midwest Guardrail System Connections to Abutments and Walls
RSP A77U4	Midwest Guardrail System Transition Railing (Type WB-31)
RSP A77U5	Midwest Guardrail System Transition to Metal Beam Guardrail
RSP A77V1	Midwest Guardrail System Connections to Bridge Railings with Sidewalks Details No. 1
RSP A77V2	Midwest Guardrail System Connections to Bridge Railings with Sidewalks Details No. 2
	THRIE BEAM BARRIER - STANDARD BARRIER SECTIONS
RSP A78A	Thrie Beam Barrier - Standard Barrier Railing Section (Wood Post with Wood Block)
A78B	Thrie Beam Barrier - Standard Barrier Railing Section (Steel Post with Notched Wood Block or Notched Recycled Plastic Block)

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

A78C1	Thrie Beam Barrier – Standard Hardware Details
RSP A78C2	Thrie Beam Barrier – Post and Block Details
	THRIE BEAM BARRIER – TYPICAL VEGETATION CONTROL
RSP A78C3	Single Thrie Beam Barrier – Typical Vegetation Control Standard Barrier Railing Section
RSP A78C4	Double Thrie Beam Barrier – Typical Vegetation Control Standard Barrier Railing Section
RSP A78C5	Thrie Beam Barrier – Typical Vegetation Control at Fixed Objects in Median
RSP A78C6	Thrie Beam Barrier – Typical Vegetation Control at Structure Approach
	THRIE BEAM BARRIER AT FIXED OBJECTS AND ON BRIDGE
RSP A78D1	Thrie Beam Barrier – at Fixed Objects in Median
A78D2	Double Thrie Beam Barrier – on Bridge
	THRIE BEAM BARRIER – END ANCHORAGE END TREATMENT AND EMERGENCY PASSEAGEWAY
RSP A78E1	Single Thrie Beam Barrier – End Anchor Assembly and Terminal System End Treatment
RSP A78E2	Double Thrie Beam Barrier – Emergency Passageway and End Anchor Assembly Details
A78E3	Double Thrie Beam Barrier – Crash Cushion End Treatment
	THRIE BEAM BARRIER – CONNECTIONS TO BRIDGE RAILINGS, ABUTMENTS, WALLS AND BARRIER
A78F1	Double Thrie Beam Barrier – Connection to Bridge Railings without Sidewalks
A78F2	Single Thrie Beam Barrier – Connections to Bridge Railings without Sidewalks
A78G	Single Thrie Beam Barrier – Connections to Abutments and Walls
RSP A78H	Thrie Beam Barrier – Typical Layout for Connection to Bridge Railing
A78I	Double Thrie Beam Barrier – Connection to Concrete Barrier
	THRIE BEAM BARRIER – TRANSITION RAILING
A78J	Single Thrie Beam Barrier – Transition Railing (Type STB)
A78K	Double Thrie Beam Barrier – Transition Railing (Type DTB)
	CRASH CUSHIONS
A81A	Crash Cushion, Sand Filled (Unidirectional)
A81B	Crash Cushion, Sand Filled (Unidirectional)
A81C	Crash Cushion, Sand Filled (Bidirectional)
	FENCES
RSP A85	Chain Link Fence
A85A	Chain Link Fence Details
RSP A85B	Chain Link Fence Details
A86	Barbed Wire and Wire Mesh Fences
A86A	Barbed Wire and Wire Mesh Fence Detail on Sharp Break in Grade
A86B	Barbed Wire and Wire Mesh Fence Details
A86C	Barbed Wire and Wire Mesh Fence Details at Ditch Crossing
RSP A86D	Barbed Wire and Wire Mesh Fence – Miscellaneous Details
	CURBS, DRIVEWAYS, DIKES, CURB RAMPS AND ACCESSIBLE PARKING
RSP A87A	Curbs and Driveways
RSP A87B	Hot Mix Asphalt Dikes
RSP A88A	Curb Ramp Details
RSP A88B	Curb Ramp and Island Passageway Details
RSP A90A	Accessible Parking Off-Street
RSP A90B	Accessible Parking On-Street

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

PAVEMENTS

RSP P1	Jointed Plain Concrete Pavement New Construction
RSP P2	Jointed Plain Concrete Pavement (Widened Lane) New Construction
RSP P3A	Jointed Plain Concrete Pavement Lane & Shoulder Addition or Replacement
RSP P3B	Jointed Plain Concrete Pavement (Widened Lane) Lane and Shoulder Addition or Replacement
RSP P4	Continuously Reinforced Concrete Pavement
RSP P5A	Continuously Reinforced Concrete Pavement (Widened Lane)
RSP P5B	Continuously Reinforced Concrete Pavement (Widened Lane) Lane and Shoulder Addition or Replacement
RSP P6	Spall Repair
RSP P7	Dowel Bar Retrofit
RSP P8	Individual Slab Replacement with Rapid Strength Concrete
RSP P10	Concrete Pavement Dowel Bar Details
RSP P12	Concrete Pavement Dowel Bar Basket Details
RSP P13	Continuously Reinforced Concrete Pavement – Single Piece Transverse Bar Assembly
RSP P14	Continuously Reinforced Concrete Pavement Transverse Construction Joint
RSP P15	Concrete Pavement – Tie Bar Details
RSP P16	Continuously Reinforced Concrete Pavement Tie Bars and Joint Details
RSP P17	Concrete Pavement Tie Bar Basket Details
RSP P18	Concrete Pavement Lane Schematics and Isolation Joint Detail
RSP P20	Joint Seals
RSP P30	Concrete Pavement – End Panel Pavement Transitions
RSP P31A	Continuously Reinforced Concrete Pavement Terminal Joint Details
RSP P31B	Continuously Reinforced Concrete Pavement – Expansion Joint and Anchor Details
RSP P32A	Continuously Reinforced Concrete Pavement – Wide Flange Beam Terminals
RSP P32B	Continuously Reinforced Concrete Pavement Wide Flange Beam Terminals
P33	Concrete Pavement – Lane Drop Paving Details No. 1
P34	Concrete Pavement – Lane Drop Paving Details No. 2
P35	Concrete Pavement – Ramp Transition Paving Details
P45	Concrete Pavement – Drainage Inlet Details No. 1
P46	Concrete Pavement – Drainage Inlet Details No. 2
P70	Hot Mix Asphalt Paving (Longitudinal Tapered Notched Wedge Joint)
RSP P74	Pavement Edge Treatments
RSP P75	Pavement Edge Treatments - Overlays
RSP P76	Pavement Edge Treatments - New Construction

CRIB WALLS

C7A	Reinforced Concrete Crib Wall – Types A, B and C
C7B	Reinforced Concrete Crib Wall – Types A, B and C – Header and Stretcher Details
C7C	Reinforced Concrete Crib Wall – Foundation Pressure

DRAINAGE INLETS, PIPE INLETS AND GRATES

D71	Drainage Inlet Markers
D72	Drainage Inlets
RSP D73	Drainage Inlets
D73A	Drainage Inlets (Precast)

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

D74A	Drainage Inlets
D74B	Drainage Inlets
D74C	Drainage Inlet Details
D75A	Steel Pipe Inlets
D75B	Concrete Pipe Inlets
D75C	Pipe Inlets - Ladder and Trash Rack Details
RSP D77A	Grate Details No. 1
RSP D77B	Grate Details No. 2
D77C	Alternative Hinged Cover for Type OL and OS Inlets and Trash Rack for Type OCP Inlet

GUTTER AND INLET DEPRESSIONS

D78A	Gutter Depressions
D78B	Inlet Depressions—Concrete Shoulders
D78C	Inlet Depressions - Hot Mix Asphalt Shoulders

CONCRETE PIPE—DIRECT DESIGN METHOD

D79	Precast Reinforced Concrete Pipe—Direct Design Method
D79A	Precast Reinforced Concrete Pipe—Direct Design Method

BOX CULVERTS

D80	Cast-In-Place Reinforced Concrete—Single Box Culvert
D81	Cast-In-Place Reinforced Concrete—Double Box Culvert
RSP D82	Cast-In-Place Reinforced Concrete Box Culvert—Miscellaneous Details
RSP D83A	Precast Reinforced Concrete Box Culvert
RSP D83B	Precast Reinforced Concrete Box Culvert—Miscellaneous Details
D84	Box Culvert Wingwalls—Types A, B and C
D85	Box Culvert Wingwalls—Types D and E
D86A	Box Culvert Warped Wingwalls

PIPE AND ARCH CULVERT—ENDWALLS AND WARPED WINGWALLS

D86B	Pipe Culvert Headwalls, Endwalls and Warped Wingwalls
D86C	Arch Culvert Headwalls, Endwalls and Warped Wingwalls

PIPE DOWNDRAINS, ANCHORAGE SYSTEMS AND OVERSIDE DRAINS

D87A	Corrugated Metal Pipe Downdrain Details
D87B	Plastic Pipe Downdrain Details
D87C	Cable Anchorage System
D87D	Overside Drains

CONSTRUCTION LOADS ON CULVERTS AND STRUT DETAILS

D88	Construction Loads on Culverts
D88A	Strut Details for Structural Steel Pipes, Arches and Vehicular Undercrossing

**PIPE CULVERT HEADWALLS, ENDWALLS, WINGWALLS AND JUNCTION
STRUCTURE**

D89	Pipe Culvert Headwalls - Straight and "L"
D90	Pipe Culvert Headwalls, Endwalls and Wingwalls—Types A, B and C
D91A	Cast-In-Place Reinforced Concrete - Junction Structure
D91B	Cast-In-Place Reinforced Concrete - Junction Structure

PIPE RISER AND DRAINAGE INLET RISER CONNECTIONS

D93A	Pipe Riser Connections
D93B	Drainage Inlet Riser Connections
D93C	Pipe Riser with Debris Rack Cage

FLARED END SECTIONS

D94A	Metal and Plastic Flared End Sections
-------------	--

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

D94B	Concrete Flared End Sections
	PIPE COUPLING AND JOINT DETAILS
D97A	Corrugated Metal Pipe Coupling Details No. 1 - Annular Coupling Band Bar and Strap and Angle Connections
D97C	Corrugated Metal Pipe Coupling Details No. 3 - Helical and Universal Couplers
D97D	Corrugated Metal Pipe Coupling Details No. 4 - Hugger Coupling Bands
D97E	Corrugated Metal Pipe Coupling Details No. 5 - Standard Joint
D97F	Corrugated Metal Pipe Coupling Details No. 6 - Positive Joint
D97G	Corrugated Metal Pipe Coupling Details No. 7 - Downdrain
D97H	Reinforced Concrete Pipe or Non-Reinforced Concrete Pipe - Standard and Positive Joints
D97I	Corrugated Polyvinyl Chloride Pipe with Smooth Interior - Standard and Positive Joints
D97J	Composite Steel Spiral Rib Pipe with Smooth Interior - Standard Joint
	SLOTTED AND GRATED LINE DRAINS
D98A	Slotted Corrugated Steel Pipe Drain Details
D98B	Slotted Corrugated Steel Pipe Drain Details
D98C	Grated Line Drain Details
D98D	Slotted Plastic Pipe Drain Details
D98E	Heel Resistant Grate for Slotted Plastic Pipe Drain
RSP D98F	Slotted Pipe Grate Extension Details
	STRUCTURAL SECTION DRAINS
D99A	Structural Section Drainage System Details
D99B	Edge Drain Outlet and Vent Details
D99C	Edge Drain Cleanout and Vent Details
D99D	Cross Drain Interceptor Details
	GABIONS AND UNDERDRAINS
D100A	Gabion Basket Details No. 1
D100B	Gabion Basket Details No. 2
D102	Underdrains
	LANDSCAPE AND EROSION CONTROL
RSP H1	Landscape and Erosion Control Abbreviations
RSP H2	Landscape and Erosion Control Symbols
H3	Landscape Details
RSP H4	Landscape Details
RSP H5	Landscape Details
RSP H6	Landscape Details
RSP H7	Landscape Details
RSP H8	Landscape Details
RSP H9	Landscape Details
RSP H9A	Landscape Details
H10	Irrigation Controller Enclosure Cabinet
H51	Erosion Control Details - Fiber Roll and Compost Sock
H52	Rolled Erosion Control Product
	TEMPORARY CRASH CUSHIONS, RAILING AND TRAFFIC SCREEN
T1A	Temporary Crash Cushion, Sand Filled (Unidirectional)
T1B	Temporary Crash Cushion, Sand Filled (Bidirectional)
T2	Temporary Crash Cushion, Sand Filled (Shoulder Installations)

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

T3A	Temporary Railing (Type K)
T3B	Temporary Railing (Type K)
T4	Temporary Traffic Screen
T5	Temporary Terminal Section (Type K)
TEMPORARY TRAFFIC CONTROL SYSTEMS	
RSP T9	Traffic Control System Tables for Lane and Ramp Closures
RSP T10	Traffic Control System for Lane Closure on Freeways and Expressways
RSP T10A	Traffic Control System for Lane Closures on Freeways and Expressways
RSP T11	Traffic Control System for Lane Closure on Multilane Conventional Highways
RSP T12	Traffic Control System for Half Road Closure on Multilane Conventional Highways and Expressways
RSP T13	Traffic Control System for Lane Closure on Two Lane Conventional Highways
RSP T14	Traffic Control System for Ramp Closure
RSP T15	Traffic Control System for Moving Lane Closure on Multilane Highways
RSP T16	Traffic Control System for Moving Lane Closure on Multilane Highways
RSP T17	Traffic Control System for Moving Lane Closure on Two Lane Highways
TEMPORARY WATER POLLUTION CONTROL	
T51	Temporary Water Pollution Control Details (Temporary Silt Fence)
T52	Temporary Water Pollution Control Details (Temporary Straw Bale Barrier)
T53	Temporary Water Pollution Control Details (Temporary Cover)
T54	Temporary Water Pollution Control Details (Temporary Erosion Control Blanket)
T55	Temporary Water Pollution Control Details (Temporary Erosion Control Blanket)
T56	Temporary Water Pollution Control Details (Temporary Fiber Roll)
T57	Temporary Water Pollution Control Details (Temporary Check Dam)
T58	Temporary Water Pollution Control Details (Temporary Construction Entrance)
T59	Temporary Water Pollution Control Details (Temporary Concrete Washout Facility)
T60	Temporary Water Pollution Control Details (Temporary Reinforced Silt Fence)
T61	Temporary Water Pollution Control Details (Temporary Drainage Inlet Protection)
T62	Temporary Water Pollution Control Details (Temporary Drainage Inlet Protection)
T63	Temporary Water Pollution Control Details (Temporary Drainage Inlet Protection)
T64	Temporary Water Pollution Control Details (Temporary Drainage Inlet Protection)
T65	Temporary Water Pollution Control Details [Temporary Fence (Type ESA)]
T66	Temporary Water Pollution Control Details (Temporary Large Sediment Barrier)
T67	Temporary Water Pollution Control Details (Temporary Construction Roadway)
BRIDGE DETAILS	
B0-1	Bridge Details
B0-3	Bridge Details
B0-5	Bridge Details
B0-13	Bridge Details
PILES	
B2-3	16" and 24" Cast-In-Drilled-Hole Concrete Pile
B2-5	Pile Details - Class 90 and Class 140

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

B2-8	Pile Details - Class 200
B2-9	Load Test Pile Details (1)
B2-10	Load Test Pile Details (2)
B2-11	Load Test Pile Details (3)
RETAINING WALLS	
RSP B3-1A	Retaining Wall Type 1 (Case 1)
RSP B3-1B	Retaining Wall Type 1 (Case 2)
RSP B3-1C	Retaining Wall Type 1 (Case 3)
RSP B3-3A	Retaining Wall Type 1A (Case 1)
RSP B3-3B	Retaining Wall Type 1A (Case 2)
RSP B3-4A	Retaining Wall Type 5 (Case 1)
RSP B3-4B	Retaining Wall Type 5 (Case 2)
RSP B3-4C	Retaining Wall Type 5 (Case 3)
RSP B3-5	Retaining Wall Details No. 1
B3-6	Retaining Wall Details No. 2
RSP B3-7A	Retaining Wall Type 6 (Case 1)
RSP B3-7B	Retaining Wall Type 6 (Case 2)
RSP B3-7C	Retaining Wall Type 6 Details
T-BEAM DETAILS	
B6-1	T-Beam Details
B6-10	Utility Openings, T-Beam
JOINT SEALS	
B6-21	Joint Seals (Maximum Movement Rating = 2")
BOX GIRDER DETAILS	
B7-1	Box Girder Details
DECK DRAINS	
B7-5	Deck Drains
B7-6	Deck Drains - Types D-1 and D-2
B7-7	Deck Drain - Type D-3
B7-8	Deck Drainage Details
UTILITY OPENING	
B7-10	Utility Opening - Box Girder
B7-11	Utility Details
CAST-IN-PLACE POST-TENSIONED GIRDER	
RSP B8-5	Cast-In-Place Post-Tensioned Girder Details
CHAIN LINK RAILING, CABLE RAILING AND TUBULAR HAND RAILING	
B11-7	Chain Link Railing
RSP B11-47	Cable Railing
B11-51	Tubular Hand Railing
B11-52	Chain Link Railing Type 7
BRIDGE CONCRETE BARRIERS	
RSP B11-54	Concrete Barrier Type 26
RSP B11-55	Concrete Barrier Type 732
RSP B11-56	Concrete Barrier Type 736
RSP B11-57	Concrete Barrier Type 742
RSP B11-60	Concrete Barrier Type 80 (Sheet 1 of 2)
B11-61	Concrete Barrier Type 80 (Sheet 2 of 2)
RSP B11-62	Concrete Barrier Type 80SW (Sheet 1 of 3)

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

B11-63	Concrete Barrier Type 80SW (Sheet 2 of 3)
B11-64	Concrete Barrier Type 80SW (Sheet 3 of 3)
BRIDGE METAL RAIL BARRIERS	
RSP B11-65	California ST-30 Bridge Rail
B11-66	California ST-40 Bridge Rail (Sheet 1 of 2)
RSP B11-67	California ST-40 Bridge Rail (Sheet 2 of 2)
RSP B11-68	California ST-10 Bridge Rail (Sheet 1 of 3)
B11-69	California ST-10 Bridge Rail (Sheet 2 of 3)
RSP B11-70	California ST-10 Bridge Rail (Sheet 3 of 3)
STRUCTURAL STEEL PLATE VEHICULAR UNDERCROSSING	
B14-1	Structural Steel Plate Vehicular Undercrossing
COMMUNICATION AND SPRINKLER CONTROL CONDUITS (BRIDGE)	
B14-3	Communication and Sprinkler Control Conduits (Conduit Less Than 4")
WATER SUPPLY LINE (BRIDGE)	
B14-4	Water Supply Line (Bridge) (Pipe Sizes Less Than 4")
B14-5	Water Supply Line (Details) (Pipe Sizes Less Than 4")
SOUND WALLS	
B15-1	Sound Wall Masonry Block on Footing Detail (1)
B15-2	Sound Wall Masonry Block on Footing Detail (2)
B15-3	Sound Wall Masonry Block on Pile Cap Detail (1)
B15-4	Sound Wall Masonry Block on Pile Cap Detail (2)
B15-5	Sound Wall Masonry Block on Pile Cap Detail (3)
RSP B15-6	Sound Wall Masonry Block on Type 736S/SV Barrier Details (1)
RSP B15-7	Sound Wall Masonry Block on Type 736S/SV Barrier Details (2)
B15-8	Sound Wall Masonry Block on Type 736S/SV Barrier Details (3)
B15-9	Sound Wall Masonry Block Miscellaneous Details
B15-10	Sound Wall Masonry Block on Footing or Pile Cap 5'-0" Access Gate Detail (1)
B15-11	Sound Wall Masonry Block on Footing or Pile Cap 5'-0" Access Gate Details (2)
B15-12	Sound Wall Masonry Block on Barrier 5'-0" Access Gate Details (1)
B15-13	Sound Wall Masonry Block on Barrier 5'-0" Access Gate Details (2)
B15-14	Sound Wall Masonry Block Access Gate Locking Details
B15-15	Sound Wall Masonry Block on Type 736S/SV Barrier on Pile Footing for Spanning Utilities
ROADSIDE SIGNS	
RS1	Roadside Signs, Typical Installation Details No. 1
RS2	Roadside Signs - Wood Post, Typical Installation Details No. 2
RS3	Roadside Signs - Laminated Wood Box Post Typical Installation Details No. 3
RS4	Roadside Signs, Typical Installation Details No. 4
OVERHEAD SIGNS (TRUSS)	
RSP S1	Overhead Signs - Truss, Instructions and Examples
RSP S2	Overhead Signs - Truss, Single Post Type - Post Types II thru IX
S3	Overhead Signs - Truss, Single Post Type - Base Plate and Anchorage Details
S4	Overhead Signs - Truss, Single Post Type - Structural Frame Members Details No. 1
S5	Overhead Signs - Truss, Single Post Type - Structural Frame Members Details No. 2
S6	Overhead Signs - Truss, Gusset Plate Details
S8	Overhead Signs - Truss, Single Post Type - Round Pedestal Pile Foundation

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

RSP S9	Overhead Signs - Truss, Two Post Type - Post Types I-S thru VII-S
S10	Overhead Signs - Truss, Two Post Type - Base Plate and Anchorage Details
S11	Overhead Signs - Truss, Two Post Type - Structural Frame Members
S12	Overhead Signs - Truss, Structural Frame Details
S13	Overhead Signs - Truss, Frame Juncture Details
S15	Overhead Signs - Truss, Two Post Type - Round Pedestal Pile Foundation
S16	Overhead Signs - Walkway Details No. 1
S17	Overhead Signs - Walkway Details No. 2
S17A	Overhead Signs - Walkway Details No. 3
S18	Overhead Signs - Walkway Safety Railing Details
S19	Overhead Signs - Truss, Sign Mounting Details - Laminated Panel - Type A
S20	Overhead Signs - Steel Frames - Removable Sign Panel Frames
S21	Overhead Signs - Removable Sign Panel Frames Mounting Details
S22	Overhead Signs - Truss, Removable Sign Panel Frames - 110" and 120" Sign Panels
OVERHEAD SIGNS (TUBULAR)	
S30	Overhead Signs - Tubular, Instructions and Examples
S31	Overhead Signs - Tubular, Single Post Type - Layout and Pipe Selection
S32	Overhead Signs - Tubular, Two Post Type - Layout and Pipe Selection
S33	Overhead Signs - Tubular, Structural Frame - Details No. 1
S34	Overhead Signs - Tubular, Structural Frame - Details No. 2
S35	Overhead Signs - Tubular, Single and Two Post Type - Base Plate and Anchorage Details
S36	Overhead Signs - Tubular, Single Post and Two Post Type - Square Pedestal Pile Foundation
S37	Overhead Signs - Tubular, Single Post and Two Post Type - Round Pedestal Pile Foundation
OVERHEAD SIGNS (LIGHTWEIGHT)	
S48	Overhead Signs - Lightweight Post Details
S49	Overhead Signs - Lightweight Foundation Details
S50	Overhead Signs - Lightweight, Extinguishable Message Sign and Flashing Beacons Mounting Details
OVERHEAD AND ROADSIDE SIGNS PANELS	
S81	Overhead Laminated Sign - Single or Multiple Panel, Type A (1" Thick)
S82	Roadside Laminated Sign - Single or Multiple Panel, Type B (1" Thick)
S83	Roadside Laminated Sign - Single or Multiple Panel, Type B (2-1/2" Thick)
S84	Roadside Laminated Sign - Single or Multiple Panel, Type H (2-1/2" Thick)
S85	Seam Closure, "H" Section Extrusion and Post Spacing Tables, Multi-Horizontal Laminated Panel Aluminum Signs
S86	Laminated Panel Details - Extrusions for Type A, B and H Panels
S87	Type A-1 Mounting Hardware - Overhead Laminated Type A Panel, Truss and Lightweight Sign Structures
S88	Type A-2 Mounting Hardware - Overhead Laminated Type A Panel, Bridge Mounted and Tubular Sign Structures
S89	Roadside Sign - Formed Single Sheet Aluminum Panel
S90	Channel and Bolt Hole Location, Overhead Formed Sign Panel
S91	Overhead Sign - Formed Sign Panel, Type A-3 Mounting Hardware
S92	Overhead Sign - Formed Sign Panel
S93	Framing Details for Framed Single Sheet Aluminum Signs, Rectangular Shape

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

S94	Roadside Framed Single Sheet Aluminum Signs, Rectangular Shape
S95	Roadside Single Sheet Aluminum Signs, Diamond Shape
	OVERHEAD SIGN - CHANGEABLE MESSAGE SIGN (MODEL 500)
S101	Overhead Sign - Truss, Single Post Type, Layout, Unbalanced Butterfly Changeable Message Signs, Model 500
S102	Overhead Sign - Truss, Single Post Type, Structural Frame Details, Unbalanced Butterfly Changeable Message Signs, Model 500
S103	Overhead Sign - Truss, Single Post Type, Plan and Upper Bolt Details, Unbalanced Butterfly Changeable Message Signs, Model 500
S104	Overhead Sign - Truss, Single Post Type, Frame Juncture Details, Unbalanced Butterfly Changeable Message Signs, Model 500
S105	Overhead Sign - Truss, Single Post Type, Layout, Balanced Butterfly Changeable Message Signs, Model 500
S106	Overhead Sign - Truss, Single Post Type, Structural Frame Details, Balanced Butterfly Changeable Message Signs, Model 500
S107	Overhead Sign - Truss, Single Post Type, Plan and Upper Bolt Details, Balanced Butterfly Changeable Message Signs, Model 500
S108	Overhead Sign - Truss, Single Post Type, Frame Juncture Details, Balanced Butterfly Changeable Message Signs, Model 500
S109	Overhead Sign - Truss, Single Post Type, Layout, Full Cantilever Changeable Message Signs, Model 500
S110	Overhead Sign - Truss, Single Post Type, Structural Frame Details, Full Cantilever Changeable Message Signs, Model 500
S111	Overhead Sign - Truss, Single Post Type, Plan and Upper Bolt Details, Full Cantilever Changeable Message Signs, Model 500
S112	Overhead Sign - Truss, Single Post Type, Frame Juncture Details, Full Cantilever Changeable Message Signs, Model 500
S113	Overhead Sign - Truss, Single Post Type, Mounting Details, Changeable Message Signs, Model 500
S114	Overhead Sign - Truss, Single Post Type, Walkway Details, Changeable Message Signs, Model 500
S115	Overhead Sign - Truss, Single Post Type, Anchorage and Base Plate Details, Changeable Message Signs, Model 500
S116	Overhead Sign - Truss, Single Post Type, Foundation And Miscellaneous Details, Changeable Message Signs, Model 500
	OVERHEAD SIGN - CHANGEABLE MESSAGE SIGN (MODEL 500 AND 510)
	WALKWAY SAFETY RAILING AND GUSSET PLATE DETAILS
RSP S140	Overhead Sign - Truss, Single Post Type, Walkway Safety Railing Details, Changeable Message Signs, Model 500 and 510
RSP S141	Overhead Sign - Truss, Single Post Type, Safety Cable Anchorage Details, Changeable Message Signs, Model 500 and 510
S142	Overhead Sign - Truss, Single Post Type, Gusset Plate Details, Changeable Message Signs, Model 500 and 510
	ELECTRICAL SYSTEMS - LEGEND AND ABBREVIATIONS
RSP ES-1A	Electrical Systems (Legend and Abbreviations)
RSP ES-1B	Electrical Systems (Legend and Abbreviations)
RSP ES-1C	Electrical Systems (Legend and Abbreviations)
	ELECTRICAL SYSTEMS - SERVICE EQUIPMENT AND WIRING DIAGRAMS
ES-2A	Electrical Systems (Service Equipment)
ES-2B	Electrical Systems (Service Equipment, Type II Series)
ES-2C	Electrical Systems (Service Equipment Notes, Type III Series)

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CTA Contract No. XXX

ES-2D	Electrical Systems (Service Equipment Enclosure and Typical Wiring Diagram, Type III - A Series)
ES-2E	Electrical Systems (Service Equipment Enclosure and Typical Wiring Diagram, Type III - B Series)
ES-2F	Electrical Systems (Service Equipment Enclosure and Typical Wiring Diagram Type III - C Series)
ES-2G	Electrical Systems (Service Equipment Enclosure and Typical Wiring Diagram Type III - D Series)
ELECTRICAL SYSTEMS - CONTROLLER CABINETS	
ES-3A	Electrical Systems (Controller Cabinet Details)
ES-3B	Electrical Systems (Controller Cabinet Adapter Details)
ES-3C	Electrical Systems (Controller Cabinet Foundation Details)
ELECTRICAL SYSTEMS - TELEPHONE DEMARCATION CABINETS	
ES-3D	Electrical Systems (Telephone Demarcation Cabinet, Type A)
ES-3E	Electrical Systems (Telephone Demarcation Cabinet, Type B)
ES-3F	Electrical Systems (Telephone Demarcation Cabinet, Type C)
ES-3G	Electrical Systems (Telephone Demarcation Cabinet, Type C Details)
ELECTRICAL SYSTEMS - IRRIGATION CONTROLLER ENCLOSURE CABINET	
ES-3H	Electrical Systems (Irrigation Controller Enclosure Cabinet)
ELECTRICAL SYSTEMS - SIGNAL HEADS, SIGNAL FACES AND MOUNTINGS	
RSP ES-4A	Electrical Systems (Vehicular Signal Heads and Mountings)
RSP ES-4B	Electrical Systems (Pedestrian Signal and Ramp Metering Sign)
RSP ES-4C	Electrical Systems (Vehicular Signal Heads and Mountings)
ES-4D	Electrical Systems (Signal Mounting)
RSP ES-4E	Electrical Systems (Vehicular Signal Heads and Optical Detector Mounting)
ELECTRICAL SYSTEMS - DETECTORS	
ES-5A	Electrical Systems (Detectors)
RSP ES-5B	Electrical Systems (Detectors)
RSP ES-5C	Electrical Systems (Accessible Pedestrian Signal, Push Button Assemblies and Magnetic Vehicle Detector)
RSP ES-5D	Electrical Systems (Curb Termination and Handhole)
ELECTRICAL SYSTEMS - LIGHTING STANDARDS	
ES-6A	Electrical Systems (Lighting Standard, Types 15 and 21)
ES-6B	Electrical Systems (Electrolier Anchorage and Grouting for Types 15 and 21, Barrier Rail Mounted)
ES-6C	Electrical Systems (Lighting Standard, Types 5 and 10, Overhead Sign Mounted)
ES-6D	Electrical Systems (Lighting Standard, Types 15D and 21D, Double Luminaire Mast Arm)
ES-6E	Electrical Systems (Lighting Standard, Types 30 and 31)
ES-6F	Electrical Systems (Lighting Standard, Slip Base Plate)
ES-6G	Electrical Systems (Lighting Standard, Type 32)
ELECTRICAL SYSTEMS - SIGNAL AND LIGHTING STANDARD, TYPE TS, AND PEDESTRIAN PUSH BUTTON POST	
RSP ES-7A	Electrical Systems (Signal and Lighting Standard, Type TS, and Push Button Assembly Post)
ELECTRICAL SYSTEMS - SIGNAL AND LIGHTING STANDARDS	
ES-7B	Electrical Systems (Signal and Lighting Standard - Type 1 and Equipment Numbering)

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

RSP ES-7C	Electrical Systems (Signal and Lighting Standard, Case 1 Signal Mast Arm Loading, Wind Velocity = 100 mph and Signal Mast Arm Lengths 15' to 30')
RSP ES-7D	Electrical Systems (Signal and Lighting Standard, Case 2 Signal Mast Arm Loading, Wind Velocity = 100 mph and Signal Mast Arm Lengths 15' to 30')
RSP ES-7E	Electrical Systems (Signal and Lighting Standard, Case 3 Signal Mast Arm Loading, Wind Velocity = 100 mph and Signal Mast Arm Lengths 15' to 45')
RSP ES-7F	Electrical Systems (Signal and Lighting Standard, Case 4 Signal Mast Arm Loading, Wind Velocity = 100 mph and Signal Mast Arm Lengths 25' to 45')
RSP ES-7G	Electrical Systems (Signal And Lighting Standard, Case 5 Signal Mast Arm Loading, Wind Velocity = 100 mph and Signal Mast Arm Lengths 50' to 55')
RSP ES-7H	Electrical Systems (Signal and Lighting Standard, Case 5 Signal Mast Arm Loading, Wind Velocity = 100 mph and Signal Mast Arm Lengths 60' to 65')
ELECTRICAL SYSTEMS - FLASHING BEACONS	
RSP ES-7J	Electrical Systems (Flashing Beacon on a Type 1, Type 15-FBS and Type 40 Standard)
ES-7K	Electrical Systems (Flashing Beacon with Type 9, 9A and 9B Sign)
ES-7L	Electrical Systems (Flashing Beacon with Type 9, 9A and 9B Sign)
ELECTRICAL SYSTEMS - SIGNAL AND LIGHTING STANDARD DETAILS	
ES-7M	Electrical Systems (Signal and Lighting Standard - Detail No. 1)
ES-7N	Electrical Systems (Signal and Lighting Standard - Detail No. 2)
ES-7O	Electrical Systems (Signal and Lighting Standard - Detail No. 3)
ELECTRICAL SYSTEMS - INTERNALLY ILLUMINATION STREET NAME SIGN	
ES-7P	Electrical Systems (Internally Illuminated Street Name Sign)
ELECTRICAL SYSTEMS - PEDESTRIAN BARRICADES	
ES-7Q	Electrical Systems (Pedestrian Barricades)
ELECTRICAL SYSTEMS - SIGNAL AND LIGHTING, MISCELLANEOUS ATTACHMENT	
RSP ES-7R	Electrical Systems (Signal and Lighting, Miscellaneous Attachment)
ELECTRICAL SYSTEMS - PULL BOX	
RSP ES-8A	Electrical Systems (Non-Traffic Pull Box)
RSP ES-8B	Electrical Systems (Traffic Pull Box)
ELECTRICAL SYSTEMS - STRUCTURE INSTALLATIONS	
ES-9A	Electrical Systems (Structure Pull Box Installations)
ES-9B	Electrical Systems (Conduit Riser and Expansion Fitting, Structure Installations)
ES-9C	Electrical Systems (Structure Pull Box)
ES-9D	Electrical Systems (Structure Pull Box Installations)
ES-9E	Electrical Systems (Flush Soffit, Pendant soffit and Wall Luminaire, Structure Installations)
ES-9F	Electrical Systems (Flush Soffit Luminaire Details)
ELECTRICAL SYSTEMS - ISOFOOTCANDLE DIAGRAMS AND FOUNDATION DETAILS	
RSP ES-10A	Electrical Systems (Isofootcandle Diagrams)
RSP ES-10B	Electrical Systems (Isofootcandle Diagrams)
RSP ES-11	Electrical Systems (Foundation Installations)
ELECTRICAL SYSTEMS - PEDESTRIAN OVERHEAD LIGHTING	
ES-12A	Electrical Systems (Pedestrian Overcrossing Fluorescent Lighting Fixture)
ES-12B	Electrical Systems (Pedestrian Undercrossing Fluorescent Lighting Fixture)
ELECTRICAL SYSTEMS - SPLICING, FUSE RATING, KINKING AND BANDING DETAILS	
ES-13A	Electrical Systems (Splicing Details)

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

ES-13B	Electrical Systems (Fuse Rating, Kinking and Banding Detail)
	ELECTRICAL SYSTEMS - EXTINGUISHABLE MESSAGE SIGN
ES-14A	Electrical Systems (LED Extinguishable Message Sign, 10" Letters)
ES-14B	Electrical Systems (Control Assembly Wiring Diagrams)
RSP ES-14C	Electrical Systems (Extinguishable Message Sign on a Full Cantilever)
	ELECTRICAL SYSTEMS - SIGN ILLUMINATION EQUIPMENT AND CONTROLS
ES-15A	Electrical Systems (Sign Illumination Equipment)
ES-15B	Electrical Systems (36" Fluorescent Sign Illumination Equipment)
ES-15C	Electrical Systems (Sign Illumination Equipment)
ES-15D	Electrical Systems (Lighting and Sign Illumination Control)
	ELECTRICAL SYSTEMS - CLOSED CIRCUIT TELEVISION POLE AND FOUNDATION DETAILS
ES-16A	Electrical Systems (Closed Circuit Television, 5' to 15' Overhead Sign Mounted Pole)
RSP ES-16B	Electrical Systems (Closed Circuit Television, 25' to 45' Pole)
ES-16C	Electrical Systems (Closed Circuit Television - 50' to 90' High Mast Pole)
RSP ES-16D	Electrical Systems (Closed Circuit Television with Vehicle Detection System, 30' to 40' Pole)

NOTICE TO BIDDERS

Bids open Wednesday, November 13, 2013

General work description: Construct one concrete box girder bridge and two pre-cast prestressed wide flange girder bridges, retaining walls, roadway pavement, drainage systems, and electrical work under the Caltrans 2010 Standard Specifications and Standard Plans.

The Authority will receive sealed bids for BALFOUR INTERCHANGE PROJECT, ON ROUTE 4, IN CONTRA COSTA COUNTY IN THE CITY OF BRENTWOOD FROM 1.1 MILES NORTH OF BALFOUR ROAD TO 0.6 MILES SOUTH OF BALFOUR ROAD.

District-County-Route-Post Mile: 04-CC-4-R30.5/R31.1
04-CC-160-L0.5/L1.3

CCTA Contract Number: XXX
Caltrans Contract Number: 04-4H1604
Project ID: 0413000100

Proposal forms for this work are included in a separate book entitled:

PROPOSAL AND CONTRACT
FOR
BALFOUR INTERCHANGE PROJECT

Submit bids under sealed cover plainly marked as a proposal and identified with the project number, the date and time for receipt of sealed bids and the name of the bidder. Bids will only be accepted from registered plan holders. You become a registered Plan Holder by signing up to obtain the contract documents at **www.planroom.us/contracostatrans**. Bids not properly marked will be considered nonresponsive.

Contract Documents can be obtained at www.planroom.us/contracostatrans. Any addenda issued for this project will also be available at this website.

The Contractor must have either a Class A license or a combination of class C licenses that make up a majority of the work at the time of bid opening.

You are prohibited from bidding on the project if you are ineligible to perform work on a public works project under § 1777.1 or § 1777.7 of the Labor Code.

Bids will be on a unit price basis. Complete work within XXX working days.

The estimated cost of construction is \$38,000,000.

A pre-bid (pre-proposal) meeting is scheduled for 10:00 a.m. on Tuesday, October 1, 2013, in the Board Room (Suite 110) at the office of the Contra Costa Transportation Authority located at 2999 Oak Road, Suite 100, Walnut Creek, CA 94597. Attendance at the pre-bid meeting is NOT mandatory.

The Authority will receive sealed bids until 2:00 p.m. on the bid open date in the Board Room (Suite 110) at the office of the Contra Costa Transportation Authority ("Authority") located at 2999 Oak Road, Suite 100, Walnut Creek, CA 94597. Bids received after this time will not be accepted. Bids will be valid for forty-five (45) calendar days after the bid opening date.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CTA Contract No. XXX

The Authority will immediately open and publicly read the bids at the mentioned location after the specified closing time.

Questions about alleged patent ambiguity of the plans, specifications, or estimate must be submitted as a bidder inquiry before bid opening. After this time, the Authority will not consider these questions as bid protests.

Email bidders' inquiries and other communications relative to this project to XXXXXXXX, Resident Engineer of Psomas, at XXXXXXXX@psomas.com. Submit all bidder inquiries on the Bidder Inquiry Form included in the *Proposal and Contract Booklet*. Bid inquiries must be received by 4:00 PM on the fifth (5th) business day before bid opening date. All responses to bidder inquiries and addendums will be available at www.planroom.us/contracostatrans. It is each bidder's responsibility to check the website for these documents.

Submit your bid with bidder's security equal to at least ten percent (10%) of the bid.

The work covered by this proposal (bid) is not federally funded. As such, no specific Disadvantaged Business Enterprise (DBE) goal is established for this project; however, you are encouraged to use qualified DBE firms as subcontractors.

Pursuant to Section 1770, et seq. of the California Labor Code, you and all subcontractors under you will pay not less than the prevailing rate of per diem wages as determined by the Director of the California Department of Industrial Relations and comply with all applicable Labor Code provisions, which include the employment of apprentices, the hours of labor and the debarment of contractors and subcontractors.

California Department of Transportation has made available Notices of Suspension and Proposed Debarment from the Federal Highway Administration. For a copy of the notices, go to http://www.dot.ca.gov/hq/esd/oe/contractor_info. Additional information is provided in the Excluded Parties List System at <http://www.epls.gov>.

Only registered Plan Holders may protest this solicitation process. Submit all solicitation process protests in writing before the deadline stated below along with a \$2,500 protest fee. The submitted protest fee shall be made payable to Contra Costa Transportation Authority. The protest fee will be refunded to you only if the protest is upheld by the Authority. Written protests with the \$2,500 protest fee must be addressed to Randell H. Iwasaki, Executive Director, Contra Costa Transportation Authority, 2999 Oak Road, Suite 100, Walnut Creek, CA 94597.

You may protest the terms of this solicitation on the grounds that

- (a) a material provision is ambiguous,
- (b) any aspect of the procurement process is contrary to express legal requirements under this procurement, or
- (c) this solicitation in whole or in part exceeds the Authority's authority.

Protests regarding this solicitation may be filed only after the registered Plan Holder has informally discussed the nature and basis of the protest with Authority in an effort to remove the grounds for protest. Protests regarding this solicitation must completely and clearly state the grounds for protest and include all factual and legal documentation in sufficient detail to establish the merits of the protest. Protests regarding this solicitation must be filed as soon as the basis for protest is known to you, but no later than five (5) business-days before the deadline for final receipt of bids. No hearing will be held on the protest, but it will be decided, based on the written submissions, by the Contra Costa Transportation Authority Executive Director, whose decision will be final and conclusive. The Executive Director may, but need not, request other registered Plan Holders submit statements or arguments regarding the protest and may, in his/her sole and absolute discretion, discuss the protest with the protestant. A decision regarding any protest shall be in writing and, if necessary, appropriate revisions to this solicitation may be made by issuing addenda.

Failure to raise a ground for a protest regarding this solicitation will preclude consideration of that ground

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

in any protest of a selection unless such ground was not and could not have been known to you in time to protest before the final date for such protests. The written decision will be available to all registered Plan Holders. The Authority may extend the deadline for final receipt of bids to address any such protest issues.

Labor compliance oversight will be conducted by the Department of Industrial Relations, Division of Labor Standards Enforcement, Compliance Monitoring Unit (CMU). You must comply with the CMU requirements under Section 1771.3 of the Labor Code and Subchapter 4.5 of Chapter 8 of Title 8 of the California Code of Regulations. It is your sole responsibility in submitting a bid to evaluate and include the cost of complying with all labor compliance requirements under the contract and applicable law in the bid amount.

If you are awarded a contract, you will be required to furnish the Authority with payment and performance bonds equal to 100% of the total bid.

Pursuant to Public Contract Code Section 22300, you may substitute certain securities for funds withheld by the Authority to ensure your performance under the contract.

Award of Contract: The Authority will award the contract for the work to the lowest responsive, responsible bidder as determined from the base bid alone by the Authority. The Authority reserves the right to reject any or all bids or to waive any irregularities or informalities in any bids or in the bidding process.

BY THE ORDER OF THE CONTRA COSTA TRANSPORTATION AUTHORITY:

Randell H. Iwasaki, Executive Director
July 21, 2014

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

BID ITEM LIST

Item No.	Item Code (F)	Item Description	Unit of Measure	Estimated Quantity
1	066237	REMOVE TREES	LS	LUMP SUM
2	070030	LEAD COMPLIANCE PLAN	LS	LUMP SUM
3	080050	PROGRESS SCHEDULE (CRITICAL PATH METHOD)	LS	LUMP SUM
4	090100	TIME-RELATED OVERHEAD (WDAY)	WDAY	400
5	120090	CONSTRUCTION AREA SIGNS	LS	LUMP SUM
6	120100	TRAFFIC CONTROL SYSTEM	LS	LUMP SUM
7	120119	TRAFFIC CONE	EA	1350
8	120120	TYPE III BARRICADE	EA	240
9	120149	TEMPORARY PAVEMENT MARKING (PAINT)	SQFT	8260
10	120159	TEMPORARY TRAFFIC STRIPE (PAINT)	LF	101200
11	120165	CHANNELIZER (SURFACE MOUNTED)	EA	170
12	120182	PORTABLE DELINEATOR	EA	640
13	120199	TRAFFIC PLASTIC DRUM	EA	30
14	120300	TEMPORARY PAVEMENT MARKER	EA	3288
15	128651	PORTABLE CHANGEABLE MESSAGE SIGN (EA)	EA	43
16	129000	TEMPORARY RAILING (TYPE K)	LF	33000
17	129100	TEMPORARY CRASH CUSHION MODULE	EA	77
18	129101	TEMPORARY CRASH CUSHION (ABSORB 350 TL-2)	EA	23
19	129102	TEMPORARY CRASH CUSHION (ABSORB 350 TL-3)	EA	10
20	129150	TEMPORARY TRAFFIC SCREEN	LF	33000
21	130100	JOB SITE MANAGEMENT	LS	LUMP SUM
22	130300	PREPARE STORM WATER POLLUTION PREVENTION PLAN	LS	LUMP SUM
23	130330	STORM WATER ANNUAL REPORT	EA	1
24	130500	TEMPORARY EROSION CONTROL BLANKET	SQYD	3890
25	130505	MOVE-IN/MOVE-OUT (TEMPORARY EROSION CONTROL)	EA	8
26	130530	TEMPORARY HYDRAULIC MULCH (BONDED FIBER MATRIX)	SQYD	60320
27	130610	TEMPORARY CHECK DAM	LF	690

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Item No.	Item Code (F)	Item Description	Unit of Measure	Estimated Quantity
28	130620	TEMPORARY DRAINAGE INLET PROTECTION	EA	119
29	130640	TEMPORARY FIBER ROLL	LF	30500
30	130680	TEMPORARY SILT FENCE	LF	24400
31	130710	TEMPORARY CONSTRUCTION ENTRANCE	EA	3
32	130730	STREET SWEEPING	LS	LUMP SUM
33	130900	TEMPORARY CONCRETE WASHOUT	EA	8
34	131103	WATER QUALITY SAMPLING AND ANALYSIS DAY	EA	20
35	131104	WATER QUALITY MONITORING REPORT	EA	20
36	131105	WATER QUALITY ANNUAL REPORT	EA	2
37	131200	TEMPORARY CREEK DIVERSION SYSTEM	LS	LUMP SUM
38	131201	TEMPORARY CREEK BED PROTECTION SYSTEM	LS	LUMP SUM
39	141000	TEMPORARY FENCE (TYPE ESA)	LF	750
40	141103	REMOVE YELLOW THERMOPLASTIC TRAFFIC STRIPE (HAZARDOUS WASTE)	LF	2960
41	141104	REMOVE YELLOW THERMOPLASTIC PAVEMENT MARKING (HAZARDOUS WASTE)	SQFT	390
42	141120	TREATED WOOD WASTE	LB	1000
43	149000	DUST CONTROL	LS	LUMP SUM
44	150230	DESTROY WELL	EA	1
45	150242	ABANDON SEWER PIPELINE	LF	430
46	150305	OBLITERATE SURFACING	SQYD	21500
47	150605	REMOVE FENCE	LF	2400
48	150646	REMOVE PEDESTRIAN BARRICADE	EA	4
49	150714	REMOVE THERMOPLASTIC TRAFFIC STRIPE	LF	9410
50	150715	REMOVE THERMOPLASTIC PAVEMENT MARKING	SQFT	3350
51	150722	REMOVE PAVEMENT MARKER	EA	859
52	150742	REMOVE ROADSIDE SIGN	EA	75
53	150747	REMOVE ROADSIDE SIGN (STRAP AND SADDLE BRACKET METHOD)	EA	2
54	150812	REMOVE PIPE (LF)	LF	2360
55	150820	REMOVE INLET	EA	12
56	150821	REMOVE HEADWALL	EA	6

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Item No.	Item Code (F)	Item Description	Unit of Measure	Estimated Quantity
57	150826	REMOVE MANHOLE	EA	5
58	150829	REMOVE ABANDONED VAULT	EA	9
59	150830	REMOVE ABANDONED UTILITY	LF	12700
60	150841	REMOVE SEWER PIPE	LF	430
61	150860	REMOVE BASE AND SURFACING	CY	7640
62	152390	RELOCATE ROADSIDE SIGN	EA	8
63	152423	ADJUST MONUMENT TO GRADE	EA	1
64	152440	ADJUST MANHOLE TO GRADE	EA	1
65	152481	48" SEWER MANHOLE	LF	54
66	153103	COLD PLANE ASPHALT CONCRETE PAVEMENT	SQYD	27300
67	153240	REMOVE CONCRETE (CURB, GUTTER, AND SIDEWALK) (CY)	CY	580
68	155003	CAP INLET	EA	1
69	155231	CULVERT SLURRY-CEMENT BACKFILL	CY	6
70	155232	SAND BACKFILL	CY	20
71	160103	CLEARING AND GRUBBING (ACRE)	ACRE	52
72	190101	ROADWAY EXCAVATION	CY	133000
73	190151	CHANNEL EXCAVATION	CY	3130
74	190185	SHOULDER BACKING	TON	56
75	192003 (F)	STRUCTURE EXCAVATION (BRIDGE)	CY	3158
76	192037 (F)	STRUCTURE EXCAVATION (RETAINING WALL)	CY	1312
77	193003 (F)	STRUCTURE BACKFILL (BRIDGE)	CY	2555
78	193013 (F)	STRUCTURE BACKFILL (RETAINING WALL)	CY	1603
79	193118 (F)	CONCRETE BACKFILL	CY	2
80	194001	DITCH EXCAVATION	CY	1970
81	198010	IMPORTED BORROW (CY)	CY	173000
82	198051	BIOFILTRATION SWALE BERM	EA	11
83	208603 (F)	8" PLASTIC PIPE (SCHEDULE 40) (SUPPLY LINE)	LF	1580
84	210002	IMPORTED BIOFILTRATION SOIL	CY	4240
85	210270	ROLLED EROSION CONTROL PRODUCT (NETTING)	SQFT	138000

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Item No.	Item Code (F)	Item Description	Unit of Measure	Estimated Quantity
86	210300	HYDROMULCH	SQFT	1170000
87	210350	FIBER ROLLS	LF	65700
88	210430	HYDROSEED	SQFT	1170000
89	210600	COMPOST	SQFT	1170000
90	250401	CLASS 4 AGGREGATE SUBBASE	CY	95900
91	260203	CLASS 2 AGGREGATE BASE (CY)	CY	15100
92	260204	TEMPORARY CLASS 2 AGGREGATE BASE (CY)	CY	250
93	280000	LEAN CONCRETE BASE	CY	9390
94	290201	ASPHALT TREATED PERMEABLE BASE	CY	130
95	390128	TEMPORARY HOT MIX ASPHALT	TON	680
96	390132	HOT MIX ASPHALT (TYPE A)	TON	30500
97	390137	RUBBERIZED HOT MIX ASPHALT (GAP GRADED)	TON	8330
98	390138	RUBBERIZED HOT MIX ASPHALT (OPEN GRADED)	TON	2100
99	394053	SHOULDER RUMBLE STRIP (HMA,GROUND-IN INDENTATIONS)	STA	65
100	394060	DATA CORE	LS	LUMP SUM
101	394074	PLACE HOT MIX ASPHALT DIKE (TYPE C)	LF	4720
102	394076	PLACE HOT MIX ASPHALT DIKE (TYPE E)	LF	6260
103	394079	TEMPORARY PLACE HOT MIX ASPHALT DIKE (TYPE E)	LF	1360
104	394090	PLACE HOT MIX ASPHALT (MISCELLANEOUS AREA)	SQYD	34
105	397005	TACK COAT	TON	98
106	477020 (F)	MECHANICALLY STABILIZED EMBANKMENT	SQFT	2241
107	480600	TEMPORARY SHORING	LF	870
108	490528	FURNISH STEEL PILING (HP 14 X 89)	LF	15849
109	490529	DRIVE STEEL PILE (HP 14 X 89)	EA	272
110	490746	FURNISH PILING (CLASS 140) (ALTERNATIVE W)	LF	183
111	490747	DRIVE PILE (CLASS 140) (ALTERNATIVE W)	EA	6
112	490781	DRIVE PILE (CLASS 200)	EA	36
113	490782	FURNISH PILING (CLASS 200) (ALTERNATIVE W)	LF	2356
114	498052	60" CAST-IN-DRILLED-HOLE CONCRETE PILE (SIGN FOUNDATION)	LF	70

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Item No.	Item Code (F)	Item Description	Unit of Measure	Estimated Quantity
115	500020	PRESTRESSING PRECAST GIRDER	LS	LUMP SUM
116	510051 (F)	STRUCTURAL CONCRETE, BRIDGE FOOTING	CY	767.3
117	510053 (F)	STRUCTURAL CONCRETE, BRIDGE	CY	2828.8
118	510060 (F)	STRUCTURAL CONCRETE, RETAINING WALL	CY	573
119	510072 (F)	STRUCTURAL CONCRETE, BARRIER SLAB	CY	37
120	510086 (F)	STRUCTURAL CONCRETE, APPROACH SLAB (TYPE N)	CY	485.1
121	510092 (F)	STRUCTURAL CONCRETE, HEADWALL	CY	140
122	510502 (F)	MINOR CONCRETE (MINOR STRUCTURE)	CY	310
123	510504	MINOR CONCRETE (PIPE ENCASEMENT)	CY	110
124	511035 (F)	ARCHITECTURAL TREATMENT	SQFT	2369
125	511036 (F)	ARCHITECTURAL SURFACE (BARRIER)	SQFT	1747
126	512208	FURNISH PRECAST PRESTRESSED CONCRETE GIRDER (90'-100')	EA	22
127	512211	FURNISH PRECAST PRESTRESSED CONCRETE GIRDER (150'-160')	EA	7
128	512500 (F)	ERECT PRECAST PRESTRESSED CONCRETE GIRDER	EA	29
129	519091	JOINT SEAL (MR 1 1/2")	LF	499
130	519100	JOINT SEAL (MR 2")	LF	212
131	520102 (F)	BAR REINFORCING STEEL (BRIDGE)	LB	857076
132	520103 (F)	BAR REINFORCING STEEL (RETAINING WALL)	LB	85580
133	560218 (F)	FURNISH SIGN STRUCTURE (TRUSS)	LB	74000
134	560219 (F)	INSTALL SIGN STRUCTURE (TRUSS)	LB	74000
135	560225	INSTALL SIGN (BRIDGE MOUNTED)	EA	2
136	560244	FURNISH LAMINATED PANEL SIGN (1"-TYPE A)	SQFT	1040
137	560248	FURNISH SINGLE SHEET ALUMINUM SIGN (0.063"-UNFRAMED)	SQFT	370
138	560249	FURNISH SINGLE SHEET ALUMINUM SIGN (0.080"-UNFRAMED)	SQFT	490
139	560251	FURNISH SINGLE SHEET ALUMINUM SIGN (0.063"-FRAMED)	SQFT	310
140	560252	FURNISH SINGLE SHEET ALUMINUM SIGN (0.080"-FRAMED)	SQFT	28
141	566011	ROADSIDE SIGN - ONE POST	EA	72
142	566012	ROADSIDE SIGN - TWO POST	EA	9
143	568001	INSTALL SIGN (STRAP AND SADDLE BRACKET METHOD)	EA	4

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Item No.	Item Code (F)	Item Description	Unit of Measure	Estimated Quantity
144	568015	INSTALL SIGN (MAST-ARM HANGER METHOD)	EA	2
145	568016	INSTALL SIGN PANEL ON EXISTING FRAME	SQFT	150
146	650014	18" REINFORCED CONCRETE PIPE	LF	12700
147	650018	24" REINFORCED CONCRETE PIPE	LF	1190
148	650034	48" REINFORCED CONCRETE PIPE	LF	440
149	650058	84" REINFORCED CONCRETE PIPE	LF	280
150	680905	8" PERFORATED PLASTIC PIPE UNDERDRAIN	LF	13800
151	682022 (F)	CLASS 1 PERMEABLE MATERIAL (BLANKET)	CY	2830
152	690116	18" CORRUGATED STEEL PIPE DOWNDRAIN (.064" THICK)	LF	390
153	692307	18" ANCHOR ASSEMBLY	EA	56
154	700617	DRAINAGE INLET MARKER	EA	13
155	703254	48" CORRUGATED STEEL PIPE RISER (.079" THICK)	LF	110
156	705011	18" STEEL FLARED END SECTION	EA	13
157	705204	18" CONCRETE FLARED END SECTION	EA	18
158	705206	24" CONCRETE FLARED END SECTION	EA	2
159	707117	36" PRECAST CONCRETE PIPE INLET	LF	91
160	707242	TYPE I MANHOLE	LF	140
161	707243	TYPE II MANHOLE	LF	53
162	707244	TYPE III MANHOLE	LF	70
163	709522	INLET DEPRESSION	EA	8
164	721026 (F)	ROCK SLOPE PROTECTION (NO. 1, METHOD B) (CY)	CY	570
165	721431	CONCRETE (CONCRETE APRON)	CY	7
166	721810	SLOPE PAVING (CONCRETE)	CY	76
167	721812	SLOPE PAVING (CONCRETE PAVERS)	SQFT	4581
168	729011	ROCK SLOPE PROTECTION FABRIC (CLASS 8)	SQYD	1020
169	730020	MINOR CONCRETE (CURB) (CY)	CY	340
170	731505	TEMPORARY CURB, GUTTER, SIDEWALK, & CURB RAMP	CY	25
171	731521	MINOR CONCRETE (SIDEWALK & RAMP)	CY	210
172	731530	MINOR CONCRETE (TEXTURED PAVING)	CY	280

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Item No.	Item Code (F)	Item Description	Unit of Measure	Estimated Quantity
173	750001 (F)	MISCELLANEOUS IRON AND STEEL	LB	50330
174	760096	GROUNDWATER MONITORING WELL	EA	5
175	760097	REMOVE MONITORING WELL	EA	5
176	781100	18" SEWER PIPE	LF	420
177	782100	20" POTABLE WATERLINE RELOCATION	LS	LUMP SUM
178	782200	24" NON-POTABLE WATERLINE RELOCATION	LS	LUMP SUM
179	790100	ARV RELOCATION	LS	LUMP SUM
180	790101	REMOVE BLOW OFF	LS	LUMP SUM
181	790200	CONCRETE CAP (TYPE 1)	LF	420
182	790201	CONCRETE CAP (TYPE 2)	LF	180
183	790202	CONCRETE CAP (TYPE 3)	LF	250
184	790300	CSTS RELOCATION (NORTH)	LS	LUMP SUM
185	790301	CSTS RELOCATION (SOUTH)	LS	LUMP SUM
186	800400	CHAIN LINK FENCE (TYPE CL-8)	LF	
187	820107	DELINEATOR (CLASS 1)	EA	199
188	820151	OBJECT MARKER (TYPE L-1)	EA	6
189	832005	MIDWEST GUARDRAIL SYSTEM	LF	3690
190	832070	VEGETATION CONTROL (MINOR CONCRETE)	SQYD	1360
191	833077	PEDESTRIAN BARRICADE	EA	4
192	839521 (F)	CABLE RAILING	LF	20
193	839543	TRANSITION RAILING (TYPE WB-31)	EA	9
194	839581	END ANCHOR ASSEMBLY (TYPE SFT)	EA	9
195	839584	ALTERNATIVE IN-LINE TERMINAL SYSTEM	EA	9
196	839585	ALTERNATIVE FLARED TERMINAL SYSTEM	EA	1
197	839603	CRASH CUSHION (ADIEM)	EA	1
198	839701	CONCRETE BARRIER (TYPE 60)	LF	2700
199	839702 (F)	CONCRETE BARRIER (TYPE 60A)	LF	220
200	839706	CONCRETE BARRIER (TYPE 60G)	LF	680
201	839707	CONCRETE BARRIER (TYPE 60GA)	LF	260

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Item No.	Item Code (F)	Item Description	Unit of Measure	Estimated Quantity
202	839720 (F)	CONCRETE BARRIER (TYPE 732)	LF	500
203	839725 (F)	CONCRETE BARRIER (TYPE 736)	LF	320
204	846001	4" THERMOPLASTIC TRAFFIC STRIPE (ENHANCED WET NIGHT VISIBILITY)	LF	51800
205	846007	6" THERMOPLASTIC TRAFFIC STRIPE (ENHANCED WET NIGHT VISIBILITY)	LF	3720
206	846009	8" THERMOPLASTIC TRAFFIC STRIPE (ENHANCED WET NIGHT VISIBILITY)	LF	10600
207	846008	6" THERMOPLASTIC TRAFFIC STRIPE (ENHANCED WET NIGHT VISIBILITY) (BROKEN 8-4)	LF	600
208	846012	THERMOPLASTIC CROSSWALK AND PAVEMENT MARKING (ENHANCED WET NIGHT VISIBILITY)	SQFT	5050
209	846003	4" THERMOPLASTIC TRAFFIC STRIPE (ENHANCED WET NIGHT VISIBILITY) (BROKEN 12-3)	LF	220
210	846004	4" THERMOPLASTIC TRAFFIC STRIPE (ENHANCED WET NIGHT VISIBILITY) (BROKEN 17-7)	LF	290
211	846000	4" THERMOPLASTIC TRAFFIC STRIPE (ENHANCED WET NIGHT VISIBILITY) (BROKEN 18-12)	LF	6720
212	847000	POST MILE MARKING (PAINT)	EA	14
213	850101	PAVEMENT MARKER (NON-REFLECTIVE)	EA	2050
214	850111	PAVEMENT MARKER (RETROREFLECTIVE)	EA	2360
215	860150	SIGNAL AND LIGHTING (TEMPORARY)	LS	LUMP SUM
216	860251	SIGNAL AND LIGHTING (LOCATION 1)	LS	LUMP SUM
217	860252	SIGNAL AND LIGHTING (LOCATION 2)	LS	LUMP SUM
218	860253	SIGNAL AND LIGHTING (LOCATION 3)	LS	LUMP SUM
219	860300	SIGNAL AND LIGHTING (CITY STREET LOCATION 1)	LS	LUMP SUM
220	860460	LIGHTING AND SIGN ILLUMINATION	LS	LUMP SUM
221	860799	BATTERY BACKUP SYSTEM	LS	LUMP SUM
222	860930	TRAFFIC MONITORING STATION	LS	LUMP SUM
223	8611009	RAMP METERING SYSTEM AND TMS ELEMENTS	LS	LUMP SUM
224	8690019	EMERGENCY VEHICLE PREEMPTION SYSTEM (LOCATIONS 2 AND 3)	LS	LUMP SUM
225	999990	MOBILIZATION	LS	LUMP SUM

SP_TEMPLATE. Insert special provisions between corresponding headings and caret separations. Delete headings and carets if you do not insert special provisions between them. Do not use a reserved heading without authorization from the OCCS Chief.

Insert the Standard Plan List at the top of this document.

Unless an SSP instructs otherwise, use the following editing instructions for all SSPs:

1. Do not delete a section of an SSP. If a section is not used under the instructions of the SSP, (1) leave the heading unedited, (2) write "Not Used" under the heading, and (3) strike and hide the text of the section.
2. Renumber a list if an item other than the last is deleted.
3. If 1 item remains after deleting items in a list and the clause introducing the list becomes incorrect, combine the remaining item with the clause introducing the list. Exception: Do not combine 1 listed item and change an introduction for a grammatical correction (e.g., do not change plural pronouns and verbs to their singular forms).
4. Use the style *Comments* for any editing notes you add. Limit your use of editing notes.

ORGANIZATION

Special provisions are under headings that correspond with the main-section headings of the *Standard Specifications*. A main-section heading is a heading shown in the table of contents of the *Standard Specifications*.

Each special provision begins with a revision clause that describes or introduces a revision to the *Standard Specifications* as revised by any revised standard specification.

Any paragraph added or deleted by a revision clause does not change the paragraph numbering of the *Standard Specifications* for any other reference to a paragraph of the *Standard Specifications*.

AA

DIVISION I GENERAL PROVISIONS

1 GENERAL

{ XE "1-1.01_A05-30-14" }
Page 1 of 1

Section 1-1.01. Use for any bid item that has a code that does not correspond to the specification section number.

Undelete applicable rows.

Add rows for nonstandard items. Use an item code that corresponds to the specification section number and add an A to the code (e.g., 801000A). HQOE will convert the number to a one-time-use number. Add rows as necessary.

**** KG 6/24/14**

Add to section 1-1.01:

Bid Items and Applicable Sections

Item code	Item description	Applicable section
066237	REMOVE TREES	16
995100	WATER METER CHARGES	5
995200	IRRIGATION WATER SERVICE CHARGES	5
999991	MOBILIZATION (MARINE ACCESS)	9

Add to section 1-1.07B:

Authority: The Contra Costa Transportation Authority (CCTA), including its authorized officers, employees, agents, consultants and volunteers.

Authority Indemnitees: The Authority and the indemnitees listed in Section 7-1.05B and their respective successors and assigns, governing bodies or boards, board members, officers, directors, agents, employee, consultants and subconsultants.

Caltrans or Department of Transportation: Department of Transportation as defined in St & Hwy Code § 20 and authorized in St & Hwy Code § 90; its authorized representatives.

Contract Approval Date: The date the fully executed contract is approved by the Authority as evidenced by the date entered by Authority's counsel on the signature document.

Contract Award Date: The effective date the contract is awarded by the Authority as evidenced by a resolution approved by the Authority's Board of Directors.

Inspector: The engineering or technical personnel authorized to act as agents or representatives for the Engineer in inspection of work covered by the contract, limited to the particular duties entrusted to them.

Oversight Engineer: The assigned Caltrans representative duly authorized to oversee work covered by the contract. The Oversight Engineer will have authority to stop work at any time there is a risk to the traveling traffic or pedestrians or when the work is performed in an unsafe manner. The Oversight Engineer has authority to reject any materials or work not in conformance with project specifications.

Local Agency or Public Agency: All references to "Local Agency" or "Public Agency" shall be references to the Authority.

Replace definition for "Department", "Director" and "State" in section 1-1.07B with:

Department: The Contra Costa Transportation Authority except that any references to the Department's forms, websites, manuals, guides, test methods. These shall be defined as forms, websites, manuals, guides, test methods of Caltrans.

State: The Contra Costa Transportation Authority (CCTA), including its authorized officers, employees, agents, consultants and volunteers.

Caltrans

Payment and performance bonds must name the CCTA as obligee and Caltrans as an additional obligee.

The *Notice to Bidders and Special Provisions* includes the *Notice to Bidders*, revised standard specifications, and special provisions.

Section 2-1.06B. Use if supplemental project information is available.

List available supplemental project information.

If railroad relations and insurance requirements are available, insert *Railroad Relations and Insurance Requirements* in the 1st row.

If cross sections are available, insert *Cross sections* in the 2nd row.

If bridge as-built drawings are available, insert *Bridge as-built drawings* in the 2nd row.

If logs of test borings are available, insert *Logs of test borings* in the 3rd row.

Insert the telephone number in the 5th row.

For a District 10 project, insert (209) 948-7934

For districts other than 5, 6, and 10, insert the telephone number to call to schedule a viewing date.

Insert the location and telephone number in the 6th row.

**For a District 5 project, insert 1150 LAUREL LN STE 175
SAN LUIS OBISPO CA
(805) 549-3116.**

**For a District 6 project, insert 2015 E SHIELDS AVE STE 100
FRESNO CA
(559) 230-3115**

Add rows as necessary. Delete nonapplicable rows.

Replace Add to section 2-1.06B of the RSS with:

The Agency Department makes the following supplemental project information available:

Supplemental Project Information

Means	Description
Included in the <i>Information Handout</i>	(a) <u>Balfour Road UC Foundation Report,</u> (b) <u>Deer Creek Bridge at East bound On-ramp Foundation Report,</u> (c) <u>Deer Creek Bridge at SR 4 Foundation Report,</u> (d) <u>Permits - Caltrans Encroachment Permit, State RWQCB 401 Water Quality Certification, Army Corp of Engineers 404, and California Department of Fish and Wildlife Game-1603 Permit,</u> (e) <u>Opt-out Form</u> (f) <u>Cross Sections</u>
Included with the project plans	<u>Log of Test Borings</u>

The Information Handout is available at the same location as the contract documents.

Replace the 1st sentence of the 2nd paragraph in section 2-1.10 of the RSS with

The Subcontractor List form must show the name, address, license number and work portions to be performed by each subcontractor listed.

Delete section 2-1.15 of the RSS

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Delete section 2-1.18 of the RSS

Replace section 2-1.24 with:

After bid verification, the Department breaks a tie between 2 or more bidders with a coin toss.

Delete section 2-1.27 of the RSS

Replace section 2-1.33 of the RSS with:

Complete forms in the *Proposal and Contract* book.

Submit your bid as directed in the Notice to Bidders. Bids not properly marked may be considered nonresponsive. Note several of the documents in the Proposal and Contract must be notarized before being submitted as part of the bid.

Information required of you in the Proposal and Contract may require you to use continuation pages. In such cases, you will describe in the space provided at the bottom of such forms or statements the number of continuation pages used, and unless instructed differently, you will use the "Continuation Page" form, found at the end of the Proposal and Contract. You may make copies of the blank "Continuation Page" as needed. Place any used "Continuation Pages," loosely inside the bound Proposal and Contract immediately after the bound page being continued.

The Bid Schedule in the Proposal and Contract sets the item prices and totals, and must be signed by you. Fill in all blanks in the proposal form, bid schedule and other documents as required in the Proposal and Contract.

Submit the forms and form information at the times shown in the following table:

Bid Form Submittal Schedule				
Contract type	Forms to be submitted at the time of bid	Forms to be submitted no later than 24 hours after bid opening ^a	Forms to be submitted no later than 4 p.m. on the 2nd business day after bid opening ^a	Forms to be submitted no later than 4 p.m. on the 4th business day after bid opening ^a
All contracts	<ul style="list-style-type: none">• Bid to the Department of Transportation• Business name license number and location; description of subcontracted work on the Subcontractor List• Opt Out of Payment Adjustments for Price Index Fluctuations^c	<ul style="list-style-type: none">• Bid item nos. and percentage of bid item subcontracted on the SubcontractorList^b	--	--

^aThe forms and information may be submitted at the time of bid.

^bIf the information is not submitted at the time of bid, fax it to the CCTA at (925) 256-4701 ~~(916) 227-6282~~. This after-bid submittal does not apply to an informal-bid contract. For an informal bid contract, submit the completed form at the time of bid.

^cApplicable only if the preference or option is chosen.

Failure to submit the forms and information as specified results in a nonresponsive bid.

If an agent other than the authorized corporation officer or a partnership member signs the bid, file a Power of Attorney with the Department either before opening bids or with the bid. Otherwise, the bid may be nonresponsive.

Submit your bid with one of the following forms of bidder's security equal to at least 10 percent of the bid:

If using a bidder's bond, you must use the form in the Proposal and Contract book.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

After bid verification, the Agency breaks a tie between 2 or more bidders with a coin toss.

Replace “Reserved” section 3-1.03 with:

3-1.03 BID PROTESTS

For purpose of this bid protest procedure, the following definitions apply:

- a) “Bid Protest” means a protest filed by the bidder on this contract which
 - i. claims that one or more bidders on the contract should be disqualified or rejected for any reason;
 - ii. contests an Authority staff recommendation to award the contract to a particular bidder; or
 - iii. contests an Authority staff recommendation to disqualify or reject one or more bidders on the contract.
- b) “Protested Bidder” means a bidder on a contract which the bid protest claims should be disqualified or rejected.
- c) “Protesting Bidder” means a bidder on a contract, or such bidder’s authorized representative, who files a bid protest on the contract.
- d) “Written Notice” means notice to be given in writing addressed to the Authority, the protesting bidder or protested bidder (as appropriate). Delivered by registered or certified mail (return receipt requested), by personal delivery or by any other method that provides reliable evidence of the date and time of receipt. Written notice provided by personal delivery will be deemed received on the date and time of delivery, except as expressly authorized, facsimile or electronic mail will not be used to provide written notice. If permitted, facsimile or electronic mail notice will be considered received on the date and time that transmission is confirmed by the transmitting equipment.

Only a bidder on a contract or such bidder’s authorized representative may file a bid protest.

Bid protest must be received after bid opening and before 4:00 PM on the fifth (5th) working day after receipt of staff’s recommendation for award of the contract. Recommendation for award may be transmitted by facsimile. Bid protests received after the deadline or violate these requirements will not be considered.

Bid protests must be in writing and must:

- 1. Include the name, address, telephone, and facsimile telephone numbers of the Protesting Bidder
- 2. Identify the contract which the bid protest pertains to, including the contract number and the date of bid opening
- 3. identify and explain the factual and legal basis for the protest,
- 4. by attachment to the bid protest, include any written materials that the bid protester wishes to have considered in connection with the protest.

Submit bid protest to:
Deputy Executive Director, Projects
Contra Costa Transportation Authority
2999 Oak Road, Suite 100
Walnut Creek, CA 94597

If the bid protest is properly filed, a copy will be provided to the Protested Bidder and the protest will be reviewed by the Authority staff. On request, you will provide promptly any additional information necessary for staff to conduct its review of the bid protest. Staff may, but will not be obligated, to hold a meeting or meetings to obtain additional information and to seek to resolve the matter. If a meeting is held, staff will give notice to the Protesting Bidder and the Protested Bidder, indicating the time and place

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

of the meeting. Bid protest will be withdrawn and no longer considered by the Authority if you fail to attend any meeting.

At the conclusion of its review, the staff will provide the Protesting Bidder and the Protested Bidder written notice of their recommendation with a brief explanation with respect to the bid protest. No later than 4:00 PM on the third (3rd) working day after the date notice is received, any party objecting to the recommendation will provide written notice to the Authority requesting a hearing on the bid protest. If no such notice is received, the recommendation of the staff will be considered accepted by the parties, and the recommendation will be forwarded to the Authority Board for action.

If a timely request for a hearing is received the matter will be referred to a Bid Protest Panel consisting of three persons;

1. one member of the Staff of the Authority,
2. one member of the Authority Board and
3. one non- Authority staff member knowledgeable with respect to matters related to public contracts and bid protests, who may be an employee of another public agency.

The Chair of the Authority will select the panel member from the Authority Board, who will be the Chair of the panel. The Executive Director will select the remaining panel members. The Chair of the panel will promptly convene the panel to hear the bid protest. Notice will be given to the Protesting Bidder and the Protested Bidder of the time and place of the hearing.

The bid protest and staff's recommendation regarding the protest will be submitted to the Panel for consideration at the hearing. The Panel will allow the parties and Authority staff an opportunity to present additional evidence and argument limited to the facts and legal issues raised in the bid protest at the hearing. After the hearing the Panel will do one of the following:

- A. Accept the recommendation of staff as submitted,
- B. Amend the staff recommendation, or
- C. Recommend the rejection of all bids.

The decision of the Panel is final with respect to the disposition of bid protest. The Panel's recommendation will be forwarded to the Authority Board. The Authority Board's will either award the contract as recommended by the Panel or reject all bids.

Replace section 3-1.04 with:

The Authority will either award the Contract or reject all bids within 45 days from bid opening.

After award, the Authority will issue a letter to the lowest responsible bidder enclosing the contract documents. You must sign and return the contract documents, contract bonds and insurance forms, within the period allowed under Section 3-1.18. Failure to execute the Contract and file acceptable required bonds and insurance will result in the forfeiture of your bid security. The Authority may then elect to award the Contract to the next lowest responsible bidder.

Replace section 3-1.05 with:

The successful bidder must furnish two bonds:

1. Payment bond to secure the claim payments of laborers, workers, mechanics, or material men providing goods, labor, or services under the Contract. This bond must be equal to at least 100 percent of the total bid.
2. Performance bond to guarantee the faithful performance of the Contract. This bond must be equal to at least 100 percent of the total bid.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

Sureties on each bond will be an admitted surety insurer, as defined in Code of Civil Procedure section 995.120, authorized to do business in the State of California and satisfactory to the Authority. Payment and performance bonds must name the CCTA as obligee and Caltrans as an additional obligee.

The successful bidder must provide the Authority 30 days notice before canceling or reducing any required bonds.

The successful bidder must replace any bond the Authority deems insufficient or finds the surety unsatisfactory within 10 days of receiving written notice from the Authority. No further payments will be due or made under the Contract until you have provided a bond placed with a surety deemed acceptable by the Authority.

The following are copies of the Performance Bond and the Payment Bond forms furnished by the Authority. The successful bidder must furnish the Payment Bond and Performance Bond on the forms supplied by the Authority.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

PERFORMANCE BOND

KNOW ALL PERSONS BY THESE PRESENTS:

THAT WHEREAS, the CONTRA COSTA TRANSPORTATION AUTHORITY (hereinafter referred to as "Authority") has awarded to _____, (hereinafter referred to as the "Contractor") _____ an agreement for _____ the "Project").
(hereinafter referred to as _____)

WHEREAS, the work to be performed by the Contractor is more particularly set forth in the Contract Documents for the Project dated _____, (hereinafter referred to as "Contract Documents"), the terms and conditions of which are expressly incorporated herein by reference; and

WHEREAS, the Contractor is required by the Contract Documents to perform the terms thereof and to furnish a bond for the faithful performance of the Contract Documents.

NOW, THEREFORE, we, _____, the undersigned Contractor and _____ as Surety, a corporation organized and duly authorized to transact business under the laws of the State of California, are held and firmly bound unto the Authority in the sum of _____ DOLLARS, (\$ _____), the sum being not less than one hundred percent (100%) of the total amount of the Contract, for which amount well and truly to be made, we bind ourselves, our heirs, executors and administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that, if the Contractor, his or its heirs, executors, administrators, successors or assigns, shall in all things stand to and abide by, and well and truly keep and perform the covenants, conditions and agreements in the Contract Documents and any alteration thereof made as therein provided, on its part, to be kept and performed at the time and in the manner therein specified, and in all respects according to their intent and meaning; and shall faithfully fulfill all obligations including the one-year guarantee of all materials and workmanship; and shall indemnify and save harmless the Authority, its officers and agents, as stipulated in the Contract Documents, then this obligation shall become null and void; otherwise it shall be and remain in full force and effect.

As a condition precedent to the satisfactory completion of the Contract Documents, unless otherwise provided for in the Contract Documents, the guarantee obligation shall hold good for a period of one (1) year after the acceptance of the work by Authority, during which time if Contractor shall fail to make full, complete, and satisfactory repair and replacements and totally protect the Authority from loss or damage resulting from or caused by defective materials or faulty workmanship, Surety shall undertake and faithfully fulfill all such obligations. The obligations of Surety hereunder shall continue so long as any obligation of Contractor remains. Nothing herein shall limit the Authority's rights or the Contractor or Surety's obligations under the Contract, law or equity, including, but not limited to, California Code of Civil Procedure section 337.15.

As a part of the obligation secured hereby and in addition to the face amount specified therefor, there shall be included costs and reasonable expenses and fees including reasonable attorney's fees, incurred by Authority in enforcing such obligation.

Whenever Contractor shall be, and is declared by the Authority to be, in default under the Contract Documents, the Surety shall remedy the default pursuant to the Contract Documents, or shall promptly, at the Authority's option:

- (1) Take over and complete the Project in accordance with all terms and conditions in the Contract Documents; or
- (2) Obtain a bid or bids for completing the Project in accordance with all terms and conditions in the Contract Documents and upon determination by Surety of the lowest responsive and responsible bidder, arrange for a Contract between such bidder, the

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Surety and the Authority, and make available as work progresses sufficient funds to pay the cost of completion of the Project, less the balance of the contract price, including other costs and damages for which Surety may be liable. The term "balance of the contract price" as used in this paragraph shall mean the total amount payable to Contractor by the Authority under the Contract and any modification thereto, less any amount previously paid by the Authority to the Contractor and any other set offs pursuant to the Contract Documents.

- (3) Permit the Authority to complete the Project in any manner consistent with local, California and federal law and make available as work progresses sufficient funds to pay the cost of completion of the Project, less the balance of the contract price, including other costs and damages for which Surety may be liable. The term "balance of the contract price" as used in this paragraph shall mean the total amount payable to Contractor by the Authority under the Contract and any modification thereto, less any amount previously paid by the Authority to the Contractor and any other set offs pursuant to the Contract Documents.

Surety expressly agrees that the Authority may reject any contractor or subcontractor which may be proposed by

Surety in fulfillment of its obligations in the event of default by the Contractor.

Surety shall not utilize Contractor in completing the Project nor shall Surety accept a bid from Contractor for completion of the Project if the Authority, when declaring the Contractor in default, notifies Surety of the Authority's objection to Contractor's further participation in the completion of the Project.

The Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract Documents or to the Project to be performed thereunder shall in any way affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract Documents or to the Project.

[Remainder of Page Left Intentionally Blank.]

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

IN WITNESS WHEREOF, we have hereunto set our hands and seals this _____ day of _____, 20____.

CONTRACTOR/PRINCIPAL

Name

By _____
SURETY:

By: _____
Attorney-In-Fact

Signatures of those signing for the Contractor and Surety must be notarized and evidence of corporate authority attached.

The rate of premium on this bond is _____ per thousand. The total amount of premium charges, \$_____.
(The above must be filled in by corporate attorney.)

THIS IS A REQUIRED FORM

Any claims under this bond may be addressed to:

(Name and Address of Surety)

(Name and Address of Agent or Representative for service of process in California, if different from above)

(Telephone number of Surety and Agent or Representative for service of process in California)

ACKNOWLEDGMENT

State of California

County of _____)

On
before me,

(insert name and title of the officer)

personally appeared

,

who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

NOTE: A copy of the Power-of-Attorney to local representatives of the bonding company must be attached hereto.

PAYMENT BOND (LABOR AND MATERIALS)

KNOW ALL MEN BY THESE PRESENTS THAT

WHEREAS, the CONTRA COSTA TRANSPORTATION AUTHORITY (hereinafter designated as the "Authority"), by action taken or a resolution passed _____, 20____ has awarded to hereinafter designated as the "Principal," a contract for the work described as follows:

(the "Work"); and

WHEREAS, Principal is required to furnish a bond in connection with the contract described above; providing that if Principal or any of its Subcontractors shall fail to pay for any materials, provisions, provender, equipment, or other supplies used in, upon, for or about the performance of the work contracted to be done, or for any work or labor done thereon of any kind, or for amounts due under the Unemployment Insurance Code or for any amounts required to be deducted, withheld, and paid over to the Employment Development Department from the wages of employees of Principal and its Subcontractors with respect to such work or labor the Surety on this bond will pay for the same to the extent hereinafter set forth.

NOW THEREFORE, we, the Principal and _____ as Surety, are held and firmly bound unto the Authority in the penal sum of _____ Dollars (\$ _____), the sum being not less than one hundred percent (100%) of the total amount of the Contract, lawful money of the United States of America, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that if Principal, his or its subcontractors, heirs, executors, administrators, successors or assigns, shall fail to pay any of the persons named in Section 9100 of the Civil Code, fail to pay for any materials, provisions or other supplies, used in, upon, for or about the performance of the work contracted to be done, or for any work or labor thereon of any kind, or amounts due under the Unemployment Insurance Code with respect to work or labor performed under the contract, or for any amounts required to be deducted, withheld, and paid over to the Employment Development Department or Franchise Tax Board from the wages of employees of the contractor and his subcontractors pursuant to Section 18663 of the Revenue and Taxation Code, with respect to such work and labor the Surety or Sureties will pay for the same, in an amount not exceeding the sum herein above specified, and also, in case suit is brought upon this bond, all litigation expenses incurred by the Authority in such suit, including reasonable attorneys' fees, court costs, expert witness fees and investigation expenses.

This bond shall inure to the benefit of any of the persons named in Section 9100 of the Civil Code so as to give a right of action to such persons or their assigns in any suit brought upon this bond.

It is further stipulated and agreed that the Surety on this bond shall not be exonerated or released from the obligation of this bond by any change, extension of time for performance, addition, alteration or modification in, to, or of any contract, plans, specifications, or agreement pertaining or relating to any scheme or work of improvement herein above described, or pertaining or relating to the furnishing of labor, materials, or equipment therefore, nor by any change or modification of any terms of payment or extension of the time for any payment pertaining or relating to any scheme or work of improvement herein above described, nor by any rescission or attempted rescission or attempted rescission of the contract, agreement or bond, nor by any conditions precedent or subsequent in the bond attempting to limit the right of recovery of claimants otherwise entitled to recover under any such contract or agreement or under the bond, nor by any fraud practiced by any person other than the claimant seeking to recover on the bond and that this bond be construed most strongly against the Surety and in favor of all persons for whose benefit such bond is given, and under no circumstances shall Surety be released from liability to those for whose benefit such bond has been given, by reason of any breach of contract between the owner or Authority and original contractor or on the part of any obligee

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

named in such bond, but the sole conditions of recovery shall be that claimant is a person described in Section 9100 of the Civil Code, and has not been paid the full amount of his claim and that Surety does hereby waive notice of any such change, extension of time, addition, alteration or modification herein mentioned and the provisions of Sections 2819 and 2845 of the Civil Code.

[Remainder of Page Left Intentionally Blank.]

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

IN WITNESS WHEREOF, two (2) identical counterparts of this instrument, each of which shall for all purposes be deemed an original thereof, have been duly executed by the Principal and Surety above named, on the

day of _____ 20____ the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative pursuant to authority of its governing body.

(Corporate Seal of Principal,
if corporation)

Principal (Property Name of Contractor)

By _____
(Signature of Contractor)

(Seal of
Surety)

Surety

By _____
Attorney in Fact

Signatures of those signing for the Contractor and Surety must be notarized and evidence of corporate authority attached. A copy of the Power-of-Attorney to local representatives of the bonding company must be attached hereto.

[Remainder of Page Left Intentionally Blank.]

ACKNOWLEDGMENT

State of California

County of _____)

On
before me,

(insert name and title of the officer)

personally appeared
,

who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

NOTE: A copy of the Power-of-Attorney to local representatives of the bonding company must be attached hereto.

Replace section 3-1.18 with:
The Contract Form is included in the Proposal and Contract.

A. The originals and one copy of each of the contract bonds. B. One of the following:

1. Two copies of a certificate of consent to self-insure issued by the Director of Industrial Relations of the State of California, or
2. Two copies of a certificate of worker's compensation insurance issued by an admitted insurer, or
3. Two copies of a certificate of worker's compensation insurance, certified by the Director of Industrial Relations of the State of California or the insurer.

C. Two copies of certificates of insurance for the Bidder's insurance policies and endorsements thereto. D. If requested by the Authority, complete copies of any insurance policy that provides coverage required under this contract. If requested by you, the Authority will return the policy after having reviewed it.

The bidder's security may be forfeited for failure to execute the contract within the time specified (Pub Cont Code §§ 10181, 10182, and 10183).

4 SCOPE OF WORK

Within 15 days from notification of the Engineer's determination, you must file an Initial Potential Claim Record under Section 5-1.43, otherwise the decision of the Engineer is considered correct and final and accepted by you.

1. your position as it differs from the Engineer's determination
2. any additional information obtained by you, including additional geotechnical data
3. your certification that the following were made in preparation of the bid:
 - a. a review of the contract, the reports included in the Informational Handout, the log of test borings and other records of geotechnical data that were made available to you before bid opening
 - b. an examination of the conditions above ground at the job site

Contract Number 04-4H1604	44	Special Provisions
---------------------------	----	--------------------

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

All utilities relocated prior to construction per CG **KG10/23/13
{ XE "5-1.36D_A05-20-11" }
Page 1 of 2

Section 5-1.36D. Use if utilities are to be relocated during construction or if utilities are involved with pile driving, drilling, or substructure construction.

Add to section 5-1.36D:

1. Use if the date of relocation is known. Identify each utility and relocation date.

The utility owner will relocate a utility shown in the following table before the corresponding date shown:

Utility Relocation and Date of the Relocation

Utility	Location	Date

2. Use if the Department has arranged the relocation schedule with the utility owner. Identify each utility and number of days for its relocation.

During the progress of the work under this Contract, the utility owner will relocate a utility shown in the following table within the corresponding number of days shown. Notify the Engineer before you work near a utility shown. The days start on the notification date.

Utility Relocation and Department-Arranged Time for the Relocation

Utility	Location	Days

3. Use if the Contractor is to arrange the relocation schedule with the utility owner. Identify each utility and number of days for its relocation.

Installation of the utilities shown in the following table requires coordination with your activities. Make the necessary arrangements with the utility company through the Engineer and submit a schedule:

1. Verified by a representative of the utility company
2. Allowing at least the time shown for the utility owner to complete its work

Utility Relocation and Contractor-Arranged Time for the Relocation

Utility	Utility address	Location	Days

4. Use if utilities are being rearranged to permit pile driving, drilling activities, or substructure construction. Identify each utility and its location.

To allow pile driving, drilling activities, or substructure construction, the utility owner will rearrange the utilities shown in the following table during construction activities. No other utility will be rearranged or temporarily deactivated before or during construction activities for this purpose unless you make arrangements with the utility owner. Notify the Engineer at least 30 days before the interfering utilities are to be rearranged. The Engineer notifies the utility owners.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCA Contract No. XXX**

Utility Rearrangement for Pile Driving, Drilling Activities, or Substructure Construction

Utility	Location

5. Use if utilities are not being rearranged to permit pile driving, drilling activities, or substructure construction. Identify each utility and its location.

The utilities shown in the following table will not be rearranged. The utilities may interfere with pile driving, drilling activities, or substructure construction. If you want any of them rearranged or temporarily deactivated, make arrangements with the utility owner.

Utilities Not Rearranged for Pile Driving, Drilling Activities, or Substructure Construction

Utility	Location

The Contractor must coordinate with other contractors and/or operations managers on adjacent projects, to minimize potential conflicts and coordinate traffic control. The Contractor must also coordinate with and accommodate other segment contractors when preparing operations and work schedules.

Add to Section 5-1.20B(1):

Make all Permits available to operating personnel during construction activities. You are responsible for all fines, damages and job delays incurred due to failure to implement the requirements of the Permits.

Replace "Reserved" section 5-1.20D with:

5-1.20D Relations with Caltrans

An encroachment permit has been issued to the Authority by Caltrans for work within Caltrans right of way. You must be fully informed of and comply with the requirements of this encroachment permit as well as rules, regulations, and conditions that may govern your activities within the Caltrans right-of-way and should conduct the work accordingly.

You must obtain an encroachment permit rider from Caltrans before working within the State right of way.

A fee may apply.

Add section 5-1.20G:

5-1.20G Relations with City of Brentwood

You must obtain an encroachment permit from the City of Brentwood before working within the City right of way. Obtain permit application information from:

<http://www.brentwoodca.gov/department/pw/engineering/development/documents/EncroachmentPermitApp.pdf>

A fee may apply.

Add new section 5-1.20H:

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

5-1.20H Local Agency Coordination

Within one week after the Pre-construction Conference, provide copies of the project schedule to the following emergency services and local agencies:

Brentwood Police Department	(925) 634-3400
ECC Fire District	(925) 634-3400
Local Ambulance Service	(925) 435-5000
Pacific Gas & Electric-Electric (Sal Tejada)	(925) 674-6477
Pacific Gas & Electric-Gas(Greg Palmeri)	(925) 674-6374
AT&T (Karen Brinkman)	(925) 823-1622
California Highway Patrol	(510) 286-6913
Comcast/Cable Com (Ben Greenwood)	(925) 349-3481

Immediately notify each agency of any changes to the schedule or any unplanned construction activity or project situation that might reasonably be expected to affect the agencies' or services' ability to perform their missions.

Add section 5-1.20I:

5-1.20I Relations with Contra Costa Water District

You must obtain a construction permit from the Contra Costs Water District before working on their facilities. Obtain permit application information from:

<http://www.ccwater.com/Permits/constructionpermit.pdf>

You must also provide the necessary insurance certificate(s) and sign the acknowledgement page from the Contractor Safe Practices Handbook at:

<http://www.ccwater.com/files/safepracticeshandbook.pdf>

A fee may apply.

Replace section 5-1.23A with:

Section 5-1.23 includes specifications for action and informational submittals.

Submit action and informational submittals to the Engineer.

Any submittal not specified as an informational submittal is an action submittal.

When the contract requires submittals to the Office of Structure Design (OSD) Documents Unit, submit them to the Engineer instead.

Each sheet of a submittal must include:

1. Contract number
2. District–County–Route–Post Mile
3. Structure name and number, if any
4. A transmittal form –
 - a) A separate form for each specific item, class of material, equipment.
 - b) A single form if the items taken together constitute a manufacturer's package or are so functionally related that expediency indicates checking or review of the group or package as a whole.
 - c) A unique number, sequentially assigned, will be noted on the transmittal form accompanying each item submitted. Submittal numbers shall will have the following format: "XX.YY (SP NN-N.NN)"; where "XX" is the sequential number assigned by you, "YY" is the sequential number of the submittal ("01" for the first submittal, "02" for the second submittal, etc.), and "(SP or SS NN-N.NN)" identifies the Special Provision (SP) or Standard Specification (SS) section number that requires the submittal. For example, if the twelfth submittal you make is for falsework, under Section 48-2, the initial submittal would be "12.01 (SS 48-2)". If a re-submittal were required, it

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

would be "12.02 (SS 48-2)."

- d) Indicate on the form if material, equipment, or method of work deviates from the plans and specifications.

The Department rejects a submittal if it has any error or any omission. Convert foreign language documents to English and U.S. customary units.

Submittal reviews will be only for general conformance with the design concept and general compliance with the Plans and Specifications. It will not include review of quantities, dimensions, coordination with the work, or construction safety precautions, all of which are your sole responsibility.

Review of drawings, methods of work, or information regarding materials or equipment you propose to provide will not relieve you of your responsibility for errors and will not be regarded as an assumption of risks or liability by the Authority, or by any officer or employee or by any engineering firm conducting such review on behalf of the Authority, and you will have no claim under the Contract on account of the failure, or partial failure, of the method of work, material, or equipment so reviewed.

Review of a specific item will not indicate acceptance of an assembly of which the item is a component. The Engineer will not be required to review and will not be responsible for any deviations from the Plans and Specifications not clearly noted by you, nor will the Engineer be required to review partial submissions or those for which submissions for correlated items have not been received.

The Engineer will have sole authority for determining the conformance to the specification of each item.

You are responsible for:

1. Providing submittals in a timely way to not claim extension of contract time or additional compensation
2. Accuracy and completeness of submittal information
3. Material, equipment, or method of work will be used as described in the submittal
4. Ensuring that there are no conflicts with other submittals
5. Ensuring coordination of submittals

Your failure to provide submittals in a timely manner will not be cause for extension of contract time or claims for additional compensation.

Add after the 6th paragraph in section 5-1.23B(1):

If the Contract requires a (re)submittal, you will submit eight copies to the Authority.

Unless otherwise specified, within 30 working days after receipt of the (re)submittal, the Engineer will review the (re)submittal and return three copies to you. The returned (re)submittal will indicate one of these actions:

1. If the review indicates that the material, equipment, or work method is in general conformance with the design concept and complies with the Contract requirements, (re)submittal copies will be marked "NO EXCEPTION TAKEN." In this event, you may start the work method or incorporate the material or equipment covered by the (re)submittal.
2. If the review indicates limited corrections are required, copies will be marked, "MAKE CORRECTIONS NOTED." You may start the work method or incorporating the material and equipment covered by the (re)submittal with the noted corrections. Where (re)submittal information will be incorporated in Operation and Maintenance Data, a corrected copy will be provided.
3. If the review reveals that the (re)submittal is insufficient or contains incorrect data, copies will be marked "REVISE AND RESUBMIT." Except at its own risk, you should not undertake work covered by this (re)submittal until it has been revised, resubmitted, and returned marked either, "NO EXCEPTION TAKEN" or "MAKE CORRECTIONS NOTED."
4. If the review indicates the material, equipment, or work method cannot conform to the design concept and does not comply with the Contract requirements, (re)submittal copies will be marked "REJECTED." You should not undertake work covered by this (re)submittal until a new submittal for

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

this work has been submitted and returned marked "NO EXCEPTION TAKEN" or "MAKE CORRECTIONS NOTED."

A mark of "NO EXCEPTION TAKEN" or "MAKE CORRECTIONS NOTED" means that the Authority has no objection to you, at your own risk, using the plan or method of work proposed, or providing the materials or equipment proposed.

The Engineer will be provided the review times designated in these Contract Documents. The reviews of re- submittals are to be allotted the same review time specified for the initial submittal. Where a review time is not specified, the Engineer will be provided 30 business days for review and any subsequent re-review.

Replace the 2nd paragraph in section 5-1.27E with:

Submit change order bills to the Engineer.

Delete the 3rd thru 5th paragraph in section 5-1.27E

Replace section 5-1.31 with:

Keep the job site neat. In areas visible to the public:

- A. Dispose of broken concrete and debris concurrently with its removal. If stockpiling is necessary, dispose of weekly.
- B. Furnish trash bins for debris from construction. Place debris in trash bins daily. Stack forms or falsework that are to be re-used neatly and concurrently with their removal. Dispose of forms and falsework that are not to be re-used concurrently with their removal.
- C. All trash, debris, and recycle bins, cans or containers of any kind will have a closeable top and be closed tightly at the end of each shift on each day. No debris will be visible through covering. Failure to cover bins, cans or containers daily will result in a \$500 deduction for each occurrence. This deduction is in
- D. addition to all other retentions or deductions identified under these Special Provisions.

Add to the end of the 2nd paragraph in section 5-1.32:

You will secure, at your own expense, areas required for plant sites, storage of equipment or materials, or for other purposes.

Add to the end of the 1st paragraph in section 5-1.39A:

Your expense in the event such injuries, losses or damages are caused by acts of the federal government or the public enemy will be limited to the Contract Price.

Add after the 1st paragraph in section 5-1.42:

The RFI must

- 1. be submitted as soon as possible after you have discovered the need for additional information or clarification.
- 2. state your question or concern clearly.
- 3. reference the specification or plan sheet in question.
- 4. state the date of the RFI and the date by which you must have an answer in order not to delay your activities.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

The Prime Contractor will submit all RFI's.

Add to section 5-1.43A:

Follow Govt Codes §§ 900 et seq and 910 et seq, and these procedures when filing claims against the Authority. File all claims with the Chief Financial Officer (CFO) of the Contra Costa Transportation Authority.

Submit all claims in writing and accompanied by substantiating documentation. Claims must be filed on or before the date of final payment unless other notice requirements are provided in the contract.

"Claim" means a separate demand by you for:

1. a time extension,
2. payment of money or damages arising from work done by or on your behalf and payment of which is not otherwise expressly provided for or you are not otherwise entitled, or
3. an amount the payment of which is disputed by the Authority.

Replace section 5-1.43E with:

5-1.43E Arbitration

Under Pub Cont Code § 20104(a), all claims by Contractor of \$375,000 or less are subject to Article 1.5 (commencing with § 20104) of Ch 1 of Pt 3 of the Pub Cont Code, which is incorporated into the contract and which provides as follows:

§ 20104.

ARTICLE 1.5
Resolution of Construction Claims

- (a) (1) This article applies to all public works claims of three hundred seventy-five thousand dollars (\$375,000) or less which arise between a contractor and a local agency.
- (2) This article shall not apply to any claims resulting from a contract between a contractor and a public agency when the public agency has elected to resolve any disputes pursuant to Article 7.1 (commencing with Section 10240) of Chapter 1 of Part 2.
- (b) (1) "Public work" has the same meaning as in Sections 3100 and 3106 of the Civil Code, except that "public work" does not include any work or improvement contracted for by the state or the Regents of the University of California.
- (2) "Claim" means a separate demand by the contractor for (A) a time extension, (B) payment of money or damages arising from work done by or on behalf of the contractor pursuant to the contract for a public work and payment of which is not otherwise expressly provided for or the claimant is not otherwise entitled to, or (C) an amount the payment of which is disputed by the local agency.
- (c) The provisions of this article or a summary thereof shall be set forth in the plans or specifications for any work which may give rise to a claim under this article.
- (d) This article applies only to contracts entered into after December 31, 1990.

§ 20104.2 For any claim subject to this article, these requirements apply:

- (a) The claim shall be in writing and include the documents necessary to substantiate the claim. Claims must be filed on or before the date of final payment. Nothing in this subdivision is intended to extend the time limit or supersede notice requirements otherwise provided by contract for the filing of claims.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

- (b) (1) For claims of less than fifty thousand dollars (\$50,000), the local agency shall respond in writing to any written claim within 45 days of receipt of the claim, or may request, in writing, within 30 days of receipt of the claim, any additional documentation supporting the claim or relating to defenses or claims the local agency may have against the claimant.
- (2) If additional information is thereafter required, it shall be requested and provided pursuant to this subdivision, on mutual agreement of the local agency and the claimant.
- (3) The local agency's written response to the claim, as further documented, shall be submitted to the claimant within 15 days after receipt of the further documentation or within a period of time no greater than that taken by the claimant in producing the additional information, whichever is greater.
- (c) (1) For claims of over fifty thousand dollars (\$50,000) and less than or equal to three hundred seventy-five thousand dollars (\$375,000), the local agency shall respond in writing to all written claims within 60 days of receipt of the claim, or may request, in writing, within 30 days of receipt of the claim, any additional documentation supporting the claim or relating to defenses or claims the local agency may have against the claimant.
- (2) If additional information is thereafter required, it shall be requested and provided pursuant to this subdivision, on mutual agreement of the local agency and the claimant.
- (3) The local agency's written response to the claim, as further documented, shall be submitted to the claimant within 30 days after receipt of the further documentation, or within a period of time no greater than that taken by the claimant in producing the additional information or requested documentation, whichever is greater.
- (d) If the claimant disputes the local agency's written response, or the local agency fails to respond within the time prescribed, the claimant may so notify the local agency, in writing, either within 15 days of receipt of the local agency's response or within 15 days of the local agency's failure to respond within the time prescribed, respectively, and demand an informal conference to meet and confer for settlement of the issues in dispute. On a demand, the local agency shall schedule a meet and confer conference within 30 days for settlement of the dispute.
- (e) If after the meet and confer conference the claim or any portion remains in dispute, the claimant may file a claim pursuant to Chapter 1 (commencing with Section 900) and Chapter 2 (commencing with Section 910) of Part 3 of Division 3.6 of Title 1 of the Government Code. For purposes of those provisions, the running of the period of time within which a claim must be filed shall be tolled from the time the claimant submits his or her written claim pursuant to subdivision (a) until the time the claim is denied, including any period of time utilized by the meet and confer conference.

§ 20104.4 These procedures are established for all civil actions filed to resolve claims subject to this article:

- (a) Within 60 days, but no earlier than 30 days, after the filing or responsive pleadings, the court shall submit the matter to non-binding mediation unless waived by mutual stipulation of both parties. The mediation process shall provide for the selection within 15 days by both parties of a disinterested third person as mediator, shall be commenced within 30 days of the submittal, and shall be concluded within 15 days from the commencement of the mediation unless a time requirement is extended on a good cause showing to the court.
- (b) (1) If the matter remains in dispute, the case shall be submitted to judicial arbitration pursuant to

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CTA Contract No. XXX**

Chapter 2.5 (commencing with Section 1141.10) of Title 3 of Part 3 of the Code of Civil Procedure, notwithstanding Section 1141.11 of that code. The Civil Discovery Act of 1986 (Article 3 (commencing with Section 2016) of Chapter 3 of Title 3 of Part 4 of the Code of Civil Procedure) shall apply to any proceeding brought under this subdivision consistent with the rules pertaining to judicial arbitration.

(2) In addition to Chapter 2.5 (commencing with Section 1141.10) of Title 3 of Part 3 of the Code of Civil Procedure, (A) arbitrators shall, when possible, be experienced in construction law, and (B) any party appealing an arbitration award who does not obtain a more favorable judgment shall, in addition to payment of costs and fees under that chapter, also pay the attorney's fees on appeal of the other party.

§ 20104.6

- (a) No local agency shall fail to pay money as to any portion of a claim which is undisputed except as otherwise provided in the contract.
- (b) In any suit filed under Section 20104.4, the local agency shall pay interest at the legal rate on any arbitration award or judgment. The interest will start to accrue on the date the suit is filed in a court of law.

Replace section 5-1.46 with:

When you complete the work, request the Engineer's final inspection

If the Engineer determines that the work is complete, the Engineer recommends Contract acceptance by the Authority. 30 days after contract acceptance by the Authority, you are relieved from:

- 1. Maintenance and protection duties
- 2. Responsibility for injury to persons or property or damage to the work not as a result of your negligence occurring after Contract acceptance except as specified in section 6-3.06

Submit all outstanding project documents (including materials certifications, labor compliance documentation and all other required project closeout forms and documentation) within 30 days of the issuance of the Proposed Final Payment. If the 30th day does not fall on a business day, submit before the close of business on the next business day.

Should you fail to submit the documents as required, you will pay liquidated damages of \$1,000.00 to the Authority for each business day until the documentation is received. These liquidated damages are in addition to liquidated damages specified under section 8-1.10.

In the event you provide a written statement of claims this section will apply to all unrelated project documentation required to close out the project.

^

6 CONTROL OF MATERIALS

Section 6-2.03. Use for Department-furnished materials.

Add items as necessary.

Delete any item not furnished by the Department.

Change Model 170 controller assembly as applicable.

Insert the plant numbers as shown on the plans and address where the Contractor is to pick them up.

Add to section 6-2.03:

1

JS

The Department furnishes you with:

- ~~Sign panels for roadside signs and overhead sign structures~~
- ~~Sign overlay panels for roadside signs and overhead sign structures~~
- ~~Mast arm sign hanger assemblies~~
- ~~Laminated wood box posts with metal caps for roadside signs~~
- ~~Hardware for mounting sign panels as follows:~~
 - ~~Aluminum closure inserts for multiple panel laminated signs~~
 - ~~A-1 and A-2 mounting hardware for mounting laminated sign panels on overhead sign structures~~
 - ~~A-3 mounting hardware for mounting overhead formed panels~~

**** KG 6/24/14**

- Disks for survey monuments
- ~~Marker panels, including reflectors, for Type N, Type P, and Type R object markers~~
- ~~Concrete barrier markers~~
- ~~Magnetic detector amplifiers and magnetic sensing elements~~
- Loop detector sensor units

JS

**** Edited based on discussion with CT Reviewer
(only 2070 controllers are now being distributed by HQ)**

- ~~Model 470 2070 controller assembly, including controller unit, completely wired controller cabinet, and loop detector sensor units~~
- ~~Model 470 2070 controller assembly, including controller unit, completely wired controller cabinet, and loop detector sensor units~~
- ~~Modems~~
- ~~Individual or axle type scales for materials hauling equipment on bridges~~
- ~~Components of battery backup system as follows:~~
 - ~~Inverter/charger unit~~
 - ~~Power transfer relay~~
 - ~~Manually operated bypass switch~~
 - ~~Battery harness~~
 - ~~Utility interconnect wires~~
 - ~~Battery temperature probe~~
 - ~~Relay contact wires~~
- ~~Plants numbered _____ on the plans. Pick these plants up at _____.~~
- ~~Recycled water signs, labels, decals, and tags~~

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

2. Use if the Department furnishes controller assemblies. Insert address.

JS

The Department furnishes you with completely wired controller cabinets with auxiliary equipment but without controller unit at 30 Rickard Street, San Francisco, CA 94134, (415) 330-6500. At least 48 hours before you pick up the materials, inform the Engineer of what you will pick up and when you will pick it up.

3. Use if the Department furnishes a changeable message sign. Insert address.

JS

The Department furnishes you with a Model 500 changeable message sign, wiring harness, and controller assembly, including the controller unit and completely wired cabinet, at _____. At least 48 hours before you pick up the materials, inform the Engineer of what you will pick up and when you will pick it up.

4. Use if the Contractor is to pick up Department-furnished sign panels and overlay panels from the district warehouse. Insert address and telephone number.

JS

The Department furnishes you with sign panels and overlay panels at the district warehouse at _____. At least 48 hours before you pick up the materials, inform the Engineer and the district warehouse manager of what you will pick up and when you will pick it up. Also, inform the manager of the number, type, and size of the sign panels and Contract number. The manager's telephone number is (____) ____-____.

5. Use if the Department furnishes recycled materials. Insert material, address, and telephone number.

JS

The Department furnishes you with _____ at the district recycle center at _____. At least 48 hours before you pick up the materials, inform the Engineer and the district recycle coordinator of the Contract number, what you will pick up, and when you will pick it up. The coordinator's telephone number is (____) ____-____.

6. Use if the Department does not furnish replacement plants.

JS

You must furnish replacement plants. The Department does not pay you for the replacement plants.

7. Use if the Department furnishes replacement plants. Insert each plant name and its deduction.

JS

The Department furnishes you with replacement plants at the same location as the original plants. For each replacement plant, the Department deducts the amount shown in the following table. If you do not plant all of the replacement plants before work completion, return unplanted plants to the location designated by the Engineer. If the plants are fit for future use, the Department credits you for them.

Replacement-Plant Deductions

Botanical name (common name)	Deduction per plant (\$)

Replace the last sentence in the 1st paragraph in section 6-3.02 with:

Under Pub Cont Code § 3400, you may submit requests for substitution of "or equal" items before contract award.

Replace No.1 in the list in paragraph 2 in section 6-3.02 with:

1. is at least 60 days before use of the item or at the preconstruction meeting, whichever is later

Testing of offsite material sources quality control is your responsibility.

AA

7 LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC

Add to section 7-1.02A:

Notwithstanding anything to the contrary, the State Contract Act does not apply.

Replace “Reserved” in section 7-1.02D with:

7-1.02D Energy Efficiency

Implement these measures to reduce energy expended during the life of the project:

- A. Minimize the number of trips transporting material to and from construction sites
- B. Turn off truck and construction equipment engines if unneeded for substantial periods
- C. Require that all construction equipment engines be properly tuned
- D. Encourage ridesharing by construction personnel traveling to and from construction sites
- E. Plan construction activities to minimize the use of all on-site construction equipment

Add to section 7-1.02K(1):

You will post, at each job site, the notice required by CA Code of Regs §16451(d) of Title 8. Template notices are available on request to Ivan Ramirez, 2999 Oak Road, Suite 100, Walnut Creek, California 94597, (925) 256-

4700. Template notices are also available at the following location or by emailing a request to the Compliance Monitoring Unit(CMU) at CMU@dir.ca.gov.

District Office of the Division of Labor Standards Enforcement
1515 Clay Street, Suite 801
Oakland, CA 94612

Add at the end of the 1st paragraph in section 7-1.02K(3):

Payroll records will be in the format under CA Code of Regs § 16401 of Title 8, with use of the current version of the Department of Industrial Relations' Public Works Payroll Reporting Form (A-1-131) and Statement of Employer Payments (DLSE Form PW26).

Replace “weekly” in the 2nd paragraph in section 7-1.02K(3) with:

monthly

Replace the 5th paragraph in section 7-1.02K(3) with:

You and your subcontractors must also submit electronic certified payroll reports to the CMU on a monthly basis, and within ten (10) days of any separate request by the CMU, via the Department of Industrial Relations' online payroll system called Labor Compliance Management (MyLCM). The Authority will contact you with registration details for MyLCM, and you must register within 3 days. You will work with Authority staff and consultants to ensure full compliance with the CMU requirements and all other labor compliance requirements under this contract and applicable labor law.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX
Delete the 6th thru 9th paragraphs in section 7-1.02K(3)

Replace section 7-1.05 with:

7-1.05 INDEMNIFICATION

7-1.05A General

Each Authority Indemnitee (additional insured), as defined in Section 7-1.05B, "ADDITIONAL INSUREDS," of these Special Provisions will not be answerable or accountable in any way for any loss or damage that may happen to the work or any part thereof; for any loss or damage to any of the materials or other things used or employed in performing the work; for injury to or death of any person, either workers or the public; or for damage to property from any cause which might have been prevented by you, or your workers, or anyone employed by you.

You will be responsible for any liability imposed by law and for injuries to or death of any person including workers and the public, or damage to property resulting from defects or obstructions or from any cause whatsoever during the progress of the work or at any time before its completion and final acceptance.

At your sole expense and to the fullest extent allowed by law, you will defend, indemnify, save, and hold harmless each Authority Indemnitee, from all claims, suits, demands, causes of action, costs, expenses, liabilities, losses, damages, injuries or actions of every name, kind and description, in law or in equity, including injuries or death of any person including workers and the public or damage to property, regardless of whether the allegations are false, fraudulent, or groundless, to the extent arising out of or incident to any acts, omissions or willful misconduct of you, your officials, officers, employees, agents, consultants and subcontractors arising out of or in connection with the performance of the Work or this Contract, including claims made by subcontractors for nonpayment and the payment of all consequential damages and attorneys' fees and other related costs and expenses except as otherwise provided by statute. You will defend, at your sole cost, expense and risk, with counsel of the Authority's choosing, all such suits, actions or other legal proceedings of every kind that may be brought or instituted against the Authority Indemnitees. You will pay and satisfy any judgment, award or decree that may be rendered against the Authority Indemnitees in any such suit, action or other legal proceeding. You will reimburse the Authority Indemnitees for any and all legal expenses and costs incurred by each of them in connection with therewith or in enforcing the indemnity herein provided.

You will require every subcontractor performing Work to similarly provide the indemnification required by this Section in favor of the Authority Indemnitees. You agree to bind every subcontractor to the terms of the Contract Documents as far as such terms are applicable to subcontractor's portion of the Work. You will be as fully responsible to the Authority for the acts and omissions of your subcontractors and of persons either directly or indirectly employed by your subcontractors, as you are for the acts and omissions of persons directly employed by you.

With respect to third party claims against you, you waive all rights to any type of express or implied indemnity against each Authority Indemnitee.

It is the intent of the parties that you will defend, indemnify, save, and hold harmless each Authority Indemnitee, as defined in Section 7-1.05B "ADDITIONAL INSUREDS," of these Special Provisions, from any claims, suits, demands, causes of action, costs, expenses, liabilities, losses, damages or injuries or actions as set forth above regardless of the existence or degree of fault or negligence on the part of each Authority Indemnitee, the Contractor or any subcontractor or employee thereof, other than the sole active negligence or willful misconduct of an Authority Indemnitee, except as precluded by Civil Code 2782.

Your expense in the event such injuries, losses or damages are directly and proximately caused by acts of the federal government or the public enemy will be limited to the Contract Price. Your expense in the event such injuries, losses or damages are proximately caused by an Act of God within the meaning of Public Contract Code Section 7105 will be limited to five percent (5%) of the Contract Price, provided that the work damaged was built in accordance with accepted and applicable building standards and the Plans and Specifications.

7-1.05B Additional Insureds

The following entities and their successors and assigns, governing bodies or boards, board members,

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

directors, officers, agents, employees, consultants, and subconsultants will be named as additional insureds on all insurance coverage required under this contract and **will be defended, indemnified, saved and held harmless to the same extent as the Authority**. The insurance coverage will contain no special limitations on the scope of protection afforded to these additional insureds.

The State of California
111 Grand Avenue
P.O. Box 23660
Oakland, CA 94623-0440

Contra Costa Transportation Authority
2999 Oak Road, Suite 100
Walnut Creek, CA 94523

Metropolitan Transportation Commission
101 Eighth Street
Oakland, CA 94607

Contra Costa Water District
1331 Concord Ave
Concord, CA 94520

Fehr & Peers
2990 Lava Ridge Court, Ste 200
Roseville, CA 95661

Psomas
3550 Watt Avenue, Suite 140
Sacramento, CA 95821

Quincy Engineering, Inc.
11017 Cobble Rock Drive, Suite 100
Rancho Cordova, CA 95670

Wreco
1243 Alpine Road, Suite 108
Walnut Creek, CA 94596

Parikh Consultants, Inc.
2360 Qume Drive, Suite A
San Jose, CA 95131

Parsons Transportation Group
2121 N. California Blvd., suite 500
Walnut Creek, CA 94596

City of Brentwood
150 City Park Way
Brentwood, CA 94513

Replace the 4th paragraph in section 7-1.06D(2) with:

Each Authority Indemnitee (additional insured) listed in Section 7-1.05B, including its officers, directors, agents (except agents who are design professionals), and employees, must be named as additional insureds under the General Liability and Umbrella Liability Policies with respect to liability arising out of or connected with work or activities performed by or on behalf of you under this Contract. Coverage for such additional insureds does not extend to liability:

1. Arising from any defective or substandard condition of the roadway which existed at or before the

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CTA Contract No. XXX**

- time you started work, unless such condition has been changed by the work or the scope of the work requires you to maintain existing roadway facilities and the claim arises from your failure to maintain;
2. For claims occurring after the work is completed and accepted unless these claims are directly related to alleged acts or omissions of you that occurred during the course of the work; or
 3. To the extent prohibited by Ins Code § 11580.04.

AA

8 PROSECUTION AND PROGRESS

{ XE "8-1.04C_A07-19-13" }
Page 1 of 2

Section 8-1.04C. Use for a project (1) with an estimated cost of \$5 million or more and with 200 or more working days, (2) that requires a SWPPP, or (3) if SSP 59-2.01C(2), requiring SSPC QP certification, is used.

Do not use this SSP for maintenance or building projects.

Obtain concurrence from the district or region construction deputy director or chief if you are:

- 1. Not using the SSP in a project complying with the SSP instructions**
- 2. Using the SSP in a project not complying with the SSP instructions**
- 3. Changing the 55-day period**
- 4. Adding or deleting submittals to par. 3 or 6 except as described in the instructions**

Use for a delayed start to procure materials as a first activity in the sequence of construction. For this case, the project need not comply with the above instructions and concurrence from the district or region construction deputy director or chief is not required.

Replace "Reserved" in section 8-1.04C with:

1

Section 8-1.04B does not apply.

10/08/13 KG

2. Replace "55" as required for a delayed start other than 55 days.

~~Start job site activities within 55 days after receiving notice that the Contract has been approved by the Attorney General or the attorney appointed and authorized to represent the Department.~~

3. Use item 1 (1) if SSP 14-6.05 is used and if requested by a district biologist or (2) if SSP 14-6.02 is used and desert tortoise or Mohave ground squirrel is specified.

Use item 2 if SSP 14-6.08 is used.

Use item 4 if a WPCP or SWPPP is required.

Used item 5 for a contract with 100 or more original working days and a total bid of \$3 million or more.

Use item 6 if SSP 14-6.07 is used.

Use item 7 if SSP 12-4.03 is used and a contingency plan is required.

Use item 8 if SSP 59-2.01C(2), requiring SSPC QP certification, is used.

Contingency plan requirement added per TMP KG 7/21/14**

Do not start job site activities until the Department authorizes or accepts your submittal for:

- ~~1. Contractor-supplied biologist~~
- ~~2. Biological resource information program~~
- ~~3. CPM baseline schedule~~
- ~~2. WPCP or SWPPP, whichever applies~~
- ~~5. Notification of DRA or DRB nominee and disclosure statement~~
- ~~6. Natural resource protection plan~~
- ~~3. Contingency plan for opening closures to public traffic~~
- ~~8. SSPC QP certifications~~

10/08/13 KG

5. Use if par. 4 is not used.

Use item 4 if ordering structural steel or other material with a long lead time is a first activity in the sequence of construction. Edit item 4 for the type of material.

**** KG 7/21/14**

1. Caltrans Notice of Materials To Be Used form.
2. Written statement from the vendor that the order for the sign panels has been received and accepted by the vendor. The statement must show the dates that the materials will be shipped.
3. Written statement from the vendor that the order for electrical material has been received and accepted by the vendor. The statement must show the dates that the materials will be shipped.
4. Written statement from the vendor that the order for structural steel has been received and accepted by the vendor. The statement must show the dates that the materials will be shipped.

7. If "55" in par. 2 is replaced, replace "55th" to match par. 2.

1. Obtain specified authorization or acceptance for each submittal before the 55th day
2. Receive authorization to start

8

**** KG 6/24/14**

AA

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

9 PAYMENT

Replace the 11th paragraph in section 9-1.03 with:

The Authority will pay you within 30 days of an undisputed properly submitted payment request.

If the Authority fails to make timely payments, the Authority pays interest to you equivalent to the legal rate under subdivision (a) of Civ Pro Code § 685.010 for unpaid and undisputed:

1. Progress payments
2. After-acceptance payment except for claims

{ XE "9-1.16C_A05-20-11" }
Page 1 of 1

Section 9-1.16C. Use for a project that has (1) at least 90 working days except plant establishment, (2) an estimated cost exceeding the minor B threshold, and (3) items shown in section 6.13 of the RTL Guide. Insert any item that has (1) a material value of at least \$1,000 for a project with an estimated cost of less than \$1 million or (2) a material value of at least \$5,000 for a project with an estimated cost of over \$1 million.

Verify with latest estimate **KG 6/30/14

Add to section 9-1.16C:

The following items are eligible for progress payment even if they are not incorporated into the work:

1. Furnish Sign Structure (Truss)
2. Reinforced Concrete Pipe and appurtenances
3. Perforated Plastic Pipe Underdrain
4. Rock Slope Protection Fabric
5. Miscellaneous Iron and Steel
6. Chain Link Fence (Type CL-8)
7. Midwest Guardrail System appurtenances
8. Transition Railing (Type WB-31)
9. Alternative Flared Terminal System
10. Alternative In-Line Terminal System
11. Crash Cushion (ADIEM)
12. Precast Concrete Pipe Manhole
13. Precast Concrete Pipe Inlet
14. Furnish Steel Piling (HP 14x89)
15. Furnish Piling (Class 140) (Alternative W)
16. Furnish Piling (Class 200) (Alternative W)
17. Furnish Precast Prestressed Concrete Girders (150'-160')
18. Furnish Precast Prestressed Concrete Girders (90'-100')
19. Joint Seals
20. Bar Reinforcing Steel (Bridge)
21. Earth Retaining System (MSE Wall)
22. Bar Reinforcing Steel (Retaining Wall)
23. Cable Railing
24. Prestressing Steel (Sealed Packages only)
25. Corrugated Steel Pipe Downdrain
26. Corrugated Steel Pipe Riser
27. Signal Heads and Mounting Brackets
28. Signal Cabinets
29. Signal and Lighting Standards
30. Sewer Pipe

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

31. Waterline Pipe

Replace section 9-1.16E(4) with:

The Authority may demand that you remove any claims filed under Civ. Code § 9350 et seq.

Alternatively, the Authority may, in addition to other amounts properly retained under this Contract, deduct from progress payments an amount equal to 125% of the value claimed under a stop payment notice filed with the Authority for labor, materials, supplies, equipment or other things of value furnished to or incorporated into the project for which payment was not received. The Authority may release such funds on receipt of satisfactory evidence that you have resolved such claim by settlement, stop payment notice release bond or otherwise.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Replace section 9-1.16F with:

The Authority will withhold 5 percent of all progress payments as retention. Retention will be paid to you on the Final Payment.

You will have the right to substitute securities for the retention under Pub Cont Code § 22300. No substitution will be accepted until:

1. the Authority approves the securities and their value,
2. the parties have entered into an escrow agreement (if the securities are to be held in escrow) in a form substantially similar to that under § 22300,
3. all documentation necessary for assignment of the securities to the Authority or to the escrow agent, are delivered in a form satisfactory to the Authority.

If you have substituted securities for any of the retention, the Authority may request that such securities be re-valued from time to time, but not more often than monthly. Such re-valuation will be made by a person or entity designated by the Authority and approved by you. If such re-valuation results in a determination that the securities have a market value less than the amount of retention for which they were substituted, then the amount of the retention required under the Contract will be increased by such difference in market value. Such increased retention will be withheld from the next progress payment(s) due to you under the Contract.

Add to section 9-1.17D(1):

Complete and submit the *Release and Certificate of Final Payment Form* before close of business of the 30th day after receiving the proposed final payment.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

BALFOUR INTERCHANGE PROJECT
CCTA Contract No. XXX, Caltrans Contract No. 04-4H1604

RELEASE AND CERTIFICATE OF FINAL PAYMENT

With reference to Agreement CCTA Contract No. XXX, Caltrans Contract No. 04-4H1604, and all Change Orders between _____ (hereafter referred to as CONTRACTOR) and CONTRA COSTA TRANSPORTATION AUTHORITY (hereafter referred to as AUTHORITY), for constructing the above named project, CONTRACTOR hereby certifies and represents that it has made full payment to all persons and entities of all costs, charges and expenses incurred by it or on its behalf for labor, services, equipment and materials supplied to CONTRACTOR by such persons and entities in connection with its performance of the work under said Contract.

CONTRACTOR further certifies that to its best knowledge and belief, each of its subcontractors and suppliers has made full payment of all costs, charges and expenses incurred by it or on its behalf of work labor, services, materials and equipment supplied and/or used by it in connection with CONTRACTOR's work under said Contract.

In consideration of the receipt, which receipt is hereby acknowledged, of an aggregate amount of _____ Dollars (\$ _____) for all work performed pursuant to the Contract, including the adjusting payment, CONTRACTOR hereby unconditionally and fully releases and forever discharges AUTHORITY and its officers, employees, agents, consultants, volunteers, premises and property from all claims, liens and obligations of every nature, presently known or unknown, arising out of or in connection with the performance of said Contract and all Change Orders thereto except:

CONTRACTOR expressly waives all rights or benefits which it now has, or in the future may have, under the terms of Section 1542 of the Civil Code of the State of California, which provides as follows:

A general release does not extend to claims which the creditor does not know or suspect to exist in its favor at the time of executing the release, which if known to it must have materially affected its settlement with the debtor.

As additional consideration for all payments mentioned above, including the final adjusting payment, if any, CONTRACTOR agrees to indemnify and hold harmless AUTHORITY, the Department of Transportation of the State of California, and their respective successors, assigns and consultants, and their respective officers, directors, agents, employees and subconsultants, including the Director and the Engineer, from and against all costs, losses, damages, claims, causes of action, judgments and expense, including attorneys' fees, arising out of or in connection with claims against AUTHORITY which arise out of the performance of the work under the Contract and which may be asserted by CONTRACTOR or any of its suppliers, subconsultants of any tier, or any of their representatives, officers, agents or employees.

Nothing contained in this Release and Certificate of Final Payment shall have any effect on, nor be construed in any way to relieve CONTRACTOR of its obligations under the provisions of the above Contract and all Change Orders thereto, if any, which by their nature survive completion of the work including, without limitation, warranties, guaranties and indemnities.

Executed this _____ day of _____, _____

CONTRACTOR'S SIGNATURE
BLOCK

AA

DIVISION II GENERAL CONSTRUCTION

10 GENERAL

{ XE "10-1.02_A04-19-13" }
Page 1 of 1

Section 10-1.02. Use for specifying a construction sequence not associated with a specific construction specification. (For a sequence associated with a specific construction specification, place the sequence in the section that specifies the work to be constructed first.)

Add to section 10-1.02:

1. Use for signal and lighting work and new pavement where conduits and detector loops are to be installed. Delete if district policy is to cut loops into top layer.

**Revised per QAQC comments ** KG 7/10/14
KG 10/22/13

Do not place the uppermost layer of new pavement until all underlying drainage, sewer and water facilities, conduits and loop detectors are installed.

**** KG 7/11/14**

You must determine by potholing or other means the exact utility locations within 20 days of start of working days, and before

1. performing the contract items of work,
2. ordering drainage materials and
3. placement of the drainage work items, overhead sign foundations, signal pole foundations and any subsurface work near or in the vicinity of an active utility.

Submit potholing information within 20 days of locating the facilities.

If you discover utility facilities not identified by the Engineer in the Plans or Specifications, immediately notify the Engineer in writing.

You must schedule the project to allow the Engineer 5 days to determine the work to be done when a conflict exists.

Owner of the utility facility has the sole discretion to perform the repairs or relocation work itself, or to permit you to do such repairs or relocation work at a reasonable price. In the event that the utility owner permits you to perform the work, the work will be paid for as change order work.

Nothing requires the Utility Owner to locate the presence of any existing services not expressly included in Government Code Section 4125, nor limit the Owner's rights or remedies.

You must protect from damage existing utility and other non-highway facilities that are to remain in place. This protection may consist of shoring an existing utility. Damage due to your failure to exercise reasonable care must be repaired at your expense.

**** KG 7/11/14**

Capping of the Contra Costa Waterline is the first item of work in Stage 1.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

2. Use for traffic signal work.

Before starting the traffic signal functional test at any location, all items of work related to signal control must be completed and all roadside signs, pavement delineation, and pavement markings must be in place at that location.

3. Use for a widening project that requires excavation adjacent to a lane being used by traffic and that allows a moving operation without a safety wedge if the work is on schedule and if the open trench is to be closed within a relatively short period of time.

In the 1st blank and item 2, insert 5 for widening on the left of traffic and 8 for widening on the right. In the 2nd blank, insert the sum of the number of days to construct the structural section. E.g., 1 for AS, AB, or HMA used as base; 2 for excavation and preparation of subgrade, 3 for CTB, LCB, or concrete base.

10/08/13 KG

~~Construction of the new structural section adjacent to the existing traveled way must be performed in successive and once all operations are under way, concurrent operations of excavating, preparing subgrade, placing base materials, and paving. Excavation within _____ feet of the existing traveled way must not precede the paving operation by more than _____ working days unless:~~

- ~~1. Authorized~~
- ~~2. Material is placed and compacted against the vertical cuts within _____ feet of the existing traveled way. During excavation operations, native material may be used for this purpose except once the placing of the structural section starts, structural material must be used. Place the material to the top of the existing pavement and taper at a slope of 4:1 (horizontal:vertical) or flatter to the bottom of the excavation. Do not use treated base for the taper.~~

4. Use for a project that requires excavation adjacent to a lane being used by traffic and that needs a safety wedge during nonworking hours.

Insert 5 for widening left of traveled way and 8 for widening right of traveled way.

10/08/13 KG

~~At the end of each working day if a difference in excess of 0.15 feet exists between the elevation of the existing pavement and the elevation of an excavation within 5 feet left and/or 8 feet right of the traveled way, place and compact material against the vertical cut adjacent to the traveled way. During the excavation operation, you may use native material for this purpose except once the placing of the structural section starts, structural material must be used. Place the material to the top of the existing pavement and taper at a slope of 4:1 (horizontal:vertical) or flatter to the bottom of the excavation. Do not use treated base for the taper.~~

**** KG 6/30/14**

Temporary connections from new drainage facilities to existing facilities may be required during stage construction. Connections to facilitate drainage during staging is included in the payment for the various bid items.

***** need tie-in constraints from Carollo..... *****

**Revised a little per QAQC comments ** KG 7/10/14
Per SB** KG 6/30/14**

Before interruption to either of the City of Brentwood potable and non-potable water lines, you must provide the City of Brentwood 5 days notice and the interrupted customers 48 hours' notice. Both mainline tie-ins and removal of the necessary existing sections must be completed with a single shutdown. Complete both mainline tie in's on the same day. The water cannot be shut down for more than 6 hours, allowing the City of Brentwood sufficient time to shut down and recharge, and minimizing

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

the impact on its customers. The new section of the potable water main must pass bacteriological testing prior to being placed in service.

Added per right of way agreement ** KG 7/01/14

Construction loading on the Los Vaqueros Pipeline (LVP) must not exceed the equivalent of HS20 loading at the cover that currently exists over the pipeline. The resultant pressure exerted on the pipeline from a similar surface loading condition must not be greater in the post-construction condition than in the preconstruction condition. Ensure a minimum 2-foot clearance is maintained between each utility and the LVP joint utility trench.

Before the start of construction within the LVP easement area, submit a work plan for all operations to take place within the LVP easement area. The Contra Costa Water District will review and indicate in writing acceptance of the work plan within 10 working days. Do not begin work until the work plan is accepted. The work plan must include:

1. the types and sizes of equipment to be used
2. construction methods to be employed
3. calculations, stamped by a California registered civil engineer showing the specified maximum loading criteria will not be exceeded

{ XE "10-1.03_A01-20-12" }
Page 1 of 1

Section 10-1.03. Use for specifying a time constraint not associated with a specific construction specification. (For a time constraint associated with a specific construction specification, place the constraint in that section.)
Delete nonapplicable clauses.

Replace "Reserved" in section 10-1.03 of the RSS for section 10-1 with:

1. In the 1st and 2nd blanks, insert the post miles. In the 3rd and 4th blanks, insert the dates. For a project with more than one route, add "on Route <insert route no.>" before "from." Add a similar clause for each route.

10/08/13 KG

No construction activity is allowed from post mile _____ to post mile _____ from _____ to _____.

2. In the 1st blank, insert the date. In the list, insert the locations (e.g., railroad name, bridge name, drainage structure). Add a similar clause for each date.

10/08/13 KG

Do not work at the following locations until _____:

1. _____
2. _____

3. Insert the beginning month and day and end month and day. If the month and day vary by year, delete " of any year" and insert the dates. Add a similar clause for each period.

Grading now in the creek. ESA fence is being placed to keep him out other than that area. KG
6/24/14**

****KG 10/26/13**

You may work within drainage channels only from June 15th to October 15th of any year. Do not operate equipment or work within the active creek except for grading work shown and only after temporary creek bed protection is installed.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

7

The background on construction project funding signs must be Type II retroreflective sheeting on the Authorized Material List for signing and delineation materials.

8

The legend must be retroreflective, except for nonreflective black letters and numerals. The colors blue and orange must comply with PR Color no. 3 and no. 6, respectively, as specified in the Federal Highway Administration's *Color Tolerance Chart*.

9. Replace "TYPE OF PROJECT" with one of the project types shown in the following table:

Type of project:	Work description examples:
Highway Construction	Construct Expressway, Freeway, Shoulders, Structure, HOV Lane, Ramp, Interchange, Left Turn Lane, Truck Escape Ramp, or Weigh Station; Widen Freeway, Roadway or Shoulders; Realign Roadways.
Highway Repair	Clean & Paint Overhead Sign Structure; Crack, Seal & Grind Pavement; Pavement Markings; Pavement Rehabilitation; Ramp Repaving; Replace Culverts, Drainage Systems, Railroad Crossings, or Sign Structures; Retrofit Curb Ramps.
Highway Improvement	Channelization; Changeable Message Signs; Highway Advisory Radio System; Median Barrier; Motorist Aid Communication System; Ramp Metering; Retaining & Sound Walls; Signal Modification; Signals & Lighting; Traffic Signals; Traffic Count Stations; Traffic Operations System; Slope Protection; Thrie Beam Barrier; Realign Curve; Modify Interchange, or Gore; Reconstruct Interchange.
Bridge Construction	Replace, Remove or Widen Bridge; Construct Overcrossing, Pedestrian Overcrossing, Overhead, Undercrossing, Sidehill Viaduct, or Interchange Connectors.
Bridge Repair	Clean and Paint Bridge; Clean and Replace Joint Seals; Upgrade Joints Seals; Modify Bridge Railing; Raise Bridge; Replace Bridge Bearings; Rehabilitate Bridge Decks; Tunnel Rehabilitation.
Roadside Work	Erosion Control; Highway Planting & Irrigation; Replacement Planting; Revegetation; Irrigation Upgrade; Planting; Restoration and Irrigation; Maintenance Station; Landscape Maintenance Station; Maintenance Yard & Building; Pumping Plant; Roadside Rest Area; Vista Point; Park & Ride Lot; Transit Station; Truck Inspection Facility; Truck Scale; Right of Way Fence Upgrade; Biological or Habitat Enhancement; Treat Contaminated Water Supply.

** KG 6/24/14

The legend for the type of project on construction project funding signs must read as follows:

HIGHWAY CONSTRUCTION

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CTA Contract No. XXX**

10. Specify the type of funding. If county funds are involved (i.e., a cooperative agreement is provided), specify the type of county funding. Otherwise, delete the third line. If the project does not have any Federal funding, delete the first line.

** KG 6/24/14

**KG 10/28/13

~~The legend for the types of funding on construction project funding signs must read as follows and in the following order:~~

~~FEDERAL HIGHWAY TRUST FUNDS~~

~~STATE HIGHWAY FUNDS~~

~~___ COUNTY TRANSPORTATION FUNDS~~

**11. Use if the Engineer is to specify the year of completion and delete par. 12.
Delete if not used.**

**KG 10/22/13

~~The Engineer will provide the year of completion for the legend on construction project funding signs.
Furnish and install a sign overlay for the year of completion within 10 working days of notification.~~

12. Insert the year of completion.

** KG 6/24/14

**KG 10/22/13

~~The legend for the year of completion on construction project funding signs must read as follows:~~

~~YEAR OF COMPLETION 2017~~

13

The size of the legend on construction project funding signs must be as described. Do not add any additional information unless authorized.

12-2.03 CONSTRUCTION

14. Insert the quantity and type of construction project funding signs on the project. Insert Type 1 for conventional highways; Type 2 for freeways and expressways. Edit as necessary to include both types.

**KG 10/22/13

Install 2 Type 2 construction project funding signs at the locations designated by the Engineer before starting major work activities visible to highway users.

15

When authorized, remove and dispose of construction project funding signs upon completion of the project.

12-2.04 PAYMENT

16

Not Used

Add to section 12-3.02C:

All barricades in place at night must have a working flashing beacon mounted on it.

** KG 6/24/14

Add to section 12-3.03C:

Except where placed behind guardrail or Type K temporary railing, make a taper consisting of 9 traffic cones placed 25 feet apart (200 feet total) to delineate the location of a flashing arrow sign.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CTA Contract No. XXX**

Move unprotected flashing arrow signs to an area at least 15 feet from the edge of the traveled way or remove them from the job site away from traffic when not in use.

{ XE "12-3.06B(1)_A04-19-13" }
Page 1 of 1

Section 12-3.06B(1). Use to specify retroreflective, nonfluorescent-orange construction area signs instead of retroreflective, fluorescent-orange construction area signs. Consult with District Traffic.

Replace 1st paragraph in section 12-3.06B(1) with:

****KG 10/22/13**

Construction area warning and guide signs must have a black legend on a retroreflective, nonfluorescent-orange background. ~~W10-1 advance warning sign for highway-rail grade crossings must have a black legend on a retroreflective, nonfluorescent-yellow background.~~

{ XE "12-3.12C_A05-20-11" }
Page 1 of 1

Section 12-3.12C. Use (1) to specify a start time for portable changeable message signs, (2) to specify number and location of portable changeable message signs, or (3) for newly installed traffic signals.

Add to section 12-3.12C:

1. Edit per the District Traffic Manager's instructions. Delete if not used.

10/08/13 KG

Start displaying the message on the portable changeable message sign 15 minutes before closing the lane.

2. Edit as necessary to fit the type of work if the locations of portable changeable message signs are not shown. Include exact locations by station or post mile if necessary. Delete if not used.

Place the portable changeable message sign in advance of the 1st warning sign for each:

****KG 10/22/13**

1. Stationary lane closure
2. ~~Off-ramp closure~~
3. ~~Connector closure~~
4. ~~Shoulder closure~~
3. Speed reduction zone
4. At locations directed by the Engineer

3. Use for newly installed traffic signals. Delete if not applicable.

For 5 days, starting on the day of signal activation, place 1 portable changeable message sign in each direction of travel and display the following message: "SIGNAL AHEAD -- PREPARE TO STOP."

Section 12-3.13. Use (1) for a shadow vehicle in a moving lane closure, or (2) if a shadow vehicle is required to place and remove components of a stationary lane closure.

Replace "Reserved" in section 12-3.13 with:

12-3.13A General

12-3.13A(1) Summary

1

Section 12-3.13 includes specifications for protecting traffic and workers with an impact attenuator vehicle during moving lane closures and when placing and removing components of stationary lane closures, ramp closures, shoulder closures, or a combination.

2. Under the direction of District Construction, edit or rewrite par. 2 to suit the project. On conventional highways, consider traffic conditions, roadway geometrics, and whether there is enough useable shoulder width to accommodate the impact attenuator vehicle safely during placement and removal activities for the traffic control system. Edit to include highway type or types, shoulder width, or other requirements as necessary. For example: "Do not use an impact attenuator vehicle to place, remove, or place and remove components of a stationary traffic control system on a 2-lane, 2-way highway where the useable shoulder width is less than 10 feet unless authorized."

**** KG 6/23/14**

Do not use an impact attenuator vehicle to place, remove, or place and remove components of a stationary traffic control system on a 2-lane, 2-way highway where the useable shoulder width is less than 10 feet.

3

Impact attenuator vehicles must comply with the following test levels under National Cooperative Highway Research Program 350:

1. Test level 3 if the preconstruction posted speed limit is 50 mph or more
2. Test levels 2 or 3 if the preconstruction posted speed limit is 45 mph or less

4

The impact attenuator vehicle must comply with the attenuator manufacturer's instructions for:

1. Support truck, except the weight of the support truck must comply with the allowable vehicle weight limits shown on the Authorized Materials List for highway safety features and the manufacturer's instructions
2. Trailer-mounted attenuator
3. Truck-mounted attenuator

5

Flashing arrow signs must comply with section 12-3.03 except you may use a portable changeable message sign instead of a flashing arrow sign. If a portable changeable message sign is used as a flashing arrow sign, it must comply with section 6F.56 "Arrow Panels" of the *California MUTCD*.

12-3.13A(2) Definitions

6

impact attenuator vehicle: Support truck that is towing a deployed attenuator mounted to a trailer or a support truck with a deployed attenuator that is mounted to the support truck.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

12-3.13A(3) Submittals

7

Submit a certificate of compliance for each attenuator used on the project.

12-3.13A(4) Quality Control and Assurance

8

Do not start impact attenuator vehicle activities until authorized.

9

Before using an impact attenuator vehicle, conduct a meeting with the Engineer, subcontractors, and other parties involved with traffic control to discuss the operation of the impact attenuator vehicle during moving lane closures and when placing and removing components of a stationary traffic control system.

10

Schedule the location, time, and date for the meeting with all participants. Furnish a meeting facility located within 5 miles of the job site or at another authorized location.

12-3.13B Materials

11

Impact attenuator vehicles must be on the Authorized Materials List for highway safety features. Impact attenuator vehicles must comply with Veh Code Div 12.

12

For the Trinity MPS-350 truck-mounted attenuator, the support truck must not have a fuel tank mounted underneath within 10'-6" of the rear of the support truck.

13

Each impact attenuator vehicle must have:

1. Inverted "V" chevron pattern placed across the entire rear of the attenuator composed of alternating 4-inch wide nonreflective black stripes and 4-inch wide yellow retroreflective stripes sloping at 45 degrees
2. Type II flashing arrow sign
3. Flashing or rotating amber light
4. Operable 2-way communication system for maintaining contact with workers

12-3.13C Construction

14. Edit as necessary for compatibility with par. 2.

Except where prohibited, use an impact attenuator vehicle:

1. To follow behind equipment and workers who are placing and removing components of a stationary lane closure, ramp closure, shoulder closure, or any combination. Operate the flashing arrow sign in the arrow or caution mode during this activity, whichever applies. Follow at a distance that prevents intrusion into the workspace from passing traffic.
2. As a shadow vehicle in a moving lane closure.

15

Monitor placement and use of the attenuator vehicle on a regular basis and adjust the use of the attenuator to match changing field conditions as construction progresses.

16

After placing components of a stationary traffic control system you may place the impact attenuator vehicle in advance of the work area or at another authorized location to protect traffic and workers.

17

Secure objects, including equipment, tools, and ballast on impact attenuator vehicles to prevent loosening upon impact by an errant vehicle.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

18

Do not use a damaged attenuator in the work. Replace any attenuator damaged from an impact during work activities.

12-3.13D Payment

19

Not Used

{ XE "12-3.14_A05-20-11" }
Page 1 of 1

Section 12-3.14. Use if temporary traffic screen is included in the project as a "Gawk" screen and is not on railing separating opposing traffic.

Replace section 12-3.14 with:

12-3.14 TEMPORARY TRAFFIC SCREEN

12-3.14A General

1

Section 12-3.14 includes specifications for constructing temporary traffic screen at the locations shown.

12-3.14B Materials

2

Temporary traffic screen panels must be new or used, CDX grade or better, plywood or weather-resistant strandboard mounted and anchored on Type K temporary railing.

3

Wale boards must be new or used Douglas fir, rough sawn, construction grade or better.

4

Pipe screen supports must be new or used schedule 40, galvanized steel pipe.

5

Nuts, bolts, and washers must be cadmium plated.

6

Screws must be black or cadmium-plated flat head, cross-slotted screws with full thread length.

12-3.14C Construction

7

Mount and anchor temporary traffic screen on top of Type K temporary railing.

8

Remove the traffic screen from the highway when the Engineer determines it is no longer required. The traffic screen that is removed becomes your property.

9

A lateral move of Type K temporary railing with attached temporary traffic screen is change order work if ordered and the repositioning is not shown.

12-3.14D Payment

10

Temporary traffic screen is measured along the line of the completed screen.

Section 12-3.16. Use if temporary signal system is included.

Replace section 12-3.16 with:

12-3.16 TEMPORARY SIGNAL SYSTEM

12-3.16A General

Installing temporary signal system (TSS) consists of installing and maintaining temporary traffic signal, lighting, and flashing beacons for traffic control.

2. Use if controller assembly is Department furnished. Edit as required.

The Department will furnish 1 Model 170E traffic signal controller assembly, including wired cabinet, controller unit, and loop detector sensor units.

3

Furnish other materials and equipment for a TSS, including flashing beacons, signal heads, mast arms, luminaires, wood poles, conductors, and hardware.

4

Material and equipment used in the TSS may be new or used but must be suitable for the intended use.

5

Orient each signal face to be clearly visible to traffic approaching from the direction that the signal is intended to control.

6

12-3.16B Operation

TSS must operate at nominal 120 V(ac). Lighting must operate at 120 V(ac) or 240 V(ac).

7

Unless otherwise directed, the system must operate on a continuous, 24-hour basis except when it is necessary that traffic be controlled by flaggers.

8

The Department will perform timing for the TSS.

9

12-3.16C Maintaining Temporary Signal System

Except for the controller assembly, you are responsible for maintaining the TSS.

10

If components in the TSS are damaged, displaced, or cease to operate or function as specified from any cause during the progress of the work, immediately repair or replace the components, then restore to the original condition. Components include signs, generator, flashing beacons, and signal equipment.

11

If the TSS is out of operation, provide flaggers, at your expense, to maintain traffic control until the traffic signals are returned to service.

12

12-3.16D Conduit

At locations where conduit is required to be installed under pavement and if a delay to vehicles will not exceed 5 minutes, conduit may be installed by the trenching in pavement method as specified in section 86-2.05C.

13

12-3.16E Conductors and Wiring

Conductors must be the types specified in section 86-2.08 or Type UF cable of the size and number of conductors shown. The minimum conductor size must be no. 12.

14

If conductors are placed across paved areas, placement must comply with one of the following:

1. Place in a conduit
2. Suspend at least 25 feet above the roadway

15

Conductors placed outside of paved areas must be placed by one of the following methods:

1. Direct burial method with Type UF cable installed at a minimum depth of 24 inches below grade.
2. Placed in conduit. If Type 1 or 2 conduit is used, the minimum depth must be 12 inches. If Type 3 conduit is used, the minimum depth must be 18 inches.
3. Suspended from wood poles with a minimum clearance of 25 feet from grade at any point. Place the portions of the conductor installed on the face of wood poles in either Type 3 or Type 4 conduit.

16

Conductors placed across structures must be placed in a Type 1, 2, or 3 conduit. Install the conduit on the outside face of the railing and secure by a method determined by the Engineer.

17

Conductors to a terminal compartment or signal head on a pole may be spliced to through conductors of the same phase in a pull box adjacent to the pole. Do not splice conductors or cables except in pull boxes or in NEMA Type 3R enclosures.

18

12-3.16F Bonding and Grounding

Comply with section 86-2.10.

19. Use if a generator is an option or required.

Provide effective grounding for the generator.

20. Select appropriate methods and edit or delete pars. 21–33 to agree.

12-3.16G Service

12-3.16G(1) General

JS

Use one of the following methods to provide power for the TSS:

1. Commercial power from an existing utility company
- ~~2. Commercial power with a generator backup~~
- ~~3. Generator system with an additional generator as a backup~~

Pars. 21, 26, 29, and 30. Renumber sections as appropriate.

21

12-3.16G(2) Commercial Power

Commercial power must be 120 V(ac) or 120/240 V(ac). Protect the power source in a locked enclosure. Provide keys to all locks.

22

Do not use power from private parties.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

23

Do not use electrical power from existing highway facilities unless authorized.

24

Make the arrangements with the utility company for providing service.

25

Commercial electrical power is available at the job site.

Pars 26–28. Use as required with either par. 29 or pars. 30–33 if a generator system is required.

26

JS

12-3.16G(3) Generator

~~Generators must be 120 V(ac) or 120/240 V(ac), 60 Hz, 2.5 kW minimum, continuous duty type. Generators may be powered by gasoline, LPG, or diesel engines operating at approximately 1,800 rpm. Engines must have automatic oil feed. Generator systems must be equipped to provide automatic start-stop operation, with a 12 V starting system. Generator output circuits must have overcurrent protection with a maximum setting of 15 A or as shown.~~

27

JS

~~Fuel storage must be sufficient for times when the generator system operates unattended.~~

28. Use if required by local fire district.

JS

~~Engines must be equipped with approved spark arrestors.~~

29

JS

12-3.16G(4) Generator Operation

~~Provide 2 generators. A single generator must operate the system. In the event of a failure to supply voltage for the system, the 2nd generator must start automatically and transfer the system load upon reaching operating voltage.~~

30

JS

12-3.16G(4) Generator Operation

~~A generator must be provided to back up the commercial power.~~

31

~~An automatic transfer switch must provide the following functions:~~

- ~~1. Line voltage monitoring and in the event of a power outage signal the generator to start.~~
- ~~2. Engine start delay, adjustable from 0 to 6 seconds, to prevent starting if the power outage is only momentary and an engine stop delay, adjustable from 0 to 8 minutes, to allow the generator set to run unloaded to cool before shut down.~~
- ~~3. Transfer delay of 0 to 120 seconds to allow the generator to stabilize before connecting to the load and retransfer delay of 0 to 32 minutes to allow the line voltage to stabilize.~~
- ~~4. "Load-No Load" switch to allow a test with or without load.~~
- ~~5. "Normal-Test" switch that will start and run the generator in the "Test" position. "Normal" position must return the generator to automatic operation.~~
- ~~6. Battery charger powered by the normal line voltage.~~
- ~~7. Generator voltage sensor that signals for a transfer if the generator output is ready.~~

JS

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

32

JS

~~Provide a mechanical interlock to prevent application of power to the load from both sources and to prevent backfeeding from the generator to the line.~~

33

JS

~~The automatic transfer switch must be rated at 100 A, 120/240 V(ac), 3 wire, single phase and be compatible with the generator furnished.~~

34

12-3.16H Department-Furnished Controller Assembly

Construct the controller cabinet foundation as shown for Model 332L, 334L, or 336L cabinets, including furnishing and installing anchor bolts. Install the controller cabinet on the foundation and make field wiring connections to the terminal blocks in the controller cabinet.

35

A listing of field conductor terminations in each Department-furnished controller cabinet will be furnished to you at the job site.

36

The Department or local forces will maintain all controller assemblies.

37

12-3.16I Detectors

Loop detector sensor units are Department-furnished as part of the controller assembly.

38. Edit for type.

JS

Loop detector lead-in cable must be Type B ~~or~~ Type C.

39. Delete if inductive loops are not used.

Comply with section 86-5.01A.

40

12-3.16J Completion and Restoration

Backfill pole holes.

41

The following materials may be abandoned in place when no longer required:

1. Conductors placed in slots across paved areas
2. Direct buried cables, installed 24 inches or more below the ground surface

Add to section 12-3:

12-3.18 Temporary Crash Cushion Absorb 350

12-3.18A General

12-3.18A(1) Summary

This work includes furnishing, installing and maintaining temporary crash cushion Absorb 350 or approved equal.

Temporary crash cushion Absorb 350 TL-2 must be a 5-element system and the Absorb TL-3 must be a 9-element system as manufactured by Barrier Systems Inc. and must include the items shown for the crash cushion.

Arrangements have been made to ensure that any successful bidder can obtain the crash cushion from the distributor, Statewide Safety and Signs, 130 Grobic Court, Fairfield, California 94534.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Telephone (800) 770-2644.

The price quoted by the distributor for the crash cushion, FOB Fairfield, California is

1. TL-2: \$????, not including sales tax
2. TL-3: \$????, not including sales tax

The above price will be firm for orders placed on or before ????????, provided delivery is accepted within 90 days after the order is placed.

12-3.18A(2) Submittals

Submit a copy of the manufacturer's plan and parts list as an informational submittal. Submit a certificate of compliance for each type of temporary crash cushion Absorb 350.

12-3.18A(3) Construction

Install the temporary crash cushion under the manufacturer's installation instructions.

Attach a Type R or Type P marker panel to the front of the temporary crash cushion (Absorb 350) when the closest point of the crash cushion is within 12 feet of the traveled way. Firmly fasten the marker panel to the crash cushion with commercial quality hardware or by other authorized methods.

Maintain temporary crash cushion Absorb 350 in place at location, including times when work is not actively in progress.

Temporary crash cushion Absorb 350 systems damaged due to your operations must be repaired immediately by you at your expense. Temporary crash cushion (Absorb 350) systems damaged beyond repair due to your operations, as determined by the Engineer, must be removed and replaced by you at your expense.

Upon completion of work, temporary crash cushion Absorb 350 becomes your property and must be removed from the job site. Do not install temporary crash cushion Absorb 350 in the permanent work.

12-3.18A(4) Payment

Not used.

{ XE "12-4.02_X1_A07-19-13" }
Page 1 of 8

Section 12-4.02. Use if work will be performed over, on, or adjacent to lanes carrying traffic, including contiguous or adjacent shoulders.

Add to section 12-4.02A:

Pars. 1–3. Use for high-volume freeway with sufficient number of lanes to allow closure of the adjacent lanes. Freeway must have 2 or more lanes adjacent to the lane where work is being performed.

1

**** KG 6/28/14**

Temporary wood pedestrian ramp must be constructed at locations shown. Temporary wood pedestrian ramp must be skid resistant and free of irregularities. Maintain the ramp in good condition and keep clear of obstructions.

If work including installing, maintaining, and removing Type K temporary railing is to be performed within 6 feet of the adjacent traffic lane, close the adjacent traffic lane.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

2

Except as listed above, closure of the adjacent traffic lane is not required for installing, maintaining, and removing traffic control devices.

3. Use for projects that include grinding, concrete pavement replacement, loop detector installation, or grooving operations where equipment can be operated up to the edge of the lane using the 2-foot offset of the cones for separation between the work and the traffic.

****KG 10/22/13**

For grinding and grooving operations, ~~saw-cutting concrete slabs~~, and installing loop detectors, closure of the adjacent traffic lane is not required if an impact attenuator vehicle is used as a shadow vehicle.

4. Use for projects that have no lane requirement charts, but have lane closure restrictions for weekend work, designated legal holidays and special days. Delete "special days" if recommended by District Traffic Manager or District TMP Manager.

10/08/13 KG

The full width of the traveled way must be open to traffic when there are no active construction activities in the traveled way or within 6 feet of the traveled way and on:

1. ~~Fridays after 3:00 p.m.~~
2. ~~Saturdays~~
3. ~~Sundays~~
4. ~~Designated holidays~~
5. ~~Special days~~

5. Use if designated holidays are specified or if lane requirement charts are included. Edit for holidays that do not generate heavy traffic through the project.

Designated holidays are shown in the following table:

Designated Holidays

Holiday	Date observed
New Year's Day	January 1st
Washington's Birthday	3rd Monday in February
Memorial Day	Last Monday in May
Independence Day	July 4th
Labor Day	1st Monday in September
Veterans Day	November 11th
Thanksgiving Day	4th Thursday in November
Christmas Day	December 25th

6

If a designated holiday falls on a Sunday, the following Monday is a designated holiday. If November 11th falls on a Saturday, the preceding Friday is a designated holiday.

7. Use if special days are specified. Consult with District Traffic Managers for special days.

10/08/13 KG

Special days are: The third Monday in January.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CTA Contract No. XXX**

Pars. 8–11. To be edited by the District Traffic Manager or the District TMP Manager.

8. Use with one-way reversing traffic control.

****KG 10/22/13**

~~For a one-way reversing traffic-control lane closure, traffic may be stopped in 1 direction for periods not to exceed 10 minutes. After each stoppage, all accumulated traffic for that direction must pass through the work zone before another stoppage is made.~~

9. Use if limiting the length of a one-way reversing lane closure is necessary. Consider the activities and road geometry when setting the length restrictions. Insert the maximum length. The typical maximum length is 2 miles. Replace "flaggers" with "signals" if temporary signals are used to control traffic.

10/08/13 KG

The maximum length of a single stationary one-way reversing traffic-control lane closure is 1 miles between flaggers.

10. Use if limiting the length of the work area for closures other than one-way reversing traffic control is necessary. Recommended default of 2 miles, edit this number as necessary. Consider the activities, number of ramps impacted, ADT, and road geometry when setting the length restrictions.

10/08/13 KG

~~The maximum length of the work area inside a lane closure other than one-way reversing traffic-control lane closure is _____ miles. Work area is as shown.~~

11. Use if limiting the number and spacing of closures in the same direction. The number of closures may be higher for slab replacement, multiple bridge activities, or other activities that require multiple closures. Delete "in each direction of travel" for one-way reversing traffic control. Insert number of stationary lane closures and spacing. Typical values are 2 lanes and 2 miles. If the number of lane closures is 1, change "closures" to "closure."

10/08/13 KG

Not more than 1 stationary lane closures will be allowed in each direction of travel at one time. ~~Concurrent stationary closures in the same direction of travel must be spaced no closer than _____ miles apart. Closures in the same direction of travel on alternating inside lane/outside lanes must be spaced by an additional _____ miles.~~

12. Use if closures of local streets are included in the project. Times to be edited by the District Traffic Manager or the District TMP Manager. Add additional information as needed. Closure charts may be provided by the District Traffic Manager or the District TMP Manager instead of using this par.

****KG 10/22/13**

~~Do not perform work on local streets between _____ and _____ between _____ and _____.~~

13. Edit for project work. To be edited by the District Traffic Manager or the District TMP Manager.

**** KG 6/26/14**

****KG 10/23/13**

**** MS 7/15/14**

Freeway-Closure charts are for girder erection over Balfour Road, placement of K-rail, HMA overlay, rumble strip removal, temporary striping and structural section reconstruction, sign structure construction at "B2RN" 549+80 Lt and "B2RN" 499+20 Lt the erection and removal of falsework, placement and removal of overhead sign structures, and other authorized work.

14. Use on undivided highways as needed. Edit as recommended by the District Traffic Manager or the District TMP Manager for the type of operation that requires

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

the stopping of traffic, including erection of girders, falsework erection and removal, and time requirements.

10/08/13 KG

~~During blasting, hauling, and slide removal excavation operations, the road may be closed and traffic stopped for periods not to exceed _____ hours _____ minutes. After 1 closure is made, all accumulated traffic must pass through the work zone before another closure is allowed.~~

Pars. 15–17. Use 1 par. only.

15. Use if personal vehicles of the Contractor's employees may be parked at various locations except on the traveled way or shoulders. Delete "or shoulders" as needed.

Personal vehicles of your employees must not be parked on the traveled way or shoulders, including sections closed to traffic.

16. Use if personal vehicles of the Contractor's employees may be parked within the right-of-way, but only within certain limits.

10/08/13 KG

~~Personal vehicles of your employees must not be parked within the right-of-way except between _____ and _____.~~

17. Use if personal vehicles of the Contractor's employees may be parked within the right-of-way, but only at a designated area.

10/08/13 KG

~~Personal vehicles of your employees must not be parked within the right-of-way except in the area _____.~~

18 Use if Standard Plan T-10 is included.

If work vehicles or equipment are parked within 6 feet of a traffic lane, close the shoulder area as shown.

19. Use if Standard Plan T-10 is not included or if there are locations with speeds less than 40 mph. Insert locations.

10/08/13 KG

~~For work at _____, if work vehicles or equipment are parked within 6 feet of a traffic lane, close the shoulder area with fluorescent orange traffic cones or portable delineators. Place the cones or delineators on a taper in advance of the parked vehicles or equipment and along the edge of the traveled way at 25-foot intervals to a point not less than 25 feet past the last vehicle or piece of equipment. Use at least 9 cones or delineators for the taper. Use a W20-1, "Road Work Ahead," W21-5b, "Right/Left Shoulder Closed Ahead," or C24(CA), "Shoulder Work Ahead," sign mounted on a crashworthy, portable sign support with flags. The sign must be 48 by 48 inches and placed as ordered by the Engineer. If a cone or delineator is displaced or overturned, immediately restore the device to its original position or location.~~

20. Use for multilane highways and undivided highways if lane requirement charts are not required because closures are allowed without restriction. If a lane width of less than 10 feet is specified, add "Regardless of the minimum lane width requirements specified in section 7-1.04," to the beginning of this paragraph. A lane width less than 10 feet must be justified. Delete "paved" if traffic is allowed to travel on unpaved surface.

****KG 10/22/13**

~~A minimum of 1 paved traffic lane not less than _____ feet wide must be open for use by traffic in each direction of travel.~~

21. Use for two-lane, two-way highways and undivided highways if one-way traffic is allowed and lane requirement charts are not required. If a lane width of less than 10 feet is specified, add "Regardless of the minimum lane width requirements specified in section 7-1.04" to the beginning of this paragraph. A lane width less

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

than 10 feet must be justified. Delete "paved" if traffic is allowed to travel on unpaved surface.

****KG 10/22/13**

A minimum of 1 paved traffic lane not less than _____ feet wide must be open for use by traffic.

22. Use for landscape, electrical, or striping/pavement marker projects only.

10/08/13 KG

~~If a connector closure is required within the limits of a freeway lane closure, complete the work on the connector first. Then, complete the work on the freeway traveled way necessary to ensure safe passage of traffic between the connector and open freeway lanes. Complete the remaining work only after reopening the connector.~~

23. Use for miscellaneous usable waterways not provided for by agreement. Insert waterway.

10/08/13 KG

~~For bridges, embankments, falsework, or other temporary work constructed within the limits of the usable channel of _____, provide 1 opening for the passage of small boats. The opening must have a horizontal clearance of not less than 20 feet measured normal to the direction of flow and a vertical clearance of not less than 8 feet measured from the normal water elevation. The opening and the approach channels must be marked under 14 CA Code of Regs § 7000 et seq.~~

**Pars. 24–27. Use if falsework openings and falsework lighting are required.
24**

****KG 10/23/13**

~~At each location where falsework is constructed over a street or route listed, provide openings through the bridge falsework. The type, minimum width, height, and number of openings at each location, and the location and maximum spacing of the falsework lighting, if required for each opening, must comply with the requirements shown in the table. The width of vehicular openings is the clear width between temporary railings or other protective work. The spacing shown in the table for falsework pavement lighting is the maximum distance from center to center, in feet, between fixtures.~~

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

25. Add the location and spacing of falsework pavement lighting from the table below. Omit the spacing of falsework pavement lighting if the pavement length between portals is expected to be 30 feet or less.

The width shown is for standard width openings. For nonstandard widths, use the location and spacing of pavement lighting for the next wider opening.

R=Right side of traffic L=Left side of traffic C=Centered overhead

Freeway Traffic Opening

1 Lane	25 ft	R30
2 Lanes	37 ft	R and L 40 staggered 1/2 space
3 Lanes	49 ft	R and L 30
4 Lanes	61 ft	R and L 40 with C 40 staggered 1/2 space

Nonfreeway Traffic Opening

1 Lane	20 ft	R 22.5
2 Lanes	32 ft	R and L 30 staggered 1/2 space
2 Lanes	40 ft	R and L 22.5 with 8 ft shoulders
3 Lanes	52 ft	R and L 22.5
4 Lanes	64 ft	R and L 22.5 with C 22.5 staggered 1/2 space

Balfour Road Undercrossing (Right)

(Bridge No. 28-0411R)

Structure identification

(e.g., Str. no., Street name, Route no.)

	Number	Width (feet)	Height (feet)
Vehicle openings	<u> 2 </u>	<u> </u>	<u> </u>
Pedestrian openings	<u> </u>	<u> </u>	<u> </u>
	Location	Spacing	
Falsework pavement lighting	<u> </u>	<u> </u>	

NOTE:

R = Right side of traffic

L = Left side of traffic

C = Centered overhead

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

Structure identification (e.g., Str. no., Street name, Route no.)			
	Number	Width (feet)	Height (feet)
Vehicle openings	_____	_____	_____
Pedestrian openings	_____	_____	_____
	Location	Spacing	
Falsework pavement lighting	_____	_____	

NOTE:

R = Right side of traffic

L = Left side of traffic

C = Centered overhead

26. Use only for special roadways (e.g., fire utility access, quasi-public roads) with very light traffic. Falsework lighting is required and no temporary railing is provided in falsework opening.

1 Lane	20 ft	R-22.5
2 Lanes	32 ft	R and L 22.5 staggered 1/2 space

Temporary railing is not required at the following location. In addition to the falsework pavement lighting specified, illuminate each side of each vehicular passageway between portals with a string of yellow 25 W lamps spaced at 12-foot intervals, mounted at a height of 8 to 8 1/2 feet above the pavement.

Structure identification (e.g., Str. no., Street name, Route no.)			
	Number	Width (feet)	Height (feet)
Vehicle openings	_____	_____	_____
Pedestrian openings	_____	_____	_____
	Location	Spacing	
Falsework pavement lighting	_____	_____	

NOTE:

R = Right side of traffic

L = Left side of traffic

27

The exact location of openings will be determined by the Engineer.

Pars. 28–30. Use if project includes bridges that require the erection of precast girders or falsework.

28. Use for precast members. Edit for route information.

10/10/13 KG

Precast concrete members must not be cast within the right-of-way of Route 4.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

29. Use for precast or steel bridge girders. Edit for type of girder and route/street information.

** KG 6/23/14

**KG 10/23/13

Erect precast concrete girders over Route Balfour Road Street-1 span at a time. During girder erection, traffic in the lanes over which girders are being placed must be detoured or stopped as shown or as specified in section 12-4.02A.

30. Edit for type of operation.

**KG 10/23/13

Have the necessary materials and equipment on site to erect or remove the girders ~~falsework~~ in any 1 span or over any 1 opening ~~before detouring or stopping traffic.~~

31. Use if portion of bridge can be occupied. Edit for width of bridge roadway allowed to be occupied.

10/10/13 KG

Add to section 12-4.02C:

You may occupy one ~~_____~~ foot width of the bridge roadway, adjacent to the curb, during cleaning and painting operations. Only occupy 1 side of the bridge at a time.

Pars. 32–38. Use for toll bridges where State forces will set up lane closures.

32

10/08/13 KG

Replace "Reserved" in section 12-4.02D with:

~~Only State forces will close the lanes for the hours shown in the lane requirement charts.~~

33

~~The full width of the traveled way must be open to traffic when construction activities are not actively in progress.~~

34

~~Equipment and materials must not remain in a lane unless the lane is closed to traffic and is used for Contract activities.~~

35. Edit for bridge name.

~~For toll bridges, lane closure procedures must comply with the following:~~

- ~~1. State forces will furnish, locate, and remove all signs, barricades, traffic cones, flag trees, and other devices required for lane closures. Bidders may examine the "Lane Closure Plan" at the Administration Building for the _____ Bridge for traffic device information.~~
- ~~2. Time required for State forces to furnish, locate, and remove all traffic devices for lane closures is included within the time periods when lane closures are allowed.~~
- ~~3. Department-furnished signs, barricades, traffic cones, flag trees, and other traffic devices must be maintained.~~
- ~~4. For night lane closures, furnish, locate, and when no longer required, remove the truck- or trailer-mounted flashing arrow sign. The flashing arrow sign must be located approximately 50 feet in advance of each work area.~~

36

~~If a lane is closed for construction activities and opening the lane becomes necessary for use by traffic, immediately stop active Contract activities and start clearing the lane.~~

37

~~Your vehicles are subject to the provisions of chapter 13, "Vehicular Crossings," of the Vehicle Code.~~

38

~~Do not close lanes if the atmospheric visibility is less than 1,000 feet.~~

From SR 4/160 ** KG 7/1/14

Add new section 12-4.02E:

12-4.02E Construction Zone Enhanced Enforcement

Construction zone enhanced enforcement will be provided by the Contra Costa Transportation Authority as directed and under these special provisions. Construction zone enhanced enforcement will consist of the presence of the California Highway Patrol (CHP) within and near the limits of construction during specified stages of work to control the movement of traffic within the work zone.

Construction zone enhanced enforcement may be provided during the performance of the following stages of work:

1. Placement and removal of Temporary Railing (Type K)
2. First traffic activity after major shift in traffic lanes

In addition to stages of work requiring CHP presence additional CHP support may be provided as appropriate.

Submit a schedule at least 15 days before starting work requiring construction zone enhanced enforcement. The schedule will include all activities requiring construction zone enhanced enforcement and the estimated hours of CHP support required for each activity. The work will be performed within the number of hours allocated for CHP support.

You will inform the Engineer in writing at least 96 hours before a closure scheduled for construction zone enhancement enforcement. Cancellations to previously approved closures scheduled to include construction zone enhancement enforcement will be submitted in writing at least 36 hours before the closure is to be in place. The written notices will be delivered between the hours of 7:00 a.m. and 3:00 p.m., Monday through Friday, except designated legal holidays.

Cancellation with less than the 36-hour written notice may result in charges from the CHP. You will bear any costs and expenses resulting from cancellations with less than 36 hour written notice, except cancellations due to weather or circumstances beyond the control of the Contractor, as determined by the Engineer. The CHP will be compensated not less than \$50.00 per hour and greater than 4 hours of overtime pay per CHP Officer scheduled to participate in the construction zone enhancement enforcement that is cancelled. The costs and expenses incurred for late cancellations will be deducted from moneys due or that may become due to you.

The presence of the California Highway Patrol will not relieve you of your responsibility of providing for safety of the public under Section 7-1.04 nor does it relieve you from the responsibility for damage under Section 7-1.05.

{ XE "12-4.03_A07-19-13" }
Page 1 of 2

Section 12-4.03. Include (1) if estimated damages equal or exceed \$6,000 per hour for a mainline segment or connector closure, (2) for District 7 projects, or (3) if a contingency plan is required.

1. Use if estimated damages equal or exceed \$6,000 per hour for a mainline segment or connector closure. The District Traffic Operations office will calculate the damages. The concurrence of the Regional or District Division Chief of

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Construction is required when damages are included. Edit the number and type of facilities as appropriate. Calculate damages as follows:

Mainline or connector	<p>For the 1st half hour, without exceeding .5% of the bid item list or \$3,000 per 10 minutes, use the higher of the following:</p> <ol style="list-style-type: none">1. 50% of the amount for 10-minute intervals2. \$1,000 per 10 minutes <p>For the 2nd half hour, use the higher of the following:</p> <ol style="list-style-type: none">1. 75% of the amount for 10-minute intervals2. \$1,000 per 10 minutes <p>For the 2nd hour and beyond, use the amount for 10-minute intervals.</p>	<p>Example: Amount = \$18,000/hour based on traffic volumes over a 2-hour period</p> <p>1st half hour = \$3,000/10 minutes x 50% = \$1,500/10 minutes (> \$1,000/10 minutes)</p> <p>2nd half hour = \$3,000/10 minutes x 75% = \$2,250/10 minutes (> \$1,000/10 minutes)</p> <p>2nd hour and beyond = \$3,000/10 minutes</p>
-----------------------	---	--

From SR 4/160 Project **KG10/23/13

Add to the RSS for section 12-4.03B:

For each 10-minute interval or fraction thereof past the time specified to open the closure, the Department deducts the amount for liquidated damages per interval shown in the table below. Liquidated damages are limited to 5 percent of the total bid per occurrence. Liquidated damages are not assessed if the Engineer orders the closure to remain in place beyond the scheduled pickup time.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Type of facility	Route	Direction or Segment	Period	Liquidated damages/interval (\$)
Mainline (Partial Closure)	<u>4</u>	<u>EB SR 4</u>	1st half hour 2nd half hour 2nd hour and beyond	<u>\$1,000</u> / 10 minutes <u>\$1,000</u> / 10 minutes <u>\$1,000</u> / 10 minutes
Mainline (Partial Closure)	<u>4</u>	<u>WB SR 4</u>	1st half hour 2nd half hour 2nd hour and beyond	<u>\$1,000</u> / 10 minutes <u>\$1,000</u> / 10 minutes <u>\$1,000</u> / 10 minutes
Mainline (Full Closure)	<u>4</u>	<u>EB SR 4</u> <u>North of Balfour Rd</u>	1st half hour 2nd half hour 2nd hour and beyond	<u>\$1,100</u> / 10 minutes <u>\$1,700</u> / 10 minutes <u>\$2,200</u> / 10 minutes
Mainline (Full Closure)	<u>4</u>	<u>WB SR 4</u> <u>North of Balfour Rd</u>	1st half hour 2nd half hour 2nd hour and beyond	<u>\$1,800</u> / 10 minutes <u>\$2,800</u> / 10 minutes <u>\$3,700</u> / 10 minutes
Mainline (Full Closure)	<u>4</u>	<u>EB SR 4</u> <u>South of Balfour Rd</u>	1st half hour 2nd half hour 2nd hour and beyond	<u>\$2,000</u> / 10 minutes <u>\$3,100</u> / 10 minutes <u>\$4,100</u> / 10 minutes
Mainline (Full Closure)	<u>4</u>	<u>WB SR 4</u> <u>South of Balfour Rd</u>	1st half hour 2nd half hour 2nd hour and beyond	<u>\$1,300</u> / 10 minutes <u>\$2,000</u> / 10 minutes <u>\$2,600</u> / 10 minutes
Local Road (Partial Closure)	<u>CR</u>	<u>EB Balfour Rd</u>	<u>1st half hour</u> <u>2nd half hour</u> <u>2nd hour and beyond</u>	<u>\$1,000</u> / 10 minutes <u>\$1,300</u> / 10 minutes <u>\$1,600</u> / 10 minutes
Local Road (Partial Closure)	<u>CR</u>	<u>WB Balfour Rd</u>	<u>1st half hour</u> <u>2nd half hour</u> <u>2nd hour and beyond</u>	<u>\$1,600</u> / 10 minutes <u>\$2,400</u> / 10 minutes <u>\$3,200</u> / 10 minutes
Local Road (Full Closure)	<u>CR</u>	<u>EB Balfour Rd</u> <u>East of SR 4</u>	<u>1st half hour</u> <u>2nd half hour</u> <u>2nd hour and beyond</u>	<u>\$1,000</u> / 10 minutes <u>\$1,000</u> / 10 minutes <u>\$1,000</u> / 10 minutes
Local Road (Full Closure)	<u>CR</u>	<u>WB Balfour Rd</u> <u>East of SR 4</u>	<u>1st half hour</u> <u>2nd half hour</u> <u>2nd hour and beyond</u>	<u>\$1,000</u> / 10 minutes <u>\$1,300</u> / 10 minutes <u>\$1,500</u> / 10 minutes
Local Road (Full Closure)	<u>CR</u>	<u>EB Balfour Rd</u> <u>West of SR 4</u>	<u>1st half hour</u> <u>2nd half hour</u> <u>2nd hour and beyond</u>	<u>\$1,000</u> / 10 minutes <u>\$1,400</u> / 10 minutes <u>\$1,800</u> / 10 minutes
Local Road (Full Closure)	<u>CR</u>	<u>WB Balfour Rd</u> <u>West of SR 4</u>	<u>1st half hour</u> <u>2nd half hour</u> <u>2nd hour and beyond</u>	<u>\$1,000</u> / 10 minutes <u>\$1,100</u> / 10 minutes <u>\$1,200</u> / 10 minutes
Connector			1st half hour 2nd half hour 2nd hour and beyond	\$_____ / 10 minutes \$_____ / 10 minutes \$_____ / 10 minutes

2. Use for District 7 projects. Check with the District Traffic Manager to edit for days of week as appropriate.

10/10/13 KG

Replace "Sunday" at each occurrence in the 1st paragraph of the RSS for section 12-4.03B with:
Friday

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Pars. 3–5. Use if an activity requires a contingency plan.

3. Insert activities requiring a contingency plan. Activities include:

Activity requiring a full roadway closure
Blasting
Rapid-set concrete activities, including concrete slab replacement
Roadway excavations encroaching on the traveled way not protected by Type K railing
Cold-planing HMA for depths of 2 inches or greater
HMA paving
Asphalt or concrete grinding
Chip seal
Asphalt or concrete pavement sealing
Bridge work
Placement of bar reinforcing steel or structural members
Falsework erection or removal, including adjustments
Bridge demolition
Striping

**** KG 6/28/14**

Add to the RSS for section 12-4.03C:

Submit a contingency plan for each closure of the following activities:

1. _____
2. _____
3. _____
4. _____

4

Discuss the contingency plan with the Engineer at least 5 business days before starting the activity.

5. Use if 3 business days is not appropriate. Insert number of days. Change "business days" to "days" if more than 5 days are required.

Replace the 5th paragraph of the RSS for section 12-4.03C with:

**** KG 6/28/14**

Submit revisions to a contingency plan at least 5 business days before starting the activity requiring a contingency plan. Allow 2 business days for review of the revised contingency plan.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

{ XE "12-4.04_X1_A04-19-13" }
Page 1 of 1

**Section 12-4.04. Use if designated holidays or special days are included.
Edits do not require approval by the SSP Owner, but must be made by the District Traffic Manager, based on regional requirements.**

Updated per TMP** KG 7/21/14

Replace "Reserved" in section 12-4.04 with:

Lane Closure Restriction for Designated Holidays and Special Days										
Thu	Fri	Sat	Sun	Mon	Tues	Wed	Thu	Fri	Sat	Sun
x	H xx	xx	xx							
	SD xx									
x	xx	H xx	xx							
		SD xx								
	x	xx	H xx	xx						
			SD xx							
	x	xx	xx	H xx	xxx					
	x	xx	xx	SD xx	xxx					
				x	H xx					
				x	SD xx					
					x	H xx				
						SD xx				
						x	H xx	xx	xx	xx
							SD xx			
Legend:										
	Refer to lane requirement charts									
x	The full width of the traveled way must be open for use by traffic after 4 a.m.									
xx	The full width of the traveled way must be open for use by traffic.									
xxx	The full width of the traveled way must be open for use by traffic until 12 a.m.									
H	Designated holiday									
SD	Special day									

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

{ XE "12-4.05B_X1_A07-19-13" }
Page 1 of 1

Section 12-4.05B. Use for multilane highways.

Edit the chart title and use as many charts as needed. Do not duplicate the introduction (i.e., Replace "Reserved" in section . . .) for multiple charts.

Edits do not require approval by the SSP Owner, but must be verified by the District Traffic Manager.

Replace "Reserved" in section 12-4.05B with:

Chart no. <u>1</u> Freeway/Expressway Lane Requirements																											
County: <u>Contra Costa</u>														Route/Direction: <u>EB SR-4</u>										PM: <u>R35.37 to R35.74</u>			
Closure limits: <u>SR-4/Balfour Road Intersection</u>																											
Hour	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
Mon-Thu	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>																	<u>1</u>	<u>1</u>	<u>1</u>			
Fri	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>																	<u>1</u>	<u>1</u>			
Sat	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>															<u>1</u>	<u>1</u>	<u>1</u>			
Sun	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>													<u>1</u>	<u>1</u>	<u>1</u>			

Legend:

Delete [cut] any legend not used.

Do not use shading or crosshatching. 1/2-hour increments can be accomplished by splitting the appropriate cell. Place the cursor inside the cell, right click, on the mouse, and select split cell.

Edit for right or left shoulder closure. Do not edit if both shoulder closures apply.

1	Provide at least 1 through freeway lane, 1 right-turn lane, 1 left-turn lane open in direction of travel
	Work allowed within the highway where shoulder or lane closure is not required

REMARKS:

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

{ XE "12-4.05B_X1_A07-19-13" }
Page 1 of 1

Section 12-4.05B. Use for multilane highways.

Edit the chart title and use as many charts as needed. Do not duplicate the introduction (i.e., Replace "Reserved" in section . . .) for multiple charts.

Edits do not require approval by the SSP Owner, but must be verified by the District Traffic Manager.

Replace "Reserved" in section 12-4.05B with:

Chart no. <u>2</u> Freeway/Expressway Lane Requirements																									
County: <u>Contra Costa</u>										Route/Direction: <u>WB SR-4</u>										PM: <u>R35.76 to R35.28</u>					
Closure limits: <u>SR-4/Balfour Road Intersection</u>																									
Hour	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Mon-Thu	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>																<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	
Fri	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>																<u>1</u>	<u>1</u>	<u>1</u>	
Sat	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>													<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	
Sun	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>													<u>1</u>	<u>1</u>	<u>1</u>	

Legend:

Delete [cut] any legend not used.

Do not use shading or crosshatching. 1/2-hour increments can be accomplished by splitting the appropriate cell. Place the cursor inside the cell, right click, on the mouse, and select split cell.

Edit for right or left shoulder closure. Do not edit if both shoulder closures apply.

1	Provide at least 1 through freeway lane, 1 right-turn lane, 1 left-turn lane open in direction of travel
	Work allowed within the highway where shoulder or lane closure is not required

REMARKS:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

{ XE "12-4.05C_X1_A07-19-13" }
Page 1 of 1

Section 12-4.05C. Use for complete freeway or expressway closure.
Edit the chart title and use as many charts as needed. Do not duplicate the introduction (i.e., Replace "Reserved" in section . . .) for multiple charts.
Specify any detour routes or references to the applicable detour or traffic handling plans in the "REMARKS" section.
Edits do not require approval by the SSP Owner, but must be verified by the District Traffic Manager.

Replace "Reserved" in section 12-4.05C with:

Chart no. 3 Complete Freeway/Expressway Closure Hours																									
County: <u>Contra Costa</u>										Route/Direction: <u>EB SR-4</u>										PM: <u>R34.27 to R35.58</u>					
Closure limits: <u>From Sand Creek Road to Balfour Road</u>																									
Hour	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Mon-Thu	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>																			<u>C</u>	<u>C</u>	
Fri	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>																				<u>C</u>	
Sat	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>																			<u>C</u>	
Sun	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>																	<u>C</u>	<u>C</u>	
Legend: Do not use shading or crosshatching. 1/2-hour increments can be accomplished by splitting the appropriate cell. Place the cursor inside the cell, right click on the mouse, and select split cell.																									
<input type="checkbox"/> <u>C</u> Freeway or expressway may be closed completely																									
<input type="checkbox"/> No complete freeway or expressway closure is allowed																									
REMARKS: <u>See Detour Sheets DE-2 thru DE-5. This chart is to be used for girder erection, HMA Overlay, rumble strip removal and temporary striping work only.</u>																									

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

{ XE "12-4.05C_X1_A07-19-13" }
Page 1 of 1

Section 12-4.05C. Use for complete freeway or expressway closure.
Edit the chart title and use as many charts as needed. Do not duplicate the introduction (i.e., Replace "Reserved" in section . . .) for multiple charts.
Specify any detour routes or references to the applicable detour or traffic handling plans in the "REMARKS" section.
Edits do not require approval by the SSP Owner, but must be verified by the District Traffic Manager.

Replace "Reserved" in section 12-4.05C with:

Chart no. <u>4</u> Complete Freeway/Expressway Closure Hours																									
County: <u>Contra Costa</u>													Route/Direction: <u>WB SR-4</u>							PM: <u>R35.58 to R34.27</u>					
Closure limits: <u>From Balfour Road to Sand Creek Road</u>																									
Hour	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Mon-Thu	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>																		<u>C</u>	<u>C</u>	
Fri	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>																			<u>C</u>	
Sat	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>																		<u>C</u>	
Sun	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>																<u>C</u>	<u>C</u>	
Legend: Do not use shading or crosshatching. 1/2-hour increments can be accomplished by splitting the appropriate cell. Place the cursor inside the cell, right click on the mouse, and select split cell.																									
<input type="checkbox"/> <u>C</u> Freeway or expressway may be closed completely																									
<input type="checkbox"/> No complete freeway or expressway closure is allowed																									
REMARKS: <u>See Detour Sheets DE-1 thru DE-3, and DE-6. This chart is to be used for girder erection, HMA Overlay, rumble strip removal, temporary striping and structural section replacement work only.</u>																									

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

{ XE "12-4.05C_X1_A07-19-13" }
Page 1 of 1

Section 12-4.05C. Use for complete freeway or expressway closure.
Edit the chart title and use as many charts as needed. Do not duplicate the introduction (i.e., Replace "Reserved" in section . . .) for multiple charts.
Specify any detour routes or references to the applicable detour or traffic handling plans in the "REMARKS" section.
Edits do not require approval by the SSP Owner, but must be verified by the District Traffic Manager.

Replace "Reserved" in section 12-4.05C with:

Chart no. 5 Complete Freeway/Expressway Closure Hours																									
County: <u>Contra Costa</u>													Route/Direction: <u>EB SR-4</u>							PM: <u>R35.61 to R37.95</u>					
Closure limits: <u>From Balfour Road to Marsh Creek Road</u>																									
Hour	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Mon-Thu	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>																		<u>C</u>	<u>C</u>	
Fri	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>																			<u>C</u>	
Sat	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>																			
Sun	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>															<u>C</u>	<u>C</u>	
Legend: Do not use shading or crosshatching. 1/2-hour increments can be accomplished by splitting the appropriate cell. Place the cursor inside the cell, right click on the mouse, and select split cell.																									
<input type="checkbox"/> <u>C</u> Freeway or expressway may be closed completely																									
<input type="checkbox"/> No complete freeway or expressway closure is allowed																									
REMARKS: <u>See Detour Sheets DE-2 thru DE-5. This chart is to be used for girder erection, HMA Overlay, rumble strip removal and temporary striping work only.</u>																									

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

{ XE "12-4.05C_X1_A07-19-13" }
Page 1 of 1

Section 12-4.05C. Use for complete freeway or expressway closure.
Edit the chart title and use as many charts as needed. Do not duplicate the introduction (i.e., Replace "Reserved" in section . . .) for multiple charts.
Specify any detour routes or references to the applicable detour or traffic handling plans in the "REMARKS" section.
Edits do not require approval by the SSP Owner, but must be verified by the District Traffic Manager.

Replace "Reserved" in section 12-4.05C with:

Chart no. 6 Complete Freeway/Expressway Closure Hours																									
County: <u>Contra Costa</u>													Route/Direction: <u>WB SR-4</u>							PM: <u>R37.95to R35.61</u>					
Closure limits: <u>Marsh Creek Road to Balfour Road</u>																									
Hour	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Mon-Thu	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>																			<u>C</u>	<u>C</u>	
Fri	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>																				<u>C</u>	
Sat	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>																		<u>C</u>	
Sun	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>																<u>C</u>	<u>C</u>	
Legend: Do not use shading or crosshatching. 1/2-hour increments can be accomplished by splitting the appropriate cell. Place the cursor inside the cell, right click on the mouse, and select split cell.																									
<input type="checkbox"/> <u>C</u> Freeway or expressway may be closed completely																									
<input type="checkbox"/> No complete freeway or expressway closure is allowed																									
REMARKS: <u>See Detour Sheets DE-1 thru DE-3, and DE-6. This chart is to be used for girder erection, HMA Overlay, rumble strip removal, temporary striping and structural section replacement work only.</u>																									

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

{ XE "12-4.05F_X1_A07-19-13" }

Page 1 of 1

Section 12-4.05F. Use for conventional highways.

Edit the chart title and use as many charts as needed. Do not duplicate the introduction (i.e., Replace "Reserved" in section . . .) for multiple charts.

Edits do not require approval by the SSP Owner, but must be verified by the District Traffic Manager.

Replace "Reserved" in section 12-4.05F with:

Chart no. 7 Conventional Highway Lane Requirements																									
County: <u>Contra Costa</u>										Route/Direction: <u>EB Balfour Road</u>										PM:					
Closure limits: <u>SR-4/Balfour Intersection</u>																									
Hour	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Mon-Thu	1	1	1	1	1	1	1														1	1	1	1	
Fri	1	1	1	1	1	1	1														1	1	1	1	
Sat	1	1	1	1	1	1	1	1	1											1	1	1	1	1	
Sun	1	1	1	1	1	1	1	1	1	1	1	1						1	1	1	1	1	1	1	

Legend:

Provide at least 1 through traffic lane, 1 right-turn lane, 1 left-turn lane open in direction of travel

Work allowed within the highway where shoulder or lane closure is not required

REMARKS:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

{ XE "12-4.05F_X1_A07-19-13" }

Page 1 of 1

Section 12-4.05F. Use for conventional highways.

Edit the chart title and use as many charts as needed. Do not duplicate the introduction (i.e., Replace "Reserved" in section . . .) for multiple charts.

Edits do not require approval by the SSP Owner, but must be verified by the District Traffic Manager.

Replace "Reserved" in section 12-4.05F with:

Chart no. 8 Conventional Highway Lane Requirements																											
County: <u>Contra Costa</u>													Route/Direction: <u>WB Balfour Road</u>													PM:	
Closure limits: <u>SR-4/Balfour Intersection</u>																											
Hour	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
Mon-Thu	1	1	1	1	1	1	1														1	1	1	1			
Fri	1	1	1	1	1	1	1														1	1	1	1			
Sat	1	1	1	1	1	1	1	1	1										1	1	1	1	1	1			
Sun	1	1	1	1	1	1	1	1	1	1								1	1	1	1	1	1	1			

Legend:

Provide at least 1 through traffic lane, 1 right-turn lane, 1 left-turn lane open in direction of travel

Work allowed within the highway where shoulder or lane closure is not required

REMARKS:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

{ XE "12-4.05G_X1_A07-19-13" }
Page 1 of 1

Section 12-4.05G. Use for complete closure on conventional highways.
Edit the chart title and use as many charts as needed. Do not duplicate the introduction (i.e., Replace "Reserved" in section . . .) for multiple charts.
Specify any detour routes or references to the applicable detour or traffic handling plans in the "REMARKS" section.
Edits do not require approval by the SSP Owner, but must be verified by the District Traffic Manager.

Replace "Reserved" in section 12-4.05G with:

Chart no. 9 Complete Conventional Highway Closure Hours																									
County: <u>Contra Costa</u>													Route/Direction: <u>EB Balfour Road</u>										PM:		
Closure limits: <u>From SR 4 to Summerset Drive</u>																									
Hour	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Mon-Thu	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>																		<u>C</u>	<u>C</u>	
Fri	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>																			<u>C</u>	
Sat	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>																		
Sun	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>															<u>C</u>	<u>C</u>	
Legend: Do not use shading or crosshatching. 1/2-hour increments can be accomplished by splitting the appropriate cell. Place the cursor inside the cell, right click on the mouse, and select split cell.																									
<input type="checkbox"/> <u>C</u> Conventional highway may be closed completely																									
<input type="checkbox"/> No complete conventional highway closure is allowed																									
REMARKS:																									

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

{ XE "12-4.05G_X1_A07-19-13" }
Page 1 of 1

Section 12-4.05G. Use for complete closure on conventional highways.
Edit the chart title and use as many charts as needed. Do not duplicate the introduction (i.e., Replace "Reserved" in section . . .) for multiple charts.
Specify any detour routes or references to the applicable detour or traffic handling plans in the "REMARKS" section.
Edits do not require approval by the SSP Owner, but must be verified by the District Traffic Manager.

Replace "Reserved" in section 12-4.05G with:

Chart no. 10 Complete Conventional Highway Closure Hours																									
County: <u>Contra Costa</u>													Route/Direction: <u>WB Balfour Road</u>										PM:		
Closure limits: <u>From Summerset Drive to SR 4</u>																									
Hour	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Mon-Thu	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>																			<u>C</u>	<u>C</u>	
Fri	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>																				<u>C</u>	
Sat	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>																		<u>C</u>	
Sun	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>																<u>C</u>	<u>C</u>	
Legend: <div style="background-color: #e0e0e0; padding: 5px; margin: 5px 0;"> Do not use shading or crosshatching. 1/2-hour increments can be accomplished by splitting the appropriate cell. Place the cursor inside the cell, right click on the mouse, and select split cell. </div> <div style="margin: 5px 0;"> <div style="border: 1px solid black; width: 20px; height: 15px; display: inline-block; margin-right: 5px;"></div> Conventional highway may be closed completely </div> <div style="margin: 5px 0;"> <div style="border: 1px solid black; width: 20px; height: 15px; display: inline-block; margin-right: 5px;"></div> No complete conventional highway closure is allowed </div>																									
REMARKS:																									

Section 12-4.05G. Use for complete closure on conventional highways.
Edit the chart title and use as many charts as needed. Do not duplicate the introduction (i.e., Replace "Reserved" in section . . .) for multiple charts.
Specify any detour routes or references to the applicable detour or traffic handling plans in the "REMARKS" section.
Edits do not require approval by the SSP Owner, but must be verified by the District Traffic Manager.

Replace "Reserved" in section 12-4.05G with:

Chart no. 11 Complete Conventional Highway Closure Hours																									
County: <u>Contra Costa</u>										Route/Direction: <u>EB Balfour Road</u>										PM:					
Closure limits: <u>From Cortona Way to SR 4</u>																									
Hour	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Mon-Thu	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>																		<u>C</u>	<u>C</u>	
Fri	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>																			<u>C</u>	
Sat	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>																<u>C</u>	<u>C</u>	
Sun	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>															<u>C</u>	<u>C</u>	

Legend:

Do not use shading or crosshatching. 1/2-hour increments can be accomplished by splitting the appropriate cell. Place the cursor inside the cell, right click on the mouse, and select split cell.

Conventional highway may be closed completely

No complete conventional highway closure is allowed

REMARKS:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

{ XE "12-4.05G_X1_A07-19-13" }
Page 1 of 1

Section 12-4.05G. Use for complete closure on conventional highways.
Edit the chart title and use as many charts as needed. Do not duplicate the introduction (i.e., Replace "Reserved" in section . . .) for multiple charts.
Specify any detour routes or references to the applicable detour or traffic handling plans in the "REMARKS" section.
Edits do not require approval by the SSP Owner, but must be verified by the District Traffic Manager.

Replace "Reserved" in section 12-4.05G with:

Chart no. 12 Complete Conventional Highway Closure Hours																									
County: <u>Contra Costa</u>													Route/Direction: <u>WB Balfour Road</u>										PM:		
Closure limits: <u>From SR 4 to Cortona Way</u>																									
Hour	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Mon-Thu	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>																		<u>C</u>	<u>C</u>	
Fri	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>																			<u>C</u>	
Sat	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>																		<u>C</u>	
Sun	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>															<u>C</u>	<u>C</u>	
Legend: <div style="background-color: #e0e0e0; padding: 5px; border: 1px solid black;"> Do not use shading or crosshatching. 1/2-hour increments can be accomplished by splitting the appropriate cell. Place the cursor inside the cell, right click on the mouse, and select split cell. </div> <div style="margin-top: 5px;"> <div style="display: inline-block; width: 20px; height: 15px; border: 1px solid black; margin-right: 5px;"></div> Conventional highway may be closed completely </div> <div style="margin-top: 5px;"> <div style="display: inline-block; width: 20px; height: 15px; border: 1px solid black; margin-right: 5px;"></div> No complete conventional highway closure is allowed </div>																									
REMARKS:																									

Section 12-5. Use for stationary and moving lane closures on (1) multilane highways, (2) multilane highways for seal coat projects, and (3) 2-lane, 2-way highways for seal coat projects.

1

Replace section 12-5 with:

12-5 TRAFFIC CONTROL SYSTEM FOR LANE CLOSURE

12-5.01 GENERAL

Section 12-5 includes specifications for closing traffic lanes, ramps, or a combination, with stationary and moving lane closures on multilane highways and 2-lane, 2-way highways. The traffic control system for a lane closure or a ramp closure must comply with the details shown.

2

Traffic control system includes signs.

12-5.02 MATERIALS

3. Use if SSP 12-3.13 "Impact Attenuator Vehicle" is included and delete pars. 4-7. Delete if not used.

Vehicles equipped with attenuators must comply with section 12-3.13 of the special provisions.

10/08/13 KG

4

An attenuator must be a brand on the Authorized Material List for highway safety features.

5

Each attenuator must be individually identified with the manufacturer's name, address, attenuator model number, and a specific serial number. The name and number must be a minimum 1/2 inch high and located on the left, street side, lower front corner. The attenuator must have a message adjacent to the name and model number in 1/2-inch high letters with the blanks filled in by the attenuator manufacturer stating, "The bottom of this attenuator must be ____ ± ____ inches above the ground at all points for proper impact performance." Do not use an attenuator that is damaged or appears to be in poor condition until it is recertified by the manufacturer. The Engineer determines if a used attenuator supplied under this Contract needs to be recertified. Each unit must be certified by the manufacturer to comply with the requirements for an attenuator under the standards established by METS.

6

A new attenuator design that is proposed as equal to the authorized attenuators must comply with the procedures established by METS, including crash testing. Contact METS for information regarding submittal of new designs for evaluation.

7

A new attenuator that is proposed as equal to the authorized attenuators or attenuators ordered for recertification must not be used until authorized by METS.

12-5.03 CONSTRUCTION

12-5.03A General

8

During traffic striping and pavement marker placement using bituminous adhesive, control traffic with a stationary or a moving lane closure. During other activities, control traffic with stationary lane closures.

Whenever components of the traffic control system are displaced or cease to operate or function as specified from any cause, immediately repair the components to the original condition or replace the components and restore the components to the original location.

12-5.03B Stationary Lane Closures

10

For a stationary lane closure, ramp closure, or a combination, made only for the work period, remove the components of the traffic control system from the traveled way and shoulder, except for portable delineators placed along open trenches or excavation adjacent to the traveled way at the end of each work period. You may store the components at selected central locations designated by the Engineer within the limits of the highway.

11. Delete par. 11 if the only closure is on a 2-lane, 2-way highway, seal coat project.

Each vehicle used to place, maintain, and remove components of a traffic control system on a multilane highway must be equipped with a Type II flashing arrow sign that must be in operation whenever the vehicle is being used for placing, maintaining, or removing the components. Vehicles equipped with a Type II flashing arrow sign not involved in placing, maintaining, or removing the components if operated within a stationary-type lane closure must display only the caution display mode. The sign must be controllable by the operator of the vehicle while the vehicle is in motion. If a flashing arrow sign is required for a lane closure, the flashing arrow sign must be operational before the lane closure is in place.

12. Use if closure of multiple lanes is required on freeways and expressways and the District requires continuous closure tapers without the 2L tangent section between tapers. Delete par. 12 if the 2L tangent section is required.

10/08/13 KG

~~For multilane freeway or expressway lane closures, do not place the 2L tangent section shown along lane lines between the lane closure tapers.~~

13. Use if lane closures are to be made on freeways and expressways and the District elects to omit the cones across the closed lanes. Delete par. 13 if cones across the closed lanes are required.

For multilane freeways and expressways, do not place the traffic cones shown to be placed transversely across closed traffic lanes and shoulders.

12-5.03C Moving Lane Closures

14

A changeable message sign used in a moving lane closure must comply with section 12-3.12 except the sign must be truck-mounted. The full operational height to the bottom of the sign may be less than 7 feet above the ground but must be as high as practicable.

15

A flashing arrow sign used in a moving lane closure must be truck-mounted. Operate the flashing arrow sign in the caution display mode whenever it is being used on a 2-lane, 2-way highway.

12-5.04 PAYMENT

16. Use only if all work requires lane closures, flaggers are shown on lane closure plans, and a bid item for traffic control system is not included. Delete pars. 17, 18, and 19 if par. 16 is used.

** KG 7/7/14

~~Flagging costs are paid for as specified in section 12-1.03.~~

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CTA Contract No. XXX**

17. Use only if portions of the work require lane closures, flaggers are shown on applicable lane closure plans, and a bid item for traffic control system is included. Delete pars. 16 and 18 if par. 17 is used.

** KG 7/7/14

Traffic control system for lane closure is paid for as traffic control system. Flagging costs are included in the payment for Traffic Control System. ~~paid for as specified in Section 12-1.03 does not apply.~~

18. Use only if portions of the work require lane closures, flaggers are not shown on applicable lane closure plans, and a bid item for traffic control system is included. Delete pars. 16 and 17 if par. 18 is used.

10/08/13 KG

~~Traffic control system for lane closure is paid for as traffic control system.~~

19. Use only with pars. 17 and 18.

The requirements in section 4-1.05 for payment adjustment do not apply to traffic control system. Adjustments in compensation for traffic control system will be made for an increase or decrease in traffic control work if ordered and will be made on the basis of the cost of the necessary increased or decreased traffic control. The adjustment will be made on a force account basis for increased work and estimated on the same basis in the case of decreased work.

20. Include funds in the BEES under supplemental work for traffic control system.

A traffic control system required by change order work is paid for as a part of the change order work.

{ XE "12-8_X3_A04-20-12" }
Page 1 of 4

Section 12-8. Use if (1) existing pavement delineation will be obliterated on lanes opened to traffic and (2) temporary pavement delineation will be in place longer than 14 days but less than 180 days.

**Replace section 12-8 with:
12-8 TEMPORARY PAVEMENT DELINEATION**

12-8.01 GENERAL

1

Section 12-8 includes specifications for placing, applying, maintaining, and removing temporary pavement delineation.

2

Temporary signing for no-passing zones must comply with section 12-3.06.

3

Temporary painted traffic stripes and painted pavement markings used for temporary delineation must comply with section 84-3.

12-8.02 MATERIALS

12-8.02A General

4

Not Used

12-8.02B Temporary Lane Line and Centerline Delineation

5

Temporary pavement markers must be the same color as the lane line or centerline markers being replaced. Temporary pavement markers must be temporary pavement markers on the Authorized

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Material List for short-term day/night use, 14 days or less, or long-term day/night use, 180 days or less. Place temporary pavement markers under the manufacturer's instructions.

12-8.02C Temporary Edge Line Delineation

6

On multilane roadways, freeways, and expressways open to traffic where edge lines are obliterated and temporary pavement delineation to replace those edge lines is not shown, provide temporary pavement delineation for:

1. Right edge lines consisting of (1) a solid 4-inch wide traffic stripe tape of the same color as the stripe being replaced, (2) traffic cones, or (3) portable delineators or channelizers placed longitudinally at intervals not exceeding 100 feet
2. Left edge lines consisting of (1) solid 4-inch wide traffic stripe tape of the same color as the stripe being replaced, (2) traffic cones, (3) portable delineators or channelizers placed longitudinally at intervals not exceeding 100 feet, or (4) temporary pavement markers placed longitudinally at intervals not exceeding 6 feet

12-8.02D Temporary Traffic Stripe Tape

7. If shown, include a bid item for temporary traffic stripe (tape) KG 6/24/14**

Not Used.

~~Temporary traffic stripe tape must be one of the types of temporary, removable striping tape on the Authorized Material List.~~

12-8.02E Temporary Traffic Stripe Paint

8

Not Used

12-8.02F Temporary Pavement Marking Tape

9. If shown, include a bid item for temporary pavement marking (tape).

**** KG 6/24/14**

Not Used

~~Temporary pavement marking tape must be one of the types of temporary, removable pavement marking tape on the Authorized Material List and must be applied and removed as specified for applying and removing temporary, removable traffic stripe tape.~~

12-8.02G Temporary Pavement Marking Paint

10. If shown, include a bid item for temporary pavement marking (paint).

You may use one of the types of temporary removable pavement marking tape or permanent pavement marking tape on the Authorized Material List instead of temporary pavement marking paint.

12- 8.02H Temporary Pavement Markers

11. If shown, include a bid item for temporary pavement markers.

Temporary pavement markers must be one of the temporary pavement markers on the Authorized Material List for long term day/night use, 180 days or less.

12-8.03 CONSTRUCTION

12-8.03A General

12

Wherever work activities obliterate pavement delineation, place temporary or permanent pavement delineation before opening the traveled way to traffic. Place lane line and centerline pavement delineation for traveled ways open to traffic. On multilane roadways, freeways and expressways, place edge line delineation for traveled ways open to traffic.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

13

Establish the alignment for the temporary pavement delineation including required lines or markers. Surfaces to receive an application of paint or removable traffic tape must be dry and free of dirt and loose material. Do not apply temporary pavement delineation over existing pavement delineation or other temporary pavement delineation. Maintain temporary pavement delineation until it is superseded or you replace it with a new pattern of temporary pavement delineation or permanent pavement delineation.

14

When the Engineer determines the temporary pavement delineation is no longer required for the direction of traffic, remove the temporary pavement markers, underlying adhesive, and removable traffic tape from the final layer of surfacing and from the existing pavement to remain in place. Remove temporary pavement delineation that conflicts with any subsequent or new traffic pattern for the area.

12-8.03B Temporary Lane line and Centerline Delineation

15

Whenever lane lines or centerlines are obliterated and temporary pavement delineation to replace the lines is not shown, the minimum lane line and centerline delineation must consist of temporary pavement markers placed longitudinally at intervals not exceeding 24 feet. For temporary pavement markers on the Authorized Material List for long-term day/night use, 180 days or less, cement the markers to the surfacing with the adhesive recommended by the manufacturer except do not use epoxy adhesive to place the pavement markers in areas where removal of the markers will be required.

16

For temporary lane line or centerline delineation consisting entirely of temporary pavement markers on the Authorized Material List for short-term day/night use, 14 days or less, place the markers longitudinally at intervals not exceeding 24 feet. Do not use the markers for more than 14 days on lanes opened to traffic. Place the permanent pavement delineation before the end of the 14 days. If the permanent pavement delineation is not placed within the 14 days, replace the temporary pavement markers with additional temporary pavement delineation equivalent to the pattern specified or shown for the permanent pavement delineation for the area. The Department does not pay for the additional temporary pavement delineation.

**17. Use only when no-passing centerline pavement delineation will be obliterated.
Delete when not applicable to the project.**

Where no-passing centerline pavement delineation is obliterated, install the following temporary no-passing zone signs before opening lanes to traffic. Install a W20-1, "Road Work Ahead," sign from 1,000 feet to 2,000 feet in advance of a no-passing zone. Install a R4-1, "Do Not Pass," sign at the beginning of a no-passing zone and at 2,000-foot intervals within the no-passing zone. For continuous zones longer than 2 miles, install a W7-3a or W71(CA), "Next ___ Miles," sign beneath the W20-1 sign. Install a R4-2, "Pass With Care," sign at the end of the no-passing zone. The Engineer determines the exact location of temporary no-passing zone signs. Maintain the temporary no-passing zone signs in place until you place the permanent no-passing centerline pavement delineation. Remove the temporary no-passing zone signs when the Engineer determines they are no longer required for the direction of traffic.

12-8.03C Temporary Edge Line Delineation

18

You may apply temporary painted traffic stripe where removal of a 4-inch wide traffic stripe is not required.

19

The Engineer determines the lateral offset for traffic cones, portable delineators, and channelizers used for temporary edge line delineation. If traffic cones or portable delineators are used for temporary pavement delineation for edge lines, maintain the cones or delineators during hours of the day when the cones or delineators are being used for temporary edge line delineation.

20

Channelizers used for temporary edge line delineation must be an orange surface-mounted type. Cement channelizer bases to the pavement under section 85 for cementing pavement markers to pavement

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

except do not use epoxy adhesive to place channelizers on the top layer of the pavement. Channelizers must be one of the 36-inch, surface-mounted types on the Authorized Material List.

21

Remove the temporary edge line delineation when the Engineer determines it is no longer required for the direction of traffic.

12-8.03D Temporary Traffic Stripe Tape

22

**** KG 6/24/14**

Not Used

~~Apply temporary traffic stripe tape under the manufacturer's instructions. Slowly roll the tape with a rubber tired vehicle or roller to ensure complete contact with the pavement surface. Apply the tape straight on a tangent alignment and on a true arc on a curved alignment. Do not apply the tape when the air or pavement temperature is less than 50 degrees F unless the installation procedures are authorized beforehand.~~

23

~~The temporary traffic stripe tape must be complete in place at the location shown before opening the traveled way to traffic.~~

12-8.03E Temporary Traffic Stripe Paint

24. If shown, include a bid item for temporary traffic stripe (paint).

Apply 1 or 2 coats of temporary traffic stripe paint for new or existing pavement.

25

10/08/13 KG

The painted temporary traffic stripe must be complete in place at the location shown before opening the traveled way to traffic. ~~Removal of painted temporary traffic stripe is not required.~~

12-8.03F Temporary Pavement Marking Tape

26

**** KG 6/24/14**

Not Used

~~Apply temporary pavement marking tape at the locations shown. The tape must be complete in place at the location shown before opening the traveled way to traffic.~~

12-8.03G Temporary Pavement Marking Paint

27

10/08/13 KG

Apply and maintain temporary pavement markings consisting of painted pavement markings at the locations shown. The painted temporary pavement marking must be complete in place at the location shown before opening the traveled way to traffic. ~~Removal of painted temporary pavement marking is not required.~~

28

Apply 1 or 2 coats of temporary pavement marking paint for new or existing pavement.

12- 8.03H Temporary Pavement Markers

29

Place temporary pavement markers under the manufacturer's instructions. Cement the markers to the surfacing with the manufacturer's recommended adhesive, except do not use epoxy adhesive in areas where removal of the pavement markers is required.

30

31

32

Section 13-3. Use for all SWPPP projects.

For all SWPPP projects, include the following bid items:

130300 Prepare Storm Water Pollution Prevention Plan

130330 Storm Water Annual Report

For projects subject to the NPDES General Permit with risk level 2 or 3 and for projects in the Lake Tahoe Hydrologic Unit, include the following additional bid item items:

130310 Rain Event Action Plan

130320 Storm Water Sampling and Analysis Day

For all SWPPP projects, include supplemental funds under BEES item 066597 Storm Water Sampling and Analysis.

1. Use for projects subject to the NPDES General Permit. Insert risk level 1, 2, or 3 as determined for the project. Consult with the District/Regional Storm Water Coordinator for risk level determination.

Add to section 13-3.01A:

10/08/13 KG

The project is risk level 1.

2. Use if stormwater is regulated under a project-specific or RWQCB general permit (other than the Lake Tahoe regional general permit or the NPDES general permit). Insert the RWQCB name that issued the permit, permit title, permit number, and address where a copy of the permit is available. Edit as necessary.

To determine if a project-specific or RWQCB general permit applies to the project, contact the applicable RWQCB. Contact information for the RWQCBs is available on the SWRCB Web site at http://www.waterboards.ca.gov/water_boards.shtml.

10/08/13 KG

Replace the 4th paragraph in section 13-3.01A with

~~Discharges of stormwater from the project must comply with the permit issued by the _____ RWQCB for National Pollutant Discharge Elimination System (NPDES) Permit _____, Permit No. _____. The _____ RWQCB permit governs stormwater and nonstormwater discharges resulting from construction activities in the project area. The _____ RWQCB permit may be viewed at _____.~~

Pars. 3–18. Use for projects in the Lake Tahoe Hydrologic Unit subject to the Tahoe NPDES General Permit for Discharges of Storm Water Runoff Associated with Construction Activity Involving Land Disturbance in the Lake Tahoe Hydrologic Unit – El Dorado, Placer, and Alpine Counties, (Board Order No. R6T-2011-0019, Updated Waste Discharge Requirements and NPDES No. CAG616002).

3

10/08/13 KG

~~Delete "for a risk level 2 or risk level 3 project" and "for a risk level 3 project" at every occurrence in section 13-3.~~

~~Replace the 4th, 5th, and 6th paragraphs in section 13-3.01A with:~~

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

4

Discharges of stormwater from the project must comply with NPDES General Permit *for Discharges of Storm Water Runoff Associated with Construction Activity Involving Land Disturbance in the Lake Tahoe Hydrologic Unit—El Dorado, Placer, and Alpine Counties*, (Board Order No. R6T 2011-0019, Updated Waste Discharge Requirements and NPDES No. CAG616002) referred to herein as "Permit." The Lake Tahoe regional general permit may be viewed at the Web site for the State Water Resources Control Board, Storm Water Program, Lahontan Region General Permits.

5

Whenever a qualifying rain event produces runoff, sampling and analysis work must comply with the Construction Site Monitoring and Reporting Program (CSMRP).

6

A storm water annual report must cover the preceding period from October 16th to October 15th.

7

Replace item 3 in the list in the 2nd paragraph of section 13-3.01B(2)(a) with:

3. CSMRP

8

Replace the 3rd paragraph of section 13-3.01B(2)(a) with:

Include the following items in the SWPPP:

1. Schedule
2. CSMRP
3. REAP
4. Adherence to effluent standards for NALs and NELs

Replace section 13-3.01B(2)(b) with:

9

13-3.01B(2)(b) Construction Site Monitoring and Reporting Program

The QSD must prepare a CSMRP as part of the SWPPP. The CSMRP must be developed before starting job site activities and be revised to reflect current construction activities as necessary.

10

The CSMRP must include:

1. Purpose
2. Visual monitoring inspections including procedures
3. Water quality sampling and analysis including:
 - 3.1. Visual monitoring procedures
 - 3.2. SAP for nonvisible pollutants
 - 3.3. SAP for nonstormwater discharges
 - 3.4. SAP for monitoring required by RWQCB
 - 3.5. SAP for pH and turbidity
 - 3.6. SAP for temporary active treatment systems
4. Watershed monitoring option
5. Quality assurance and quality control
6. Reporting requirements and records retention
7. Noncompliance reporting
8. Annual report
9. Final report

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Replace the 1st and 2nd paragraphs in section 13-3.01B(7) with:

11

Submit a REAP whenever the National Weather Service is predicting a storm event in the form of rainfall with at least a 30 percent probability in the project area within 72 hours.

12

The WPC manager must submit a REAP at least 24 hours before a forecasted storm event for construction activities occurring:

1. Between May 1 and October 1
2. During periods when construction activity is conducted under a variance to the land disturbance prohibition of the Permit

13

Replace the 1st sentence in the 1st paragraph of section 13-3.01B(8) with:

Submit the storm water annual report before October 31st if construction occurs from October 16th through October 15th or within 15 days after Contract acceptance if construction ends before October 15th.

14

Delete the 6th paragraph of section 13-3.01C(1).

15

Replace the 1st paragraph in section 13-3.01C(2) with:

NALs must comply with the values shown in the following table:

Numeric Action Levels

Parameter	Test method	Detection limit (min)	Unit	Value
pH	Field test with calibrated portable instrument	0.2	pH	Lower NAL = 6.0 Upper NAL = 9.0

16

The daily average sampling results must not exceed the NAL for pH.

17

Replace the paragraphs in section 13-3.01C(3) with:

NEs comply with the values shown in the following table:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Numeric Effluent Limits

Parameter	Test method	Detection limit (min)	Unit	Value
Turbidity	Field test with calibrated portable instrument	1	NTU	20-NTU max

18

The storm event daily average for storms up to the 20-year, 1-hour storm must not exceed the NEL for turbidity.

{ XE "13-11_A07-19-13" }
Page 1 of 7

Section 13-11. Use if water quality monitoring is required by PLACs such as a Section 401 Certification for in-water work. In-water work includes clear water diversions, temporary creek diversions, pile driving, bridge scour repair, etc. Include SSP 2-1.06B and list PLACs title, e.g., "Section 401 Certification."

Replace section 13-11 with:
13-11 WATER QUALITY MONITORING

13-11.01 GENERAL

1. Edit for the type of in-water work, e.g., "temporary creek diversion system".

Revised per QAQC comments ** KG 7/10/14
** KG 6/28/14

Section 13-11 includes specifications for monitoring water quality during the following construction activities:

1. placing and removing temporary creek diversion system
2. _____

2. Insert name of receiving water given in the PLAC. If there are different receiving waters or different locations along the same receiving water, insert a table identifying the receiving waters and locations.

** KG 6/28/14

The receiving water for this project is Deer Creek.

13-11.02 WATER QUALITY MONITOR

13-11.02A General

3

Assign a water quality monitor (WQM) to collect water samples and record water quality data. The WQM must be responsible for generating and submitting water quality reports.

4

Within 7 days after Contract approval, submit the WQM qualifications including training and experience in collecting and analyzing water quality samples.

5

The WQM must have the same qualifications as the WPC manager including the requirements for QSP and must have training and experience in collecting and analyzing water quality samples. The WQM may be the same person as the WPC manager.

6

If other personnel will be collecting water quality samples, their training must include:

1. SAP review
2. Health and safety review
3. Sampling simulations

**7. Edit if PLAC has different reporting requirements for unauthorized discharges.
Use 6 hours when the RWQCB requires notification within 24 hours.**

If there is an unauthorized discharge, the WQM must immediately notify the Engineer within 6 hours.

13-11.02B Visual Inspections

8

The WQM must perform a visual inspection after each:

1. Storm event
2. Nonstormwater discharge as follows:

Edit as needed for the type of in-water work as described in the PLAC for required observation during in-water work.

- 2.1. Observe receiving waters:
 - 2.1.1. 24 hours before beginning in-water work including the installation of clear water diversions
 - 2.1.2. At least 4 times daily during in-water work activities including the installation, operation, and removal of clear water diversions

Edit if PLAC has different visual monitoring for unauthorized discharge.

- 2.2. Observe receiving waters for the presence of floating and suspended materials, sheen on the surface, discoloration, turbidity, odors, and sources of observed pollutants
- 2.3. Observe the job site for the presence of authorized and unauthorized nonstormwater discharges and their sources. Unauthorized discharges to surface waters include:
 - 2.3.1. Soil, silt, and sand
 - 2.3.2. Bark, sawdust, and slash
 - 2.3.3. Rubbish and debris
 - 2.3.4. Cement, concrete, and concrete washings
 - 2.3.5. Oil and petroleum products
 - 2.3.6. Welding slag
 - 2.3.7. Other organic or earthen materials

9

The WQM must prepare a visual inspection report for each storm event and nonstormwater discharge. Each visual inspection report must include:

1. Name of personnel performing the inspection, inspection date, and date the inspection report is completed
2. Storm and weather conditions
3. Locations and observations
4. Corrective actions taken

10

Retain visual inspection reports at the job site.

13-11.03 WATER QUALITY SAMPLING AND ANALYSIS DAY

11

Water quality sampling and analysis day includes activities such as preparation, collection, analysis, and reporting of water quality samples.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

12. Edit table for water quality objectives given in the PLAC. If the table format does not fit the requirements given in the PLAC, modify the table.

If there are different water quality objectives for different receiving waters or different locations along the same receiving water, insert additional tables identified by receiving water and location.

This project is subject the water quality objectives (WQO) shown in the following table:

Use for District 4, San Francisco Bay and North Coast Region RWQCBs.

Water Quality Objectives

Parameter	Test Method	Detection limit (min)	Units	WQO
Turbidity (during activities for in-water work)	Field test with calibrated portable instrument (Measured at downstream sampling location)	1	NTU	Must not exceed 20 percent above natural background
pH	Field test with calibrated portable instrument (Measured at downstream sampling location)	0.2	pH	Lower WQO = 6.5 Upper WQO = 8.5 And any change greater than 0.5 units from natural background
Temperature	Field test with calibrated portable instrument	0.1	°F	Must not be increased 5 degrees above natural background
Dissolved oxygen	Field test with calibrated portable instrument	1	mg/L	Must not be reduced below 7 mg/L

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

** KG 6/28/14

Use for District 10, Central Valley RWQCB.

Water Quality Objectives

Parameter	Test Method	Detection limit (min)	Units	WQO
Turbidity (during activities for in-water work)	Field test with calibrated portable instrument (Measured at downstream sampling location)	1	NTU	15 NTU above natural background
Turbidity (during activities excluding in-water work)	Field test with calibrated portable instrument (Measured at downstream sampling location)	1	NTU	1. Where natural turbidity is less than 1 NTU, increases must not exceed 2 NTU. 2. Where natural turbidity is between 1 and 5 NTUs, increases must not exceed 1 NTU. 3. Where natural turbidity is between 5 and 50 NTUs, increases must not exceed 20 percent. 4. Where natural turbidity is between 50 and 100 NTUs, increases must not exceed 10 NTUs. 5. Where natural turbidity is greater than 100 NTUs, increases must not exceed 10 percent.
Settleable material	Observed	—	ml/L	Greater than 0.1 ml/L

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Use for District 1, 2, and 3, North Coast Region RWQCB.

Water Quality Objectives

Parameter	Test Method	Detection limit (min)	Units	WQO
pH	Field test with calibrated portable instrument	0.2	pH	Lower NAL = 6.5 Upper NAL = 8.5 And any change greater than 0.5 units from natural background
Turbidity	Field test with calibrated portable instrument	4	NTU	20 percent above natural background
Temperature	Field test with calibrated portable instrument	4	°F	1 degree above natural background
Dissolved oxygen	Field test with calibrated portable instrument	4	mg/L	Must not be reduced below 7 mg/L
Total dissolved solids	Field test with calibrated portable instrument ^a	4	mg/L	Greater than 100 mg/L
Specific conductance	Field test with calibrated portable instrument	0.1	μΩ	Must not exceed 175 μΩ at 77 °F

^a Portable instrument provides an estimate of Total Dissolved Solids (TDS).

13

Perform water quality sampling whenever a project activity, conducted within waters of the State, has the potential to mobilize sediment or alter background conditions within waters of the State. Perform surface water quality sampling when:

1. Conducting in-water work
2. Work activities result in materials reaching receiving waters
3. Work activities result in the creation of a visible plume in receiving waters

14

Comply with the equipment manufacturer's recommendation for sample collection, analysis methods, and equipment calibration.

15. Edit for sampling locations as described in the PLAC for establishing sample collection locations for in-water work.

At least 24 hours before starting in-water work:

1. Establish locations for water quality sampling:

Edit distance upstream of discharge point described in PLAC such as "no more than 50 feet."

- 1.1. Upstream of the effluent discharge point or location of in-water work by no more than 50 feet.
- 1.2. Effluent discharge point including location of in-water work.

Edit distance from discharge point described in PLAC such as "between 35 and 50 feet" or "no more than 100 feet."

- 1.3. Downstream of the effluent discharge point or location of in-water work between 35 and 50 feet.
2. Conduct water quality sampling to document background conditions for upstream, effluent, and downstream locations. Sample for each WQO shown in the table titled "Water Quality Objectives."
3. Estimate water flow.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CTA Contract No. XXX**

16. Edit timing of water quality sampling as described in the PLAC, for sample collection during in-water work.

Whenever conducting in-water work including the installation of a clear water diversion, conduct water quality sampling:

1. At least 4 times daily for each water quality objective
2. At upstream, effluent, and downstream locations

17. Edit if PLAC has different sampling activities for exceedances.

If sample results exceed a WQO, immediately notify the Engineer within 30 minutes and:

1. Conduct water quality sampling every hour until measurements comply with WQOs
2. Measure the distance from the effluent location to the downstream extent of the exceedance
3. Obtain photos of the tributary upstream, downstream, and at the location of in-water work
4. If BMPs are installed, repaired, or modified to control the source of the exceedance, monitor the activity and document with samples, photos, and a brief summary

18

You are not required to physically collect samples under the following conditions:

1. During dangerous weather conditions such as flooding or electrical storms
2. Outside of normal working hours

19. Edit if PLAC has different procedure for WQO.

If downstream samples show levels outside of the acceptable range and indicate a possible WQO exceedance, assess WPC practices, site conditions, and surrounding influences to determine the probable cause for the increase.

20

Retain calibration logs, water quality sampling documentation, and analytical results at the job site.

13-11.04 WATER QUALITY MONITORING REPORT

13-11.04A General

21. Edit date as needed according to required submittal date. Allow 8 days for review and forward report to appropriate Regional Board. Use the 7th of each month if report submittal is required to the Regional Board by the 15th of the following month.

Submit a monthly water quality monitoring report by the 7th of the month for monitoring work conducted during the previous month. The report must include:

1. Visual inspection reports
2. If in-water work was done, the following field sampling results and inspections:
 - 2.1. Analytical methods, reporting units, and detection limits
 - 2.2. Date, location, time of sampling, visual observation, photos, and measurements
 - 2.3. Estimate of water flow
 - 2.4. Calibration logs for field monitoring equipment

Edit if PLAC has different requirements for photo documentation

3. If a storm event generates visible runoff, include visual inspections and sampling results with:
 - 3.1. Date, location, and time of visual observation
 - 3.2. Photos of areas disturbed by project activities including excess materials disposal areas
 - 3.3. Photos showing disturbed soil areas and documenting compliance for erosion control and revegetation measures including soil stabilization and sediment control BMPs
4. Summary of exceedance
5. Summary of corrective actions

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

13-11.04B Water Quality Objective Exceedance Report

22. Edit if PLAC has different reporting requirements for exceedances. Use 6 hours when the RWQCB requires follow-up written exceedance reporting within 24 hours.

If a WQO is exceeded, the WQM must:

1. Notify the Engineer by phone or electronic media within 30 minutes after WQO is exceeded
2. Submit a WQO exceedance report within 6 hours after WQO is exceeded

23

The report must include:

1. Field sampling results and inspections including:
 - 1.1. Analytical methods, reporting units, and detection limits
 - 1.2. Date, location, time of sampling, visual observation, photos, and measurements
 - 1.3. Estimate of water flow
2. Description of BMPs and corrective actions taken to manage WQO exceedance

13-11.04C Additional Reports

24. Use if the project does not include additional reports. Delete par. 25.

Not Used

25. Use if PLAC requires additional reports.

**** KG 6/28/14**

~~Include the following reports with your monthly water quality monitoring report submittal:~~

- ~~1. _____~~
- ~~2. _____~~
- ~~3. _____~~

13-11.05 WATER QUALITY ANNUAL REPORT

26. Use if the project includes a SWPPP. Delete pars. 27–30.

Not Used

27–30. Use for nonSWPPP projects.

27. Edit timing if PLAC gives different reporting period. If no reporting period is given, use timing from the Construction General Permit (Order No. 2009-009-DWQ, NPDES No. CAS000002).

**** KG 6/28/14**

~~Prepare a water quality annual report for each reporting period from July 1st to June 30th. If construction:~~

- ~~1. Occurs from July 1st through June 30th, submit the report no later than July 15th for the previous reporting period~~
- ~~2. Ends before June 30th, submit the report within 15 days after Contract acceptance~~

28

~~The WQM must prepare a water quality annual report. The report must:~~

- ~~1. Use an authorized report format~~
- ~~2. Include project information including description, location, and receiving waters~~
- ~~3. Include water quality monitoring information including:~~
 - ~~3.1. Summary and evaluation of sampling and analysis results including laboratory reports~~
 - ~~3.2. Analytical methods, reporting units, detection limits for analytical parameters~~
 - ~~3.3. Summary of corrective actions~~
 - ~~3.4. Identification of corrective actions or compliance activities that were not implemented~~
 - ~~3.5. Summary of exceedance~~

~~3.6. Names of individuals performing water quality inspections and sampling~~

~~3.7. Logistical information for inspections and sampling including location, date, time, and precipitation~~

~~3.8. Visual observations and sample collection records~~

4. Include photos documenting compliance for:
 - 4.1. Disturbed soil areas created by work activities
 - 4.2. Erosion control and revegetation measures including soil stabilization and sediment control BMPs
 - 4.3. Completed work

~~5. Include records of water quality permit compliance training and meetings~~

~~Submit 2 copies of the water quality annual report and allow 10 days for the Engineer's review. If revisions are required, the Engineer provides comments and specifies the date that the review stopped. Change and resubmit the report within 5 business days of receipt of the Engineer's comments. The Engineer's review resumes when the complete report is resubmitted.~~

Submit an electronic copy and 2 printed copies of the authorized water quality annual report. Include WQM signed certification and the WPC manager's signed certification.

14 ENVIRONMENTAL STEWARDSHIP

Section 14-1.02A. Use if there is an ESA for the management of environmental resources such as archaeological sites, existing vegetation, or biological habitats. Do not edit this SSP to include district biologist approvals or mitigation measures such as revegetation methods or wildlife relocation.

A. ESA boundaries will be defined by Type ESA Temporary Fence.

B. ESA boundaries will be defined by fencing or other enclosure apparatus other than Type ESA Temporary Fence.

C. Access to the ESA will be allowed under certain conditions.

An ESA exists on this project.

Before start of work, protect the ESA by installing Temporary fence (Type ESA).

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

3. Use if the Contractor is allowed limited access to the ESA for activities such as biological monitoring, water sampling, or release of encroaching wildlife. Insert activity and number of days (5 or fewer). Delete par. 3 if par. 4 is used.

10/08/13 KG

Limited access to the ESA is allowed for _____. Notify the Engineer _____ business days before the planned entry date. Any other access to an ESA is prohibited.

4. Use if different ESAs on the project have different fence or limited access conditions (e.g., project includes both riparian and archaeological ESAs which have different requirements for monitoring or access). Complete table to identify each ESA, location, and the corresponding management measures for fencing and limited access. If allowing limited access, include advance Engineer notification of 5 business days or fewer. Add rows as needed. Some example management measures are:

- 1. Before start of work, protect the ESA by installing Type ESA Temporary Fence.**
- 2. Limited access to the ESA allowed for water quality monitoring. Notify the Engineer _____ business days before planned entry date.**
- 3. Limited access to the ESA is allowed from February 1 to September 10 for water quality monitoring. Notify the Engineer _____ business days before planned entry date.**

10/08/13 KG

Take the management measures shown in the following table for the corresponding ESA shown. Any access to an ESA other than that shown is prohibited.

ESA Management

Identification	Location	Management measures

Add to section 14-2.02A:

Construction work will not resume until the Authority's qualified archaeologist examines the findings, assesses their significance, and offers recommendations for procedures to either further investigate or mitigate adverse impacts to those resources that have been encountered. The archaeologist determines your future activities with respect to the findings.

Provide appropriate measures to ensure that all construction personnel understand the need for proper and timely reporting of such findings and the consequences of any failure to report them.

Section 14-6.02. Use if a district biologist has determined that the project is occurring in or adjacent to regulated species habitat.
Use this SSP to narrow or clarify PLAC conditions or to provide additional specific requirements from the Department.
Use this SSP for birds and other species. Use SSP 14-6.03 for only migratory birds.

Replace section 14-6.02 with:

14-6.02 SPECIES PROTECTION

14-6.02A General

1

Section 14-6.02 includes specifications for protecting regulated species or their habitat.

2. Insert names of regulated species with habitat in or near the project site. Add or delete table cells as needed.

**** KG 6/30/14**

This project is within or near habitat for regulated species shown in the following table:

Species Name
<u>Western Burrowing Owl</u>
<u>San Joaquin Kit Fox</u>
<u>California Red-legged Frog</u>
<u>California Tiger Salamander</u>
<u>White Tailed Kite</u>
<u>Pallid and Western Bat</u>
<u>Migratory Birds</u>
<u>Birds of Prey</u>

3. Use if nesting period differs from section 14-6.03. Insert nesting period; consult with the district biologist.

**** KG 6/30/14**

The Department anticipates nesting or attempted nesting by migratory and nongame birds from February 1st to August 31st.

4

14-6.02B Material

Not Used

5

14-6.02C Construction

14-6.02C(1) General

Not Used

6. Insert a project-wide protective radius in the par. below. Use 100-foot or as required by PLAC terms or as determined by the project biologist. If directed by the project biologist, insert names of regulated species in or near the project site if alternate protective radii may be allowed. Insert distance with units for protective

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

radius. Add or delete rows or the table as needed. Delete, "or as defined in the table below" if the table is deleted.

14-6.02C(2) Protective Radius

** KG 6/30/14

Upon discovery of a regulated species, stop construction activities within a 100-foot radius of the discovery or as defined in the table below. Immediately notify the Engineer. Do not resume activities until receiving notification from the Engineer.

Regulated species name	Protective radius
<u>Western Burrowing Owl</u>	<u>250 feet around nest</u> <u>160 feet around burrows</u>
<u>San Joaquin Kit Fox</u>	<u>250-feet</u>
<u>White-tailed Kite</u>	<u>300-feet</u>
<u>Birds of Prey</u>	<u>300-feet</u>

7. Use if requiring specific protocols. Delete if protocols are listed in PLACs or if no protocol surveys are required and add "Not Used" under the section heading.

** KG 6/30/14

14-6.02C(3) Protocols

Use protocols required by PLACs. ~~or, if not specified, use as shown in the following table:~~

Regulated species name	Protocol

8. Use SSP 14-6.08 "Biological Resource Information Program" if a detailed program is required. Delete par. if using SSP 14-6.08 "Biological Resource Information Program" or if requirements in PLACs are clear and complete. Add or delete rows as needed. Delete par. if not needed and add "Not Used" under the heading.

** KG 6/30/14

14-6.02C(4) Biological Resource Information

Not Used

~~Implement the following biological resource information requirements.~~

1. _____
2. _____
3. _____

Pars. 9–10. Add "Not Used" under the section heading if both pars. are deleted.

14-6.02C(5) Protection Measures

9. If the entire project limits are designated as a species protection area, name that area "SPA 1" or use a descriptive name. Insert monitoring requirements and restrictions. Insert any handling or relocation requirements as needed. Provide a "Monitoring Type" name for any monitoring requirements. Add or delete rows as needed. Delete par. if not needed.

** KG 6/30/14

Not Used

~~Within species protection area 1, implement the following protection measures:~~

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

1. _____
2. _____
3. _____

10. Use if species protection areas are designated. Insert number or descriptive name for the species protection areas as named in 14-6.06 "Species Protection Area." Insert monitoring requirements and restrictions for the species protection area. Add or delete rows as needed. Provide a "Monitoring Type" name for any monitoring requirements. Add pars. for additional Species Protection Areas as needed. Delete par. if not needed.

**** KG 6/30/14**

~~Within species protection area _____, implement the following protection measures:~~

1. _____
2. _____
3. _____

**11. Delete if using SSP 14-6.07 "Natural Resources Protection Plan." "Monitoring Type" name must be listed in PLACs or in protection measures listed above.
Add "Not Used" under the section heading if par. is deleted.**

14-6.02C(6) Monitoring Schedule

**** KG 6/30/14**

Not Used

~~Monitor according to the following schedule:~~

Monitoring type	Schedule

12

14-6.02D Payment

Not Used

{ XE "14-6.08_A05-20-11" }
Page 1 of 2

Section 14-6.08. Use if PLACs require a Biological Resource Information Program.

Replace section 14-6.08 with:

14-6.08 BIOLOGICAL RESOURCE INFORMATION PROGRAM

14-6.08A General

14-6.08A(1) Summary

1

Section 14-6.08 includes specifications for preparing and presenting a Biological Resource Information Program to familiarize construction staff with regulated species and related requirements.

2

**** KG 6/30/14**

~~A Contractor-supplied biologist must prepare and present training to personnel as required in PLACs, regarding regulated species, related laws and regulations, and protection measures.~~

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

14-6.08A(2) Submittals

3. Delete if using SSP 8-1.04C for large projects. Edit number of days as needed. Use 15 days or as required by PLAC terms or as determined by the project biologist.

**** KG 6/30/14**

~~Within 7 days after Contract approval, submit an outline of the Biological Resource Information Program. Allow ____ days for the Engineer's review. If the submittal is incomplete, the Engineer will provide comments. Within 7 days after receiving the Engineer's comments, update and resubmit the outline.~~

4

Notify the Engineer of scheduled training classes at least 7 days before the 1st training class.

5. Edit the number of working days as needed. Use 2 days or as required by PLAC terms or as determined by the project biologist.

**** KG 6/30/14**

~~Provide the Engineer with an attendance list including the printed and signed name of each attendee of the Biological Resource Information Program. Provide the Engineer with the attendance list within ____ working days following each environmental education session. Submit a separate attendance list for each subsequent session for new workers.~~

6. Include if required by PLACs. Add or delete rows and columns as necessary. Typical information includes title or acronym of training, training completion date, and trainee name. Edit titles as needed.

**** KG 6/30/14**

Provide hard hat stickers to staff who have completed the Biological Resource Information Program. The hard hat stickers must show the type of training and completion date. following information:

Training type	Completion date

7

14-6.08B Materials

Not Used

14-6.08C Construction

8. Edit time as needed. Use 30 minutes or as required by PLAC terms or as determined by the project biologist.

**** KG 6/30/14**

Workers must receive Biological Resource Information training before performing on-site work. Workers include laborers, tradesmen, material suppliers, equipment maintenance personnel, supervisors, foremen, office personnel, food vendors, and other personnel who stay on the project longer than 30 minutes.

9. Add or delete items if needed to clarify or further define a PLAC requirement or based on district experience. Do not copy PLAC requirements.

**** KG 6/30/14**

The Biological Resource Information Program includes:

- ~~1. Description of regulated species that may be affected by construction~~
- ~~2. Requirements for the protection of regulated species~~
- ~~3. Definition and consequences of "take"~~
- ~~4. What to do when you see a regulated species or a species that looks like a regulated species~~
- ~~5. Permit requirements to touch or move a regulated species~~
- ~~6. Identification of work area and ESA~~
- ~~7. Species Protection Area (SPA) requirements~~
- ~~8. Description of avoidance and minimization measures~~

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

- 9. ~~Natural Resources Protection Plan or PLAC requirements~~
- 10. ~~Description and general ecology of the regulated species~~
- 11. ~~Description of specific habitats used by the regulated species and their location~~
- 12. ~~Handout to implement species protection measures that describe species, habitats, and actions as listed in section 14-6.02 or in PLACs~~

10. Use if Caltrans is providing handout materials. Delete if not needed. Delete par. 11 if par. 10 is used.

** KG 6/30/14

The Department biologist is conducting the Biological Resource Information Program training providing handout materials for regulated species as specified in section 2-1.06B.

11. Use for Contractor-supplied handout materials. Delete par. 10 if par. 11 is used.

** KG 6/30/14

~~Provide a handout to implement species protection measures that describes species, habitats, and actions as listed in species protection or in PLACs. Distribute the handout to each attendee. Display and maintain the handout at all construction field offices and on all information boards.~~

12

14-6.08D Payment

Not Used

USED TEMPORARY WETLAND PROTECTION MAT SSP AND MODIFIED IT{ XE "14-NSSP}

Replace section 14-6.10 with:

14-6.10 TEMPORARY CREEK BED PROTECTION SYSTEM

14-6.10A General

14-6.10A(1) Summary

Section 14-6.10 includes specifications for installation and removal of temporary creek bed protection mats to minimize damage to Deer Creek.

You may use mats for grading work within Deer Creek. Furnish, install, maintain, and remove the wetland protection mats in a manner consistent with laws, regulations, and PLACs.

14-6.10A(2) Definitions

temporary creek bed protection mat: Device placed temporarily in a creek bed to minimize damage to the soils and habitat.

14-6.10A(3) Submittals

Submit for acceptance a schedule for the placement and removal of creek bed protection mats. Include location, mat type, and placement and removal dates for each location. Describe the method of installing and removing creek bed protection mats.

Submit a certificate of compliance for temporary creek bed protection mat.

14-6.10A(4) Quality Control and Assurance

Prevent permanent damage and minimize temporary damage to the creek according to permit requirements.

14-6.10B Materials

Mats must be designed for use as temporary roadways and to protect the ground without ground preparation. Mats must be made of HDPE and be a minimum of 4 feet wide, 8 feet long, and 1/2 inch thick. Mats must have a load-bearing capacity of 60 tons or greater.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

14-6.10C Construction

14-6.10C(1) General

Not Used

14-6.10C(2) Installation

Mats must be free of all soil, seeds, or other organic or hazardous material before entering the work area.

Do not install mats in the creek until receiving written acceptance from the Engineer for the temporary creek bed protection.

Conduct all temporary installation activities from areas outside of the creek or on mats.

14-6.10C(3) Inspection

Inspect, clean, and maintain mats. Immediately replace or repair damaged or broken mats.

14-6.10C(4) Removal

Remove mats when creek grading work is completed. Remove mats to an appropriate washout location and clean before transporting offsite. The washout location must be outside of ESAs and inside the cleared work area where wash-water and other material will not transport into any wetlands, streams, or ESAs.

14-6.10D Payment

Not Used

Replace "Reserved" in section 14-6.11 with:

10-3 TEMPORARY CREEK DIVERSION

14-6.11 GENERAL

14-6.11A(1) Summary

Section 10-3 includes specifications for diverting and dewatering of Deer Creek through the work area as shown.

Creek diversion and dewatering must comply with the project Permits and specifications.

14-6.11A(2) Submittals

Within 20 days after contract approval, submit 2 copies of the temporary creek diversion system plan to the Engineer. Allow 10 days for the Engineer's review. If revisions are required, the Engineer will provide comments and specify the date that the review stopped. You must revise and resubmit the temporary creek diversion system plan within 15 days of receipt of the Engineer's comments. The Engineer's review will resume when the complete the temporary creek diversion system plan is resubmitted. Allow 5 days for review of resubmittals. When the Engineer approves the temporary creek diversion system plan, submit 2 copies of the approved temporary creek diversion system plan to the Engineer. You may proceed with construction activities if the Engineer conditionally approves the temporary creek diversion system plan while minor revisions are being completed.

No work will be performed that may cause creek flow disturbance until the diversion plan has been approved. You may proceed with construction activities if the Engineer conditionally approves the temporary creek diversion system plan while minor revisions are being completed.

14-6.11B MATERIALS

Not Used

14-6.11C CONSTRUCTION

Repair and replace any portion of the temporary creek diversion system that is damaged during the progress at your own expense

Prevent any leakage in the temporary creek diversion system that may interfere with your work at your own expense.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

You must inspect and clean temporary creek diversion system a minimum of two times per week for the duration of the project or as directed by the Engineer.

Remove the temporary creek diversion system when no longer required for the work. All materials shall be removed such that the original flow line of the channel is not raised and channel opening complies with the Contour Grading Plan.

14-6.11D PAYMENT

Not Used

{ XE "14-8.02_A05-20-11" }
Page 1 of 1

**Section 14-8.02. Use for work in a residential or urban area (1) at night or (2) if night or Sunday noise restrictions exist.
Choose either par. 1 or 2.**

Replace the 2nd paragraph of section 14-8.02A with:

1. Edit to include (1) specific local noise ordinances that the project manager has agreed to comply with or (2) work needing noise level restrictions that differ from those specified in section 14. List exceptions in the table. Delete " except . . . table:" and the table if exceptions are not needed. Delete par. 2.

** KG 6/28/14

Do not exceed 86 dBA LMax at 50 feet from the job site activities from 6:00 p.m. to 7:00 a.m. Monday through Friday and 8:00 a.m. to 5:00 p.m. Saturdays or on Sundays except you may perform the following activities during the hours and for the days shown in the following table:

Activity	Hours		Days	
	From	To	From	Through
<u>Servicing traffic control facilities and construction equipment</u>				
<u>Pile driving</u>				
<u>Falsework erection and removal</u>				
<u>HMA Overlay</u>				
<u>Required night work</u>				

2. Use if night or Sunday noise restrictions exist. Delete par. 1.

** KG 6/28/14

Do not operate construction equipment or run the equipment engines from 6:00 p.m. to 7:00 a.m. Monday through Friday and 8:00 a.m. to 5:00 p.m. Saturdays or on Sundays except you may operate equipment within the project limits during these hours for to:

1. Service traffic control facilities
2. Service construction equipment

Revised per QAQC comments ** KG 7/10/14

No construction activities on Sundays and Holidays except you may operate equipment within the project limits on Sundays to service traffic control facilities and construction equipment.

Equip all internal combustion engine driven equipment with the manufacturer-recommended muffler. Do not operate an internal combustion engine on the job site without the appropriate muffler.

Unnecessary idling of internal combustion engines is not allowed. Utilize "quiet" air compressors and other stationary noise sources where technology exists.

3. Use if a sound meter is required.

** KG 6/28/14

Add to section 14-8.02A:

~~Provide one Type 1 sound level meter and 1 acoustic calibrator to be used by the Department until Contract acceptance. Provide training by a person trained in noise monitoring to 1 Department employee designated by the Engineer. The sound level meter must be calibrated and certified by the manufacturer or other independent acoustical laboratory before delivery to the Department. Provide annual recalibration by the manufacturer or other independent acoustical laboratory. The sound level meter must be capable of taking measurements using the A-weighting network and the slow response settings. The measurement microphone must be fitted with a windscreen. The Department returns the equipment to you at Contract acceptance. Work specified in this paragraph is paid for as noise monitoring.~~

{ XE "14-11.07_A01-18-13" }
Page 1 of 4

Section 14-11.07. Use if yellow residue, expected to be a hazardous waste (lead concentration equal to or greater than 1,000 mg/kg total lead or 5 mg/l soluble lead), will be produced.

Use bid item 070030 Lead Compliance Plan (1 per project).

Replace section 14-11.07 with:

14-11.07 REMOVE YELLOW TRAFFIC STRIPE AND PAVEMENT MARKING WITH HAZARDOUS WASTE RESIDUE

14-11.07A General

14-11.07A(1) Summary

1

Section 14-11.07 includes specifications for removing existing yellow thermoplastic and yellow painted traffic stripe and pavement marking. The residue from the removal of this material is a Department-generated hazardous waste.

2

Residue from removal of yellow thermoplastic and yellow painted traffic stripe and pavement marking contains lead chromate. The average lead concentration is at least 1,000 mg/kg total lead or 5 mg/l soluble lead. When applied to the roadway, the yellow thermoplastic and yellow painted traffic stripe and pavement marking contained as much as 2.6 percent lead. Residue produced from the removal of this yellow thermoplastic and yellow painted traffic stripe and pavement marking contains heavy metals in concentrations that exceed thresholds established by the Health & Safety Code and 22 CA Code of Regs. For bidding purposes, assume the residue is not regulated under the Federal Resource Conservation and Recovery Act (RCRA), 42 USC § 6901 et seq.

10/09/13 KG

3. Use if removing yellow traffic paint applied before 1999 in District 1 or before 1997 in all other districts. If unsure of the age of the paint, use this par.

~~Work associated with disposal of hazardous waste residue regulated under RCRA as determined by test results is change order work.~~

4

Yellow thermoplastic and yellow paint may produce toxic fumes when heated.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

14-11.07A(2) Submittals

14-11.07A(2)(a) General

5

Reserved

14-11.07A(2)(b) Lead Compliance Plan

6

Submit a lead compliance plan under section 7-1.02K(6)(j)(ii).

14-11.07A(2)(c) Work Plan

7. For less complex projects, fast-track projects, or short construction periods and if instructed by the district construction office, you may add a sentence stipulating that the removal work plan must be submitted within 7 days rather than the default 15 days for all submittals.

Submit a work plan for the removal, containment, storage, and disposal of yellow thermoplastic and yellow painted traffic stripe and pavement marking. The work plan must include:

1. Objective of the operation
2. Removal equipment
3. Procedures for removal and collection of yellow thermoplastic and yellow painted traffic stripe and pavement marking residue, including dust
4. Type of hazardous waste storage containers
5. Container storage location and how it will be secured
6. Hazardous waste sampling protocol and QA/QC requirements and procedures
7. Qualifications of sampling personnel
8. Analytical lab that will perform the analyses
9. DTSC registration certificate and CA Highway Patrol (CHP) Biennial Inspection of Terminals (BIT) Program compliance documentation of the hazardous waste hauler that will transport the hazardous waste
10. Disposal site that will accept the hazardous waste residue

8

The Engineer will review the work plan within 5 business days of receipt.

9

Do not perform work that generates hazardous waste residue until the work plan has been authorized.

10

Correct any rejected work plan and resubmit a corrected work plan within 5 business days of notification by the Engineer. A new review period of 5 business days will begin from date of resubmittal.

14-11.07A(2)(d) Analytical Test Results

11

Submit analytical test results of the residue from removal of yellow thermoplastic and yellow painted traffic stripe and pavement marking, including chain of custody documentation, for review and acceptance before:

1. Requesting the Engineer's signature on the waste profile requested by the disposal facility
2. Requesting the Engineer obtain an US EPA Generator Identification Number for disposal
3. Removing the residue from the site

14-11.07A(2)(e) U.S. Environmental Protection Agency Identification Number Request

12

Submit a request for the US EPA Generator Identification Number when the Engineer accepts analytical test results documenting that residue from removal of yellow thermoplastic and yellow painted traffic stripe and pavement marking is a hazardous waste.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

14-11.07A(2)(f) Disposal Documentation

13

Submit documentation of proper disposal from the receiving landfill within 5 business days of residue transport from the project.

14

14-11.07B Materials

Not Used

14-11.07C Construction

15

Where grinding or other authorized methods are used to remove yellow thermoplastic and yellow painted traffic stripe and pavement marking that will produce a hazardous waste residue, immediately contain and collect the removed residue, including dust. Use a HEPA filter-equipped vacuum attachment operated concurrently with the removal operations or other equally effective approved methods for collection of the residue.

16

Make necessary arrangements to test the yellow thermoplastic and yellow paint hazardous waste residue as required by the disposal facility and these special provisions. Testing must include:

1. Total lead by US EPA Method 6010B
2. Total chromium by US EPA Method 6010B
3. Soluble lead by California Waste Extraction Test (CA WET)
4. Soluble chromium by CA WET
5. Soluble lead by Toxicity Characteristic Leaching Procedure (TCLP)
6. Soluble chromium by TCLP

17

From the first 220 gal of hazardous waste or portion thereof if less than 220 gal of hazardous waste are produced, a minimum of 4 randomly selected samples must be taken and analyzed individually. Samples must not be composited. From each additional 880 gal of hazardous waste or portion thereof if less than 880 gal are produced, a minimum of 1 additional random sample must be taken and analyzed. Use chain of custody procedures consistent with chapter 9 of US EPA Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846) while transporting samples from the project to the laboratory. Each sample must be homogenized before analysis by the laboratory performing the analyses. A sample aliquot sufficient to cover the amount necessary for the total and the soluble analyses must then be taken. This aliquot must be homogenized a 2nd time and the total and soluble analyses run on this aliquot. The homogenization process must not include grinding of the samples. Submit the name and location of the disposal facility that will be accepting the hazardous waste and the analytical laboratory along with the testing requirements not less than 5 business days before the start of removal of yellow thermoplastic and yellow painted traffic stripe and pavement marking. The analytical laboratory must be certified by the California Department of Public Health (CDPH) Environmental Laboratory Accreditation Program (ELAP) for all analyses to be performed.

18. Insert time limit for disposal of accumulated residue. Contact the district hazardous waste technical specialist for assistance to determine the specific time limit for disposal of accumulated residue on each project. Determine days based on disposal facility location and necessary storage time for hazardous waste. Allow time for analysis and scheduling disposal with the landfill. Minimum recommended storage time is 30 days, maximum storage time allowed by law is 90 days.

10/09/13 KG

After the Engineer accepts the analytical test results, dispose of yellow thermoplastic and yellow paint hazardous waste residue at a Class 1 disposal facility located in California under the requirements of the disposal facility operator within 30 days after accumulating 220 pounds of residue and dust.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CTA Contract No. XXX**

19. Insert maximum storage time. Recommended storage time if less than 220 lb is generated is 30 days; maximum storage time allowed by law is 90 days.

10/09/13 KG

If less than 220 pounds of hazardous waste residue and dust is generated in total, dispose of it within 30 days after the start of accumulation of the residue and dust.

20

The Engineer will sign all manifests as the generator within 2 business days of receiving and accepting the analytical test results and receiving your request for the US EPA Generator Identification Number. Use a transporter with a current DTSC registration certificate and that is in compliance with the CHP BIT Program when transporting hazardous waste.

14-11.07D Payment

21

Payment for a lead compliance plan is not included in the payment for environmental stewardship work.

22

If analytical test results demonstrate that the residue is a non-hazardous waste and the Engineer agrees, dispose of the residue at an appropriately permitted CA Class II or CA Class III facility. The Department does not adjust payment for this disposal.

{ XE "14-11.09_A04-19-13" }
Page 1 of 3

Section 14-11.09. Use if treated wood waste will be generated.

Replace section 14-11.09 with:

14-11.09 TREATED WOOD WASTE

14-11.09A General

14-11.09A(1) Summary

1

Section 14-11.09 includes specifications for handling, storing, transporting, and disposing of treated wood waste (TWW).

2. Insert the source of TWW. Examples are guardrail, thrie beam barrier, and roadside sign.

**** KG 6/25/14**

10/09/13 KG

Wood removed from roadside signs is TWW. Manage TWW under 22 CA Code of Regs, Div. 4.5, Chp. 34.

3

14-11.09A(2) Submittals

For disposal of TWW, submit as an informational submittal a copy of each completed shipping record and weight receipt within 5 business days.

4

14-11.09B Materials

Not Used

14-11.09C Construction

14-11.09C(1) General

Not Used

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

5

14-11.09C(2) Training

Provide training to personnel who handle TWW or may come in contact with TWW. Training must include:

1. Applicable requirements of 8 CA Code of Regs
2. Procedures for identifying and segregating TWW
3. Safe handling practices
4. Requirements of 22 CA Code of Regs, Div. 4.5, Chp. 34
5. Proper disposal methods

6

Maintain records of personnel training for 3 years.

7

14-11.09C(3) Storage

Store TWW before disposal using the following methods:

1. Elevate on blocks above a foreseeable run-on elevation and protect from precipitation for no more than 90 days.
2. Place on a containment surface or pad protected from run-on and precipitation for no more than 180 days.
3. Place in water-resistant containers designed for shipping or solid waste collection for no more than 1 year.
4. Place in a storage building as defined in 22 CA Code of Regs, Div. 4.5, Chp. 34, § 67386.6(a)(2)(C).

8

Prevent unauthorized access to TWW using a secured enclosure such as a locked chain-link-fenced area or a lockable shipping container located within the job site.

9

Resize and segregate TWW at a location where debris from the operation including sawdust and chips can be contained. Collect and manage the debris as TWW.

10

Provide water-resistant labels that comply with 22 CA Code of Regs, Div. 4.5, Chp. 34, §67386.5, to clearly mark and identify TWW and accumulation areas. Labels must include:

1. Caltrans, District number, Construction, Construction Contract number
2. District office address
3. Engineer's name, address, and telephone number
4. Contractor's contact name, address and telephone number
5. Date placed in storage

11

14-11.09C(4) Transporting and Disposal

Before transporting TWW, obtain an agreement from the receiving facility that the TWW will be accepted. Protect shipments of TWW from loss and exposure to precipitation. For projects with 10,000 lb or more of TWW, request a generator's EPA Identification Number at least 5 business days before the 1st shipment. Each shipment must be accompanied by a shipping record such as a bill of lading or invoice that includes:

1. Caltrans with district number
2. Construction Contract number
3. District office address
4. Engineer's name, address, and telephone number
5. Contractor's contact name and telephone number
6. Receiving facility name and address

7. Waste description: Treated Wood Waste with preservative type if known or unknown/mixture
8. Project location
9. Estimated quantity of shipment by weight or volume
10. Date of transport
11. Date of receipt by the receiving TWW facility
12. Weight of shipment as measured by the receiving TWW facility
13. Generator's EPA Identification Number for projects with 10,000 lb or more of TWW

The shipping record must be at least a 4-part carbon or carbonless 8-1/2-by-11-inch form to allow retention of copies by the Engineer, transporter, and disposal facility.

Dispose of TWW at an approved TWW facility. A list of currently approved TWW facilities is available at:

<http://www.dtsc.ca.gov/HazardousWaste/upload/lanfillapr11pdated1.pdf>

Dispose of TWW within:

1. 90 days of generation if stored on blocks
2. 180 days of generation if stored on a containment surface or pad
3. 1 year of generation if stored in a water-resistant container or within 90 days after the container is full, whichever is shorter
4. 1 year of generation if storing in a storage building as defined in 22 CA Code of Regs, Div. 4.5, Chp. 34, § 67386.6(a)(2)(C)

14-11.09D Payment

Not Used

AA

15 EXISTING FACILITIES

**** KG 6/24/14**

Add to section 15-1.01:

Schedule fence removal and construction to prevent access of the public to private property.

**** KG 7/10/14**

**** MS 7/15/14**

Add to section 15-1.03D:

Construction of new sidewalk and removal of old sidewalk at Station "BF" 22+00 to 24+00 will damage existing irrigation systems. Payment for this damage repair is in the lump sum payment for repair existing irrigation systems.

Section 15-2.02B(2). Use if obliteration with large lumps with earth cover is not allowed.

Delete the 4th paragraph in section 15-2.02B(2)

{ XE "15-2.02B(3)_A05-20-11" }
Page 1 of 3

**Section 15-2.02B(3). Use if planing of existing pavement is required.
Show the maximum depth to be planed at each location on the plans.**

Replace section 15-2.02B(3) with:

15-2.02B(3) Cold Planing Asphalt Concrete Pavement

15-2.02B(3)(a) General

Pars. 1–3. Use if HMA must be placed over cold planed areas during the same work shift as the cold planing.

1. If par. 1 applies to only some locations and not others, insert locations in the list.

If par. 1 applies to all locations, delete:

"At the locations listed below,"

List

Par. 2

****KG 10/23/13**

~~At the locations listed below,~~ Schedule cold planing activities to ensure that cold planing, placement of HMA, and reopening the area to traffic is completed during the same work shift.

1. _____
2. _____
3. _____

~~**2. Insert the time as hours or days. The minimum is 24 hours and the maximum is 7 days.**~~

~~For locations not listed above, schedule cold planing activities so that not more than _____ elapses between the time the pavement is cold planed and the HMA is placed.~~

3. Delete "At the above listed locations," if there is no list in par. 1.

****KG 10/23/13**

~~At the locations listed above, if~~ If you do not complete HMA placement before opening the area to traffic, you must:

1. Construct a temporary HMA taper to the level of the existing pavement
2. Place HMA during the next work shift
3. Submit a corrective action plan that shows you will complete cold planing and placement of HMA in the same work shift. Do not restart cold planing activities until the Engineer approves the corrective action plan.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

4. Use if HMA is not required to be placed over cold planed areas during the same work shift as the cold planing. Insert the time as hours or days. The minimum is 24 hours and the maximum is 7 days. Delete pars. 1–3.

10/09/13 KG

~~Schedule cold planing activities so that not more than 7 days elapses between the time the pavement is cold planed and the HMA is placed.~~

15-2.02B(3)(b) Materials

5

Use the same quality of HMA for temporary tapers that is used for the HMA overlay or comply with the specifications for minor HMA in section 39.

15-2.02B(3)(c) Construction

15-2.02B(3)(c)(i) General

6

Do not use a heating device to soften the pavement.

7

The cold planing machine must be:

1. Equipped with a cutter head width that matches the planing width. If the cutter head width is wider than the cold plane area shown, submit to the Engineer a request for using a wider cutter head. Do not cold plane unless the Engineer approves your request.
2. Equipped with automatic controls for the longitudinal grade and transverse slope of the cutter head and:
 - 2.1. If a ski device is used, it must be at least 30 feet long, rigid, and a 1-piece unit. The entire length must be used in activating the sensor.
 - 2.2. If referencing from existing pavement, the cold planing machine must be controlled by a self-contained grade reference system. The system must be used at or near the centerline of the roadway. On the adjacent pass with the cold planing machine, a joint-matching shoe may be used.
3. Equipped to effectively control dust generated by the planing operation
4. Operated so that no fumes or smoke is produced.

8

Replace broken, missing, or worn machine teeth.

15-2.02B(3)(c)(ii) Grade Control and Surface Smoothness

9

Furnish, install, and maintain grade and transverse slope references.

10

The depth, length, width, and shape of the cut must be as shown or as ordered. The final cut must result in a neat and uniform surface. Do not damage the remaining surface.

11

The completed surface of the planed asphalt concrete pavement must not vary more than 0.02 foot when measured with a 12-foot straightedge parallel with the centerline. With the straightedge at right angles to the centerline, the transverse slope of the planed surface must not vary more than 0.03 foot.

12

Where lanes are open to traffic, the drop-off of between adjacent lanes must not be more than 0.15 foot.

15-2.02B(3)(c)(iii) Temporary HMA Tapers

13

If a drop-off between the existing pavement and the planed area at transverse joints cannot be avoided before opening to traffic, construct a temporary HMA taper. The HMA temporary taper must be:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

1. Placed to the level of the existing pavement and tapered on a slope of 30:1 (horizontal:vertical) or flatter to the level of the planed area
2. Compacted by any method that will produce a smooth riding surface

14

Completely remove temporary tapers before placing permanent surfacing.

15-2.02B(3)(c)(iv) Remove Planed Material

15

Remove cold planed material concurrent with planing activities so that removal does not lag more than 50 feet behind the planer.

16. Use if planed material is to be stockpiled or recycled. Include location where salvaged materials are to be stockpiled.

10/09/13 KG

~~Haul and stockpile planed materials at _____.~~

15-2.02B(3)(d) Payment

17. Use if there is an item for cold plane asphalt concrete pavement or cold plane asphalt concrete pavement and base.

Payment for removal of pavement markers, thermoplastic traffic stripe, painted traffic stripe, and pavement marking within the area of cold planing is included in the payment for cold plane asphalt concrete pavement of the types shown in the Bid Item List.

{ XE "15-2.02C(2)_A01-18-13" }

Page 1 of 1

Section 15-2.02C(2). Use if residue from removing traffic stripes and pavement markings contains lead from the paint or thermoplastic and the average lead concentrations are less than 1,000 mg/kg total lead and 5 mg/L soluble lead. Use if removing other colors of paint (white, blue, black, etc.)

If yellow residue is a hazardous waste, use SSP 14-11.07.

If both hazardous waste and nonhazardous waste residue will be generated at separate locations within the project, use both this SSP and SSP 14-11.07.

Use with bid item 070030 Lead Compliance Plan (1 per project).

Replace section 15-2.02C(2) with:

15-2.02C(2) Remove Traffic Stripes and Pavement Markings Containing Lead

1

Residue from removing traffic stripes and pavement markings contains lead from the paint or thermoplastic. The average lead concentrations are less than 1,000 mg/kg total lead and 5 mg/L soluble lead. This residue:

1. Is a nonhazardous waste
2. Does not contain heavy metals in concentrations that exceed thresholds established by the Health and Safety Code and 22 CA Code of Regs
3. Is not regulated under the Federal Resource Conservation and Recovery Act (RCRA), 42 USC § 6901 et seq.

2

Submit a lead compliance plan under section 7-1.02K(6)(j)(ii).

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

3

Payment for a lead compliance plan is not included in the payment for existing facilities work.

4

Payment for handling, removal, and disposal of pavement residue that is a nonhazardous waste is included in the payment for the type of removal work involved.

Replace section 15-2.02M with:

15-2.02M Remove Manhole

Manholes must be completely removed if any portion of these structures is (1) within 3 feet of the grading plane in excavation areas, (2) within one foot of original ground in embankment areas, or (3) shown to be removed.

Removing PCC components must comply with section 15-3.

Replace section 15-2.02N with:

15-2.02N Remove Retaining Wall

Concrete retaining wall shown to be removed must be completely removed.

Removing PCC components must comply with section 15-3.

{ XE "15-2.05C_A05-20-11" }
Page 1 of 2

Section 15-2.05C. Use for abandoning culverts and pipelines.

If the pipe to be abandoned is composed of hazardous material, such as asbestos, removal (instead of abandonment) may be required. Contact the district hazardous materials coordinator.

** KG 7/10/14

Replace section 15-2.05C with:

15-2.05C Abandon ~~Culverts and Pipelines~~

15-2.05C(1) General

1

** KG 7/10/14

Abandon ~~culverts or pipelines~~ by removing portions of the ~~culverts or pipelines~~, filling the inside, and backfilling the depressions and trenches to grade. As an alternative to abandoning a ~~culvert or pipeline~~, you may remove the ~~culvert or pipeline~~, dispose of it, and backfill.

2

** KG 7/10/14

Notify the Engineer before abandoning a ~~culvert or pipeline~~.

15-2.05C(2) Materials

3

Openings into existing structures that are to remain in place must be plugged with minor concrete under section 90.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

15-2.05C(3) Construction

4

**** KG 7/10/14**

Wherever ~~culverts or~~ pipelines intersect side slopes, remove them to a depth of at least 3 feet. Measure the depth normal to the plane of the finished side slope. Abandon the remaining portion of the ~~culvert or~~ pipeline.

5

**** KG 7/10/14**

~~Culverts or~~ Pipelines that are 12 inches or more in diameter must be completely filled by authorized methods. Backfill with sand that is clean, free draining, and free from roots and other deleterious substances. As an alternative to sand, you may backfill with one of the following:

1. Controlled low-strength material under section 19-3.02F
2. Slurry cement backfill under section 19-3.02D

6

**** KG 7/10/14**

Ends of ~~culverts and~~ pipelines must be securely closed by a 6-inch-thick, tight-fitting plug or wall of commercial-quality concrete.

15-2.05C(4) Payment

7. Use if the backfill quantity for filling the culvert or pipeline is less than 5 cy.

**** KG 7/10/14**

~~If backfilling inside the culvert or pipeline is required, payment for backfilling inside the culverts or pipelines is included in the payment for abandon culvert or abandon pipeline. Payment for backfilling outside the culvert or pipeline is included in the payment for abandon culvert or abandon pipeline.~~

8. Use if the backfill quantity for filling the culvert or pipeline is over 5 cy. Include the bid item for sand backfill.

**** KG 7/10/14**

If backfilling inside the ~~culvert or~~ pipeline is required, payment for backfilling inside the ~~culvert or~~ pipeline is paid for as sand backfill. Payment for backfilling outside the ~~culvert or~~ pipeline is included in the payment for ~~abandon culvert or~~ abandon pipeline.

{ XE "15-2.06B_A05-20-11" }
Page 1 of 2

**Section 15-2.06B. Use if water or monitoring wells must be destroyed.
Do not use the term "abandon" well.**

Replace section 15-2.06B with:

15-2.06B Destroy Wells

15-2.06B(1) General

15-2.06B(1)(a) Summary

1. Insert name of county.

**** KG 6/26/14**

Destroying wells must comply with:

1. Regulations of Contra Costa County
2. *Water Well Standards, Bulletin 74-81*
3. *Water Well Standards, Bulletin 74-90*
4. Water Code, §§ 13750.5–13753

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

2

Destroy wells after clearing and grubbing and before starting earthwork.

3

Where pumping equipment is present, remove the pump, motor, discharge piping, well cap, and appurtenances. Remove concrete at the wellhead.

15-2.06B(1)(b) Submittals

4. Insert name of county.

**** KG 6/26/14**

Obtain a well permit from Contra Costa County. Before starting the affected work, submit the permit under section 5-1.23C.

5

Per the instructions from the California Department of Water Resources, submit the *Well Completion Report* form. After completion of the work and before Contract acceptance, submit a copy of your well completion report under section 5-1.23C.

15-2.06B(2) Materials

6. Insert name of county.

**** KG 6/26/14**

Unless otherwise required by Contra Costa County, sealing materials must be either of the following:

1. Neat cement consisting of:
 - 1.1. 94 lb of cement
 - 1.2. Not more than 6 gal of clean water
 - 1.3. Up to 6 percent by weight of bentonite
 - 1.4. 2 percent by weight of calcium chloride
2. Bentonite clay

7

Do not use drilling mud.

15-2.06B(3) Construction

8

If the Engineer orders the removal of surface obstructions or materials that would interfere with destroying the well, this work is change order work. After completion of this work, do not allow material to enter the well that will obstruct or interfere with destroying the well.

9

Remove casing to 5 feet below grade.

10

Place sealing material such that it is placed in one continuous operation. Use methods that prevent jamming, bridging, free fall, or dilution. Do not allow separation of the aggregate and cement.

11

Completely fill the well with sealing material such that the sealing material spills over the casing.

12

At the time of placement, verify that the combined volume of sealing material is at least equal to the volume of the empty well.

13

Do not disturb the well for 48 hours after placing the sealing material.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

14. Edit type of backfill to match the material around the well. Require paving if necessary.

Fill depressions around the well with native material and compact to finish grade. Native material must not contain organic matter.

15-2.06B(4) Payment

15

Not Used

Replace section 15-2.10E with:

15-2.10E Adjust Monument to Grade

Where paving or surfacing work is shown, do not adjust to final grade until the adjacent pavement or surfacing is complete.

The Department furnishes survey marker disks.

Covers must fit into frames without rocking.

Remove the disk and trim the top of the monument to provide a suitable foundation for the new material.

Use minor concrete with at least 590 lb/cu yd of cementitious material.

{ XE "15-3.01_A07-19-13" }
Page 1 of 1

Section 15-3.01. Use for:

- 1. Preserving curbs and sidewalks**
- 2. Eliminating the option to dispose of concrete on the job site**
- 3. Restricting disposal of concrete to embankments**

Add to section 15-3.01:

- 1. Use if needed to preserve curbs and sidewalks. Edit to suit work**

**** KG 6/26/14**

~~At the following locations, do not remove concrete curbs and sidewalks that are adjacent to frontage roads and through city streets:~~

- ~~1. _____~~
- ~~2. _____~~

- 2. Use if there is no disposal of concrete on the job site. Delete par. 3.**

Delete the 4th paragraph of section 15-3.01 in the RSS for section 15-3.01.

- 3. Use if concrete may be disposed of in embankments but not otherwise. Delete par. 2.**

**** KG 6/26/14**

~~Delete item 2 in the 4th paragraph of section 15-3.01 in the RSS for section 15-3.01.~~

Add to section 15-3.04:

Payment for gutter removal is included in the payment for remove curb.

DIVISION III GRADING

16 CLEARING AND GRUBBING

{ XE "16-1.03A_X2_A05-20-11" }

Section 16-1.03A. Use if a maximum amount of vegetation is to be protected.

Replace the 4th paragraph in section 16-1.03A with:

Clear and grub vegetation only within the excavation and embankment slope lines.

Add to section 16-1.04:

Payment for removing trees is not included in the payment for clearing and grubbing.

AA

~~17 WATERING~~

ΛΛΛ

~~18 DUST PALLIATIVE~~

ΛΛΛ

19 EARTHWORK

Replace “roadway” in the 3rd paragraph in section 19-1.03E with:

channel

Add to section 19-1.04:

Channel excavation is measured as specified for ditch excavation.

Section 19-2.03G. Use if after constructing the embankment, the embankment surface must be roughened for the placement of erosion control materials.

Add to section 19-2.03G:

1. Use if only the slopes of the embankment must be roughened by either track-walking or sheepsfoot roller.

Roughen embankment slopes to receive erosion control materials by either track-walking or rolling with a sheepsfoot roller. Track-walk slopes by running track-mounted equipment perpendicular to slope contours.

2. Use if the slopes and flat surfaces must be roughened by scarifying. Insert depth (typically 4 to 8 inches).

10/09/13 KG

Roughen excavation slopes and flat surfaces to receive erosion control materials by scarifying to a depth of 6 inches.

{ XE "19-3.04_A01-18-13" }
Page 1 of 1

Section 19-3.04. Use for structure excavation and backfill payment clauses.

Add to section 19-3.04:

1. Use with SSP 19-3.03A for bridge and retaining walls where unstable material below the bottom of the footing is removed and replaced. Edit if the backfill is not Class 2 aggregate.

**** KG 7/03/14**

~~Class 2 aggregate base placed below footings is paid for as structure backfill.~~

2. Use with SSP 19-3.03B(1) when structure excavation (Type D) or (Type DH) is described for sometimes wet, or wet excavation, and no seal course is shown on the project. Insert type (e.g., D, DH). Do not use with par. 3.

**** KG 7/03/14**

~~Structure excavation for footings at locations not shown as structure excavation (Type —) and where ground or surface water is encountered is paid for as structure excavation (bridge).~~

3. Use with SSP 19-3.03B(1) when structure excavation (Type D) or (Type DH) is described for sometimes wet, or wet excavation, and no seal course is shown for that location but a seal course is shown at other locations. Insert type (e.g., D, DH). Do not use with par. 2.

**** KG 7/03/14**

~~Except at locations where seal course concrete is shown, structure excavation for footings at locations not shown as structure excavation (Type —) and where ground or surface water is encountered is paid for as structure excavation (bridge).~~

4. Use with SSP 19-3.03B(3) for pier column excavation.

**** KG 7/03/14**

~~Structure excavation (pier column) is measured from the bottom of the completed foundation excavation to the upper and horizontal limits shown.~~

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

5. Use if quantity of pervious backfill material is small. Small is considered to be about 50 cubic yards or less.

Pervious backfill material placed within the limits of payment for bridges is paid for as structure backfill (bridge). Pervious backfill material placed within the limits of payment for retaining walls is paid for as structure backfill (retaining wall).

6. Use if culvert drainage profiles are based on aerial surveys.

**** KG 7/03/14**

Replace the 2nd sentence in the 7th paragraph of section 19-3.04 with:

~~Structure excavation more than 1 foot from the depth shown is paid for as a work character change if you request an adjustment or the Engineer orders an adjustment.~~

{ XE "19-6.03D_A05-20-11" }
Page 1 of 1

Section 19-6.03D. Use for settlement periods and surcharges.

Add to section 19-6.03D:

1. Use for settlement periods at bridges. For embankments requiring settlement periods but no surcharge; put "0.0^a" in the "Surcharge Height" column. Notify the estimator and district of revised pay limits. If no such embankments exist, delete the note "a" at the bottom of the table.

**** KG 6/24/14**

**** MS 7/15/14**

Settlement periods and surcharges are required for bridge approach embankments as shown in the following table:

Bridge name or number	Abutment number	Surcharge height (feet)	Settlement period (days)
Balfour Road UC	1 and 3	05.0	60
Deer Creek Bridge	1 and 2	05.0	60
Deer Creek Bridge at EB SR4 Onramp	1 and 2	05.0	60

During the settlement period, you are required to perform settlement monitoring as per Caltrans Standard Test Method 112, "Method for Installation and Use of Embankment Settlement Devices".

2. Use for settlement periods at earth retaining structures.

**** KG 6/24/14**

~~Settlement periods and surcharges are required for roadway embankments at the earth retaining structures as shown in the following table:~~

Earth retaining structure number	Surcharge height (feet)	Settlement period (days)

Add new section 19-6.03F:

19-6.03F Biofiltration Swale Berm

Construction biofiltration swale berms as shown.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Use material from excavations or from imported borrow.

Revised per QAQC comments ** KG 7/10/14

Selection of material is possible, do not place borrow or excavation material having a sand equivalent value less than 10 within 2.5 feet of finished grade. Use this material to construct the lower portions of embankments. Material placed lower than 2.5 feet below finish grade is not restricted by the sand equivalent value.

Compact berm material under section 19-5.03C. If hand-operated equipment is used, do not place more than 6 inches of berm material before compaction.

{ XE "19-7.02C_A05-20-11" }
Page 1 of 1

Section 19-7.02C. Use for specifying imported borrow material.

Add to section 19-7.02C:

1. Insert R-Value. Do not specify an R-Value greater than that of native material.

10/09/13 KG

Max PI of 15 added per Brent/geotech report ** MS 07/18/14

The portion of imported borrow placed within 4 feet of the finished grade must have a resistance (R-Value) of at least 15 and a maximum Plasticity Index (PI) of 15.

Pars. 2–6. Use if the project has a mandatory source for imported borrow.

2. Enter the location of the mandatory local material source.

10/09/13 KG

Imported borrow must be obtained and produced for acceptability from the mandatory local material source located at _____.

3

Do not obtain imported borrow material from another source.

4. The items listed in this par. are typical information provided by the District. This information may vary for each material source. Items 6 and 7 may apply for desert or other critical areas. Edit to suit work.

Obtaining imported borrow includes the following:

1. Constructing an access road as shown.
2. Clearing and grubbing the material site. Strip the site of materials that may adversely affect the specified material properties.
3. Selecting material within the source.
4. Screening and wasting approximately 30 to 60 percent of the finer material. Crush aggregate so that the imported borrow complies with the grading requirements.
5. Washing materials so that the imported borrow complies with the sand equivalent requirements.

5. Insert cost and unit.

The Department has made arrangement for you to obtain material at the above location at the price of \$_____ per _____ for material removed from the site and used in the work. The Department deducts from progress pay estimates due to you to cover the cost of the material removed.

6. Use only if restoration of the borrow site and haul roads is required. Edit to suit work.

After obtaining imported borrow, grade the borrow sites and associated haul roads such that sites drain and blend with the surrounding terrain. Remove equipment before grading.

1

Section 21-1.02P. Use for specifying photodegradable plastic netting, weed-free straw, or both.

1. Use if fiber roll netting must be plastic. Do not use if endangered species may become trapped in the plastic netting.

**** KG 6/28/14**

~~Replace "biodegradable jute, sisal, or coir fiber" in the 1st paragraph of the RSS for section 21-1.02P with:~~

photodegradable plastic

2. Use if straw must be weed free.

Add to section 21-1.02P:

Straw must be weed free. Weed-free straw must comply with the Department of Food and Agriculture's certification requirements for weed-free straw.

{ XE "21-2_N04-13-12" }

Page 1 of 1

NEW

04-4H1601, CC-4 PM 34.9/36.6

06/24/2014

Add section 21-2:

21-2 IMPORTED BIOFILTRATION SOIL

21-2.01 GENERAL

21-2.01A Summary

Section 21-2 includes specifications for furnishing and applying imported biofiltration soil mix.

21-2.01B Submittals

Submit a certificate of compliance from the soil supplier.

Submit the compost producer's *Compost Technical Data Sheet* including test results and *Seal of Testing Assurance* certificate before mixing compost with sand and soil.

21-2.01C Quality Control and Assurance

Saturated hydraulic conductivity for imported biofiltration soil must be at least 5 inches per hour.

21-2.02 MATERIALS

21-2.02A General

Imported biofiltration soil consists of a uniform mixture of sand, compost, and topsoil. The ratio of the components of imported biofiltration soil by volume must consist of two-parts sand; one-part compost; 0.5-part topsoil.

21-2.02B Sand

Sand must be free of wood, waste, coating such as clay, stone dust, carbonate, or any other deleterious material. All aggregate passing No. 200 sieve size must be non-plastic. Sand must be graded within the following limits:

Sieve Sizes	Percentage Passing
3/8"	100
No. 4	90 - 100
No. 8	70 - 100
No. 16	40 - 95
No. 30	15 - 70
No. 40	5-55
No. 100	0 - 15
No. 200	0 - 5

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX
25 AGGREGATE SUBBASES

{ XE "25-1_A07-19-13" }
Page 1 of 4

Section 25-1. Use for any of the following:

1. Enhancing aggregate subbase with biaxial geogrid.
2. Adding processed glass to AS.
3. Editing grading and quality requirements for Classes 4 AS.
4. Adding Class 5 AS requirements.

1. Use for enhancing AS with biaxial geogrid.

** KG 6/26/14

Add after "AS" in the 1st paragraph of section 25-1.01:

~~including placing geosynthetic material as shown.~~

2. Use for Classes 1-4 AS. A Construction Evaluated Work Plan (CEWP) with the FHWA and Division of Pavement Management is required.

** KG 6/26/14

Add to section 25-1.02A:

~~Aggregate for Class _____ AS may include processed glass. Place AS with glass only where the AS will be permanently covered.~~

Pars. 3–7. Use for Class 4 AS.

Replace "Reserved" in section 25-1.02C with:

3. Add grading requirements.

From sand creek KG 6/26/14**

When tested under California Test 202, aggregate for Class 4 AS must comply with the grading requirements for the sieve sizes shown in the following table:

Aggregate Grading

Sieve size	Percentage passing	
	Operating range	Contract compliance
<u>2-1/2"</u>	<u>100</u>	<u>100</u>
No. 4	<u>30-65</u>	<u>25-70</u>
No. 200	<u>0-15</u>	<u>0-18</u>

4. Add operating range and contract compliance to aggregate quality table.

From sand creek ** KG 6/26/14

Aggregate for Class 4 AS must comply with the quality requirements shown in the following table:

Aggregate Quality

Property	California Test	Operating range	Contract compliance
Sand equivalent (min)	217	<u>21</u>	<u>18</u>
Resistance (R-value)(min)	301	<u>-----</u>	<u>50</u>

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

5

If the aggregate grading test results, sand equivalent test results, or both comply with contract compliance requirements but not operating range requirements, you may continue placing AS for the remainder of the work day. Do not place additional AS until you demonstrate to the Engineer the AS to be placed complies with the operating range requirements.

6

If the aggregate grading test results, sand equivalent tests results, or both do not comply with contract compliance requirements, remove the AS or request a payment deduction. If your request is authorized, \$2.00/cu yd is deducted for each noncompliant test result. An aggregate grading and a sand equivalent test represents up to (1) 500 cu yd or (2) 1 day's production if less than 500 cu yd.

7. Add Class 1, 2, or 3.

**** KG 6/26/14**

Instead of Class 4 AS, you may place Class 1 AS under the aggregate grading and quality requirements in section 25-1.02A. If you place Class 1 AS, do not use Class 4 AS without authorization.

Pars. 8–10. Use for Class 5 AS to describe aggregate source and grading requirements.

**** KG 6/26/14**

Replace "Reserved" in section 25-1.02D with:

~~8. Describe the location of the aggregate source, or delete "from" and add "as shown" in the blank space if locations are shown on the plans.~~

Obtain material for Class 5 AS from _____.

9. Add grading requirements.

~~When tested under California Test 202, aggregate for Class 5 AS must comply with the grading requirements for the sieve sizes shown in the following table:~~

Aggregate Grading

Sieve size	Percentage passing
	100
No. 200	

10

Add to section 25-1.03A:

~~Place excess material from processing Class 5 AS in embankments under section 19. Otherwise, place excess material within the right of way as directed.~~

Use Pars. 11–20 for enhancing AS with biaxial geogrid.

11. Delete "filter fabric and" if par. 12 is not used.

**** KG 6/26/14**

Add to section 25-1.03B:

~~Before placing filter fabric and biaxial geogrid, remove loose or extraneous material and sharp objects that may come in contact with the material.~~

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CTA Contract No. XXX**

~~12. Use if filter fabric is required as determined by the "Aggregate Subbase Enhancement with Biaxial Geogrid for Flexible Pavement Structures" guidelines.~~

Place filter fabric on the subgrade where shown. Placing, protecting, and repairing filter fabric must comply to the requirements for biaxial geogrid.

Add to section 25-1.03C:

~~13. Delete if filter fabric is not used.~~

Do not operate equipment or vehicles directly on the filter fabric.

~~14~~

Place biaxial geogrid as shown.

~~15~~

Place biaxial geogrid:

- ~~1. Under manufacturer's instructions~~
- ~~2. Longitudinally along the roadway alignment~~
- ~~3. Without wrinkles~~

~~16~~

~~Overlap adjacent edges of biaxial geogrid rolls at least 2 feet. Overlap the ends of the rolls at least 2 feet in the direction you spread AS covering the biaxial geogrid.~~

~~17~~

~~You may fold or cut biaxial geogrid to conform to curves. If cut, overlap at least 2 feet. You may hold material in place with mechanical ties, staples, pins, or small piles of AS.~~

~~18~~

Do not:

- ~~1. Stockpile material on biaxial geogrid~~
- ~~2. Place more biaxial geogrid than can be covered in 72 hours~~

~~19~~

~~You may operate vehicles and equipment on biaxial geogrid if one of the following conditions is met:~~

- ~~1. Vehicles and equipment are:~~
 - ~~1.1. Equipped with rubber tires~~
 - ~~1.2. Operated under 10 mph~~
 - ~~1.3. Operated in a manner to avoid sudden braking and sharp turns~~
- ~~2. At least 0.35 ft of AS has been placed, spread, and compacted on the biaxial geogrid~~

~~20~~

Add to section 25-1.03D:

Compact AS with either (1) a smooth-wheeled roller or (2) a rubber-tired roller. Do not use vibratory devices during compaction.

~~21~~

**** KG 6/26/14**

~~Repair or replace damaged biaxial geogrid. Repair biaxial geogrid by placing a new piece of material with at least 3 feet of overlap from the edges of the damaged area.~~

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

22. Use for Class 5 AS.

**** KG 6/26/14**

Add to section 25-1.04:

~~If excavated material is used for Class 5 AS, quantities are not deducted from excavation bid items and stockpiling or handling the material is not paid for. The payment quantity of Class 5 AS is the actual quantity placed and does not include excess material used in embankments or placed within the right-of-way.~~

AA

26 AGGREGATE BASES

Add to section 26-1.01:

Temporary aggregate base must comply with section 5-1.36A and the Contract for a permanent aggregate base of the same class.

{ XE "26-1_A10-19-12" }
Page 1 of 3

Section 26-1. Use for any of the following:

- 1. Enhancing aggregate base with biaxial geogrid.**
- 2. Adding processed glass to AB.**
- 3. Editing aggregate grading and add durability index requirements for Class 3 AB.**
- 4. Increasing the 0.50 foot maximum compacted thickness specified for a compacted layer of AB.**
- 5. If the quantity of Class 3 AB is less than 550 tons.**

- 1. Use for enhancing AB with biaxial geogrid.**

**** KG 6/24/14**

Add after "AB" in the 1st paragraph of section 26-1.01:

~~including placing geosynthetic material as shown.~~

2. Use to add processed glass to AB. A Construction Evaluated Work Plan (CEWP) with the FHWA and Division of Pavement Management is required.

Add to section 26-1.02A:

Aggregate may include processed glass. Place AB with glass only where the material is to be permanently covered.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Pars 3–5. Use to edit grading and add durability index to Class 3 AB.

3.

**** KG 6/24/14**

Replace the table in the 1st paragraph of section 26-1.02C with:

Aggregate Grading

Sieve sizes	Percentage passing _____ inch maximum	
	Operating range	Contract compliance
2"		
1-1/2"		
1"		
3/4"		
No. 4		
No. 30		
No. 200		

Par. 4–5. If required, use to add the durability index to the Aggregate Quality table.

4. Add the operating range and contract compliance requirements for the durability index.

Add the durability index to the Aggregate Quality table in the 2nd paragraph of section 26-1.02C:

Property	California Test	Operating range	Contract compliance
Durability index	229	_____	_____

5. Use if durability index is added in par. 4.

Add to section 26-1.02C:

Aggregate samples must not be treated with lime, cement, or chemicals before testing for durability index. Aggregate from untreated RAP, processed concrete pavement, LCB, or CTB is not considered treated.

Use Pars. 6–16 for enhancing AB with biaxial geogrid.

6. Delete "filter fabric and" if par. 7 is not used.

**** KG 6/24/14**

Add to section 26-1.03B:

Before placing filter fabric and biaxial geogrid, remove loose or extraneous material and sharp objects that may come in contact with the material.

7. Use if filter fabric is required as determined by the "Aggregate Base Enhancement with Biaxial Geogrid for Flexible Pavement Structures" guidelines.

Place filter fabric on the subgrade where shown. Placing, protecting, and repairing filter fabric must comply to the requirements for biaxial geogrid.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Add to section 26-1.03C:

8. Delete if filter fabric is not used.

Do not operate equipment or vehicles directly on the filter fabric.

9

Place biaxial geogrid as shown.

10

Place biaxial geogrid:

1. Under manufacturer's instructions
2. Longitudinally along the roadway alignment
3. Without wrinkles

11

Overlap adjacent edges of biaxial geogrid rolls at least 2 feet. Overlap the ends of the rolls at least 2 feet in the direction you spread AB covering the biaxial geogrid.

12

You may fold or cut biaxial geogrid to conform to curves. If cut, overlap at least 2 feet. You may hold material in place with mechanical ties, staples, pins, or small piles of AB.

13

Do not:

1. Stockpile material on biaxial geogrid
2. Place more biaxial geogrid than can be covered in 72 hours

14

You may operate vehicles and equipment on biaxial geogrid if one of the following conditions is met:

1. Vehicles and equipment are:
 - 1.1. Equipped with rubber tires
 - 1.2. Operated under 10 mph
 - 1.3. Operated in a manner to avoid sudden braking and sharp turns
2. At least 0.35 ft of AB has been placed, spread, and compacted on the biaxial geogrid

15

Compact AB with either (1) a smooth wheeled roller or (2) a rubber tired roller. Do not use vibratory devices during compaction.

16

Repair or replace damaged biaxial geogrid. Repair biaxial geogrid by placing a new piece of material with at least 3 feet of overlap from the edges of the damaged area.

17. Edit for class of aggregate and compacted aggregate layer thickness.

**** KG 6/24/14**

Replace the 3rd sentence in the 3rd paragraph of section 26-1.03C with:

The compacted thickness of any one layer of Class ____ AB must not exceed ____ foot.

~~**Add to section 26-1.04:**~~

[illegible]

Λ Λ

AA

AA

AA

Λ Λ

Section 39-1.03K. Use for rumble strips in new or existing material.
Variations in width and location of rumble strips, including centerlines, require a recommendation from the Traffic Safety Research Branch. Centerline rumble strips, if recommended, should use a separate one-time item code.
Edit for rumble strips in existing asphalt concrete (i.e., use the term "existing asphalt concrete.")

Replace section 39-1.03K of the RSS for section 39 with:

39-1.03K Rumble Strips

Construct rumble strips in the top layer of HMA surfacing by ground-in methods.

Select the method and equipment for constructing ground-in indentations.

Do not construct rumble strips on structures or approach slabs.

Construct rumble strips within 2 inches of the specified alignment. The grinding equipment must be equipped with a sighting device enabling the operator to maintain the rumble strip alignment.

Indentations must comply with the specified dimensions within 1/16 inch in depth and 10 percent in length and width.

The Engineer orders grinding or removal and replacement of noncompliant rumble strips to bring them within specified tolerances. Ground surface areas must be neat and uniform in appearance.

The grinding equipment must be equipped with a vacuum attachment to remove residue from the roadbed.

Dispose of removed material.

On ground areas, apply fog seal coat under section 37-2.

{ XE "39-2_A04-18-14" }
Page 1 of 5

Section 39-2. Use to specify any of the following for Type A HMA:

- 1. Warm mix asphalt additive technology requirement**
- 2. Grade of asphalt binder**
- 3. Requirements for a District 1, 2, or 6 project**

- 1. Use if warm mix asphalt additive technology is required.**

**** KG 6/23/14**

~~**Replace the 2nd paragraph in section 39-2.01A of the RSS for section 39 with:**~~

~~You must produce Type A HMA using an authorized warm mix asphalt technology, except the water injection technology is not allowed.~~

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

2-7. Use for a District 2 project.

2

Add to section 39-2.01A of the RSS for section 39:

Do not place Type A HMA on the traveled way between November 1 and May 1 for any of the following conditions:

1. Quantity of HMA is greater than 1000 tons
2. Project elevation is greater than 1500 feet

3

Add to the table in the 1st paragraph of section 39-2.01D(2)(b) of the RSS for section 39:

Coarse durability index ^e	AASHTO T 210	1 per 3,000 tons or 1 per paving day, whichever is greater
Fine durability index	AASHTO T 210	1 per 3,000 tons or 1 per paving day, whichever is greater
Sodium sulfate soundness ^f	AASHTO T 104	1 per project

^eRequirement applies if aggregate source is in Lassen, Modoc, Siskiyou, or Shasta County.

^fRequirement applies if aggregate source is in Modoc, Siskiyou, or Shasta County.

4

Replace the row for Los Angeles Rattler in the table in item 1 in the list in the paragraph of section 39-2.01D(5) of the RSS for section 39 with:

Los Angeles Rattler (max, %)	AASHTO T 96	12
Loss at 100 Rev.		25
Loss at 500 Rev.		

5

Add to the table in item 1 in the list in the paragraph of section 39-2.01D(5) of the RSS for section 39:

Coarse durability index (D_c , min) ^e	AASHTO T 210	65
Fine durability index (D_f , min)	AASHTO T 210	50
Sodium sulfate soundness (max loss, %) ^f	AASHTO T 104	25

^eRequirement applies if aggregate source is in Lassen, Modoc, Siskiyou, or Shasta County.

^fRequirement applies if aggregate source is in Modoc, Siskiyou, or Shasta County.

6

Replace the row for moisture susceptibility, wet strength, in the table in item 3 in the list in the paragraph of section 39-2.01D(5) of the RSS for section 39 with:

Moisture susceptibility (min, psi, wet strength)	AASHTO T 283	80
--	--------------	----

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

7

Add to the table in item 3 in the list in the paragraph of section 39-2.01D(5) of the RSS for section 39 with:

Surface abrasion loss (max, g/cm ²) ^h	California Test 360	0.4
--	---------------------	-----

^hIf the project elevation is greater than 1500 feet

8-9. Use for a District 6 project.

8.

**** KG 6/23/14**

Add to the table in the 1st paragraph of section 39-2.01D(2)(b) of the RSS for section 39:

Coarse durability index	AASHTO T 210	1 per 3,000 tons or 1 per paving day, whichever is greater
Fine durability index	AASHTO T 210	1 per 3,000 tons or 1 per paving day, whichever is greater

9

Add to the table in item 1 in the list in the paragraph of section 39-2.01D(5) of the RSS for section 39:

Coarse durability index (D _c , min)	AASHTO T 210	65
Fine durability index (D _f , min)	AASHTO T 210	50

10-11. Use for a District 2 project.

10

**** KG 6/23/14**

Replace the row for moisture susceptibility, wet strength, in the table in the 1st paragraph of section 39-2.02B of the RSS for section 39 with:

Moisture susceptibility (min, psi, wet strength)	AASHTO T 283	80
--	--------------	----

11

Add to the table in the 1st paragraph of section 39-2.02B of the RSS for section 39:

Surface abrasion loss (max, g/cm ²) ^f	California Test 360	0.4
--	---------------------	-----

^fIf the project elevation is greater than 1500 feet

12. Use to specify the grade of asphalt binder for Type A HMA.

**** KG 6/23/14**

Replace "Reserved" in section 39-2.02C of the RSS for section 39:

The grade of asphalt binder for Type A HMA must be PG 64-10.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

13–14. Use for a District 2 project.

13

**** KG 6/23/14**

Replace the row for Los Angeles Rattler in the table in the 1st paragraph of section 39-2.02D(1) of the RSS for section 39 with:

Los Angeles Rattler (max, %)	AASHTO T 96	12
Loss at 100 Rev.		25
Loss at 500 Rev.		

14

Add to the table in the 1st paragraph of section 39-2.02D(1) of the RSS for section 39:

Coarse durability index (D_{ci} , min) ^d	AASHTO T 210	65
Fine durability index (D_{fi} , min)	AASHTO T 210	50
Sodium sulfate soundness (max loss, %) ^e	AASHTO T 104	25

^dRequirement applies if aggregate source is in Lassen, Modoc, Siskiyou, or Shasta County.

^eRequirement applies if aggregate source is in Modoc, Siskiyou, or Shasta County.

15. Use for a District 6 project.

**** KG 6/23/14**

Add to the table in the 1st paragraph of section 39-2.02D(1) of the RSS for section 39:

Coarse durability index (D_{ci} , min)	AASHTO T 210	65
Fine durability index (D_{fi} , min)	AASHTO T 210	50

16. Use for a District 1 or 2 project.

**** KG 6/23/14**

Add to the beginning of section 39-2.03 of the RSS for section 39:

Use a material transfer vehicle when placing Type A HMA if:

1. Quantity of HMA to be paved is greater than 1000 tons
2. Any of the following exists:
 - 2.1. Paving is allowed and the atmospheric temperature is below 70 degrees F.
 - 2.2. Time from discharge to truck at the HMA plant until transfer to the paver's hopper is 90 minutes or greater.

17–19. Use if warm mix asphalt additive technology is required.

17

**** KG 6/23/14**

Replace the 1st and 2nd paragraphs of section 39-2.03 of the RSS for section 39:

If the atmospheric temperature is below 60 degrees F, cover loads in trucks with tarps. If the time for HMA discharge to truck at the HMA plant until transfer to paver's hopper is 90 minutes or greater and if the atmospheric temperature is below 70 degrees F, cover loads in trucks with tarps. The tarps must completely cover the exposed load until you transfer the mixture to the paver's hopper or to the pavement surface. Tarps are not required if the time from discharging to the truck until transfer to the paver's hopper or the pavement surface is less than 30 minutes.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

18

Spread Type A HMA at the atmospheric and surface temperatures shown in the following table:

Minimum Atmospheric and Surface Temperatures

Compacted layer thickness	Atmosphere, °F		Surface, °F	
	Unmodified asphalt binder	Modified asphalt binder	Unmodified asphalt binder	Modified asphalt binder ^a
<0.15	45	40	50	45
0.15-0.25	40	40	40	40

^aExcept asphalt rubber binder.

19

For Type A HMA placed under method compaction, if the asphalt binder is:

1. Unmodified, complete:
 - 1.1 First coverage of breakdown compaction before the surface temperature drops below 240 degrees F
 - 1.2 Breakdown and intermediate compaction before the surface temperature drops below 190 degrees F
 - 1.3 Finish compaction before the surface temperature drops below 140 degrees F
2. Modified, complete:
 - 2.1 First coverage of breakdown compaction before the surface temperature drops below 230 degrees F
 - 2.2 Breakdown and intermediate compaction before the surface temperature drops below 170 degrees F
 - 2.3 Finish compaction before the surface temperature drops below 130 degrees F

{ XE "39-3_A04-18-14" }
Page 1 of 5

Section 39-3. Use to specify any of the following for RHMA-G:

- 1. Warm mix asphalt additive technology requirement**
- 2. Grade of asphalt binder**
- 3. Requirements for a District 1, 2, 6, or 11 project**

- 1. Use if a warm mix asphalt additive technology is required.**

** KG 6/23/14

Replace the 2nd paragraph in section 39-3.01A of the RSS for section 39 with:

You must produce RHMA-G using an authorized warm mix asphalt technology, except the water injection technology is not allowed.

2-8. For a project in District 2.

2

** KG 6/23/14

Add to section 39-3.01A of the RSS for section 39:

Do not place RHMA-G on the traveled way between September 15 and May 1.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

3

Add to the table in the 1st paragraph of section 39-3.01D(3)(c) of the RSS for section 39:

Coarse durability index ^d	AASHTO T 210	1 per 3,000 or 1 per paving day, whichever is greater
Fine durability index	AASHTO T 210	1 per 3,000 tons or 1 per paving day, whichever is greater
Sodium sulfate soundness ^e	AASHTO T 104	1 per project

^dRequirement applies if aggregate source is in Lassen, Modoc, Siskiyou, or Shasta County.

^eRequirement applies if aggregate source is in Modoc, Siskiyou, or Shasta County.

4

Replace the row for Los Angeles Rattler in the table in item 1 in the list in the paragraph of section 39-3.01D(5)(a) of the RSS for section 39 with:

Los Angeles Rattler (max, %)	AASHTO T 96	12
Loss at 100 Rev.		25
Loss at 500 Rev.		

5

Add to the table in item 1 in the list in the paragraph of section 39-3.01D(5)(a) of the RSS for section 39:

Coarse durability index (D_{cs} , min) ^d	AASHTO T 210	65
Fine durability index (D_{fs} , min)	AASHTO T 210	50
Sodium sulfate soundness (max loss, %) ^e	AASHTO T 104	25

^dRequirement applies if aggregate source is in Lassen, Modoc, Siskiyou, or Shasta County.

^eRequirement applies if aggregate source is in Modoc, Siskiyou, or Shasta County.

6

Replace the row for air voids content in the table in item 2 in the list in the paragraph of section 39-3.01D(5)(a) of the RSS for section 39 with:

Air voids content @ N_{design} (%) ^{a, b}	AASHTO T 269	3.5 ± 1.5
--	--------------	---------------

7

Replace the row for moisture susceptibility, wet strength, in the table in item 2 in the list in the paragraph of section 39-3.01D(5)(a) of the RSS for section 39 with:

Moisture susceptibility (min, psi, wet strength)	AASHTO T 283	80
--	--------------	----

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

8

Add to the table in item 2 in the list in the paragraph of section 39-3.01D(5)(a) of the RSS for section 39 with:

Surface abrasion loss (max, g/cm ²) ^a	California Test 360	0.4
--	---------------------	-----

^aIf the project elevation is greater than 1500 feet

9–10. Use for a District 6 project.

9

**** KG 6/23/14**

Add to the table in the 1st paragraph of section 39-3.01D(3)(c) of the RSS for section 39:

Coarse durability index	AASHTO T 210	1 per 3,000 or 1 per paving day, whichever is greater
Fine durability index	AASHTO T 210	1 per 3,000 tons or 1 per paving day, whichever is greater

10

Add to the table in item 1 in the list in the paragraph of section 39-3.01D(5)(a) of the RSS for section 39:

Coarse durability index (D_c , min)	AASHTO T 210	65
Fine durability index (D_f , min)	AASHTO T 210	50

11. Use for a District 11 project if PG 70-10 is specified.

**** KG 6/23/14**

Replace the row air voids content in the table in item 2 in the list in the paragraph of section 39-3.01D(5)(a) of the RSS for section 39 with:

Air voids content @ N_{design} (%) ^{a, b}	AASHTO T 269	5.0 ± 1.5
--	--------------	---------------

12–15. Use for a District 2 project.

12

**** KG 6/23/14**

Replace the row for air voids content in the table in the 1st paragraph of section 39-3.02B of the RSS for section 39 with:

Air voids content (%)	AASHTO T 269 ^a	$N_{design} = 3.5$
-----------------------	---------------------------	--------------------

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

13

Replace the row for moisture susceptibility, wet strength, in the table in the 1st paragraph of section 39-3.02B of the RSS for section 39 with:

Moisture susceptibility (min, psi, wet strength)	AASHTO T 283	80
--	--------------	----

14

Add to the table in the 1st paragraph of section 39-3.02B of the RSS for section 39:

Surface abrasion loss (max, g/cm ²) ^f	California Test 360	0.4
--	---------------------	-----

^fIf the project elevation is greater than 1500 feet

15

Replace "4 percent" in item 5 in the list in the 2nd paragraph of section 39-3.02B of the RSS for section 39 with:

3.5 percent

16–17. Use for a project in District 11 when PG 70-10 is specified.

16

**** KG 6/23/14**

Replace the row for air voids content in the table in the 1st paragraph of section 39-3.02B of the RSS for section 39 with:

Air voids content (%)	AASHTO T 269 ^a	N _{design} = 5.0
-----------------------	---------------------------	---------------------------

17

Replace "4 percent" in item 5 in the list in the 2nd paragraph of section 39-3.02B of the RSS for section 39 with:

5.0 percent

18. Use to specify the grade of asphalt binder for RHMA-G or RHMA-G(BWC). Insert binder grade.

**** KG 6/23/14**

Add to section 39-3.02C(1) of the RSS for section 39:

The grade of asphalt binder for RHMA-G must be PG 64-10.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

19–20. Use for a District 2 project.

19

**** KG 6/23/14**

Replace the row for Los Angeles Rattler in the table in the 1st paragraph of section 39-3.02D(1) of the RSS for section 39 with:

Los Angeles Rattler (max, %)	AASHTO T 96	12
Loss at 100 Rev.		25
Loss at 500 Rev.		

20

Add to the table in the 1st paragraph of section 39-3.02D(1) of the RSS for section 39:

Coarse durability index (D_c , min) ^d	AASHTO T 210	65
Fine durability index (D_f , min)	AASHTO T 210	50
Sodium sulfate soundness (max loss, %) ^e	AASHTO T 104	25

^dRequirement applies if aggregate source is in Lassen, Modoc, Siskiyou, or Shasta County.

^eRequirement applies if aggregate source is in Modoc, Siskiyou, or Shasta County.

21. Use for a District 6 project.

**** KG 6/23/14**

Add to the table in the 1st paragraph of section 39-3.02D(1) of the RSS for section 39:

Coarse durability index (D_c , min)	AASHTO T 210	65
Fine durability index (D_f , min)	AASHTO T 210	50

22. Use for a District 2 project

**** KG 6/23/14**

Add to the beginning of section 39-3.03 of the RSS for section 39:

Place RHMA-G only when the ambient temperature is 70 degrees F or greater.

23–24. Use if warm mix asphalt additive technology is required.

23

**** KG 6/23/14**

Replace the 3rd and 4th paragraphs of section 39-3.03 of the RSS for section 39:

If the atmospheric temperature is below 60 degrees F, cover loads in trucks with tarpaulins. If the time for HMA discharge to truck at the HMA plant until transfer to paver's hopper is 90 minutes or greater and if the atmospheric temperature is below 70 degrees F, cover loads in trucks with tarpaulins. The tarpaulins must completely cover the exposed load until you transfer the mixture to the paver's hopper or to the pavement surface. Tarpaulins are not required if the time from discharging to the truck until transfer to the paver's hopper or the pavement surface is less than 30 minutes.

24

For RHMA-G placed under method compaction:

1. Only spread and compact if the atmospheric temperature is at least 50 degrees F and the surface temperature is at least 50 degrees F

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

- ~~2. Complete the 1st coverage of breakdown compaction before the surface temperature drops below 260 degrees F~~
- ~~3. Complete breakdown and intermediate compaction before the surface temperature drops below 230 degrees F~~
- ~~4. Complete finish compaction before the surface temperature drops below 180 degrees F~~

{ XE "39-4_A04-18-14" }
Page 1 of 4

Section 39-4. Use to specify any of the following for OGFC:

- 1. Warm mix asphalt additive technology requirement**
- 2. Grade of asphalt binder**
- 3. Requirements a District 2 or 6 project**

- 1. Use if a warm mix asphalt additive technology is required.**

** KG 6/23/14

Replace the 2nd paragraph in section 39-4.01A of the RSS for section 39 with:

~~You must produce OGFC using an authorized warm mix asphalt technology, except the water injection technology is not allowed.~~

2-5. For a project in District 2.

2

** KG 6/23/14

Add to section 39-4.01A of the RSS for section 39:

~~Do not place RHMA-O and RHMA-O-HB on the traveled way between September 15 and May 1.~~

3

Add to the table in the 1st paragraph of section 39-4.01D(2)(c) of the RSS for section 39:

Coarse durability index ^b	AASHTO T 210	1 per 3,000 tons or 1 per paving day, whichever is greater
Fine durability index	AASHTO T 210	1 per 3,000 tons or 1 per paving day, whichever is greater
Sodium sulfate soundness ^c	AASHTO T 104	1 per project

^bRequirement applies if aggregate source is in Lassen, Modoc, Siskiyou, or Shasta County.

^cRequirement applies if aggregate source is in Modoc, Siskiyou, or Shasta County.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

4

Replace the row for Los Angeles Rattler in the table in item 1 in the list in the paragraph of section 39-4.01D(3)(a) of the RSS for section 39 with:

Los Angeles Rattler (max, %)	AASHTO T 96	12
Loss at 100 Rev.		25
Loss at 500 Rev.		

5

Add to the table in item 1 in the list in the paragraph of section 39-4.01D(3)(a) of the RSS for section 39:

Coarse durability index (D_c , min) ^a	AASHTO T 210	65
Fine durability index (D_f , min)	AASHTO T 210	50
Sodium sulfate soundness (max loss, %) ^b	AASHTO T 104	25

^aRequirement applies if aggregate source is in Lassen, Modoc, Siskiyou, or Shasta County.

^bRequirement applies if aggregate source is in Modoc, Siskiyou, or Shasta County.

6–7. Use for a District 6 project.

6

** KG 6/23/14

~~Add to the table in the 1st paragraph of section 39-4.01D(2)(c) of the RSS for section 39:~~

Coarse durability index	AASHTO T 210	1 per 3,000 tons or 1 per paving day, whichever is greater
Fine durability index	AASHTO T 210	1 per 3,000 tons or 1 per paving day, whichever is greater

7

~~Add to the table in item 1 in the list in the paragraph of section 39-4.01D(3)(a) of the RSS for section 39:~~

Coarse durability index (D_c, min)	AASHTO T 210	65
Fine durability index (D_f, min)	AASHTO T 210	50

8–9. Use to specify the grade of asphalt binder for BWC.

Add to section 39-4.02C of the RSS for section 39:

8. Use for HMA-O and RHMA-O (BWC). Enter asphalt binder grade. Edit for multiple binder grades.

** KG 6/23/14

For HMA-O, the grade of asphalt binder must be _____.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

**9. Use for RHMA-O, RHMA-O (BWC) and RHMA-O-HB. Enter asphalt binder grade.
Edit for multiple binder grades.**

**** KG 6/23/14**

For RHMA-O and RHMA-O-HB, the grade of asphalt binder must be PG 64-10.

10–11. Use for a District 2 project.

10

**** KG 6/23/14**

Replace the row for Los Angeles Rattler in the table in the 1st paragraph of section 39-4.02D(1) of the RSS for section 39 with:

Los Angeles Rattler (max, %)	AASHTO T 96	12
Loss at 100 Rev.		25
Loss at 500 Rev.		

11

Add to the table in the 1st paragraph of section 39-4.02D(1) of the RSS for section 39:

Coarse durability index (D_e , min) ^a	AASHTO T 210	65
Fine durability index (D_f , min)	AASHTO T 210	50
Sodium sulfate soundness (max loss, %) ^b	AASHTO T 104	25

^aRequirement applies if aggregate source is in Lassen, Modoc, Siskiyou, or Shasta County.

^bRequirement applies if aggregate source is in Modoc, Siskiyou, or Shasta County.

12. Use for a District 6 project.

**** KG 6/23/14**

Add to the table in the 1st paragraph of section 39-4.02D(1) of the RSS for section 39:

Coarse durability index (D_e , min)	AASHTO T 210	65
Fine durability index (D_f , min):	AASHTO T 210	50

13. Use for a District 2 project.

**** KG 6/23/14**

Replace the table in the 3rd paragraph of section 39-4.03 of the RSS for section 39 with:

Tack Coat Application Rates for OGFC

OGFC over:	Minimum Residual Rates (gal/sq yd)	
	GRS2 and CQS1 Asphaltic Emulsion	Asphalt Binder and PMCRS2 Asphaltic Emulsion
New HMA	0.04	0.03
PCC and existing AC surfacing	0.06	0.04
Planed pavement	0.07	0.05

14–16. Use if warm mix asphalt additive technology is required.

~~Replace the 6th, 7th, and 8th paragraphs of section 39-4.03 with:~~

1. Spread and compact only if the atmospheric temperature is at least 45 degrees F and the surface temperature is at least 50 degrees F
2. Complete the 1st coverage using 2 rollers before the surface temperature drops below 230 degrees F
3. Complete all compaction before the surface temperature drops below 190 degrees F

- ~~1. Spread and compact only if the atmospheric temperature is at least 40 degrees F and the surface temperature is at least 40 degrees F~~
- ~~2. Complete the 1st coverage using 2 rollers before the surface temperature drops below 230 degrees F~~
- ~~3. Complete all compaction before the surface temperature drops below 170 degrees F~~

1. Spread and compact if the atmospheric temperature is at least 45 degrees F and the surface temperature is at least 50 degrees F
2. Complete the 1st coverage using 2 rollers before the surface temperature drops below 270 degrees F
3. Complete all compaction before the surface temperature drops below 240 degrees F

DIVISION VI STRUCTURES

46 GROUND ANCHORS AND SOIL NAILS

AA

47 EARTH RETAINING SYSTEMS

{ XE "47-2.01A_A05-20-11" }
Page 1 of 1

Section 47-2.01A. Use if proprietary earth retaining systems are allowed as alternatives to the Department's design shown on the plans.

Add to section 47-2.01A:

1. Insert location of MSE.

You may use an alternative earth retaining system for the mechanically stabilized embankment, ~~at~~
 . The alternative system must comply with section 47-6.

{ XE "47-2.04_A05-20-11" }
Page 1 of 1

Section 47-2.04. Use if the lower payment limit for the mechanically stabilized embankment (MSE) system shown on the plans is not from the bottom of the face panel.

Replace the 1st paragraph of section 47-2.04 with:

****KG 10/24/13**

1. Insert lower payment limit . Top of footing is common.

The vertical height of each section is the difference in elevation on the outer face from the top of leveling pad to the top of wall profile.

{ XE "47-6.01A_A10-19-12" }
Page 1 of 4

Section 47-6.01A. Use if optional proprietary earth retaining systems are allowed for any of the following:

- 1. Mechanically stabilized embankment (MSE) system**
- 2. Type 1–5 retaining walls**
- 3. Crib walls**

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Add to section 47-6.01A:

1. If there are different options at more than one location within a project, list each location separately. If both of the tables below are used, replace “table” with “tables.”

The alternative earth retaining system must be one of the systems shown in the following table:

2. Listed in the table below are the earth retaining systems with contact information for companies for which standard plans have been pre-approved. Design must specify which system is applicable for each job based on the criteria below and differential settlement requirements for each wall location in the project. Delete the systems that are not allowed from the table below. Design service life is 50 years.

The following are instructions for when each system listed in the table is allowed:

Reinforced Earth (5 ft cruciform concrete face panel) is an alternative to an MSE when there is no architectural treatment or the architectural treatment is a nonpictorial concrete surface texture .

Reinforced Earth (5 ft square concrete face panel) is an alternative to an MSE regardless of architectural treatment.

Retained Earth (5 ft square concrete face panel) is an alternative to an MSE regardless of architectural treatment.

MSE Plus (5 ft square concrete face panel) is an alternative to an MSE regardless of architectural treatment.

MSE Plus (5 ft high by 6 ft wide concrete face panel) is an alternative to an MSE when there is no architectural treatment or the architectural treatment is a nonpictorial concrete surface texture.

Welded Wire Wall is an alternative to a wire faced MSE.

Criblock is an alternative to a Standard Plan Crib Retaining Wall.

Port-O-Wall is an alternative to a Standard Plan Type 1 Retaining Wall when there is no architectural treatment or the architectural treatment is a nonpictorial concrete surface texture.

Tensar ARES system is an alternative to an MSE when there is no architectural treatment or the architectural treatment is a nonpictorial concrete surface texture, the anticipated total settlement is less than 8", and the anticipated differential settlement at any location along the wall length is less than 0.5 percent.

Landmark (modular block faced) is an alternative to an MSE when there is no architectural treatment or the architectural treatment is a nonpictorial concrete surface texture, and there is space to accommodate a 4 degree face batter.

KeySystem (modular block faced) is an alternative to an MSE when there is no architectural treatment or the architectural treatment is a nonpictorial concrete surface texture.

Verdura Segmental Retaining Wall System is an alternative to a Standard Plan Crib Retaining Wall or an MSE when there is no architectural treatment or the

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

architectural treatment is a nonpictorial concrete surface texture, and there is space to accommodate a 14 degree face batter.

Mesa Retaining Wall System is an alternative to an MSE when there is no architectural treatment or the architectural treatment is a nonpictorial concrete surface texture.

Note: A pictorial is a formed relief texture depicting birds, flowers, county seals, etc.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Proprietary earth retaining system	Web site/e-mail	Address	Telephone no.
Welded Wire Wall (Steel mesh soil reinforcement with welded wire mesh facing)	http://www.hilfiker.com	HILFIKER RETAINING WALLS 1902 HILFIKER LN EUREKA CA 95503-5711	(707) 443-5093 (800) 762-8962
Reinforced Earth – 5 ft cruciform (Steel strap soil reinforcement with 5 ft cruciform concrete face panels)	http://www.reinforcedearth.com	THE REINFORCED EARTH COMPANY 1660 HOTEL CIR N STE 304 SAN DIEGO CA 92108-2803	(619) 688-2400
Reinforced Earth – 5 ft square (Steel strap soil reinforcement with 5 ft square concrete face panels)	http://www.reinforcedearth.com	THE REINFORCED EARTH COMPANY 1660 HOTEL CIR N STE 304 SAN DIEGO CA 92108-2803	(619) 688-2400
Retained Earth (Steel mesh soil reinforcement with 5 ft square concrete face panels)	http://www.reinforcedearth.com	THE REINFORCED EARTH COMPANY 1660 HOTEL CIR N STE 304 SAN DIEGO CA 92108-2803	(619) 688-2400
MSE Plus – 5 ft square (Steel mesh soil reinforcement with 5 ft square concrete face panels)	http://www.mseplus.com	SSL 4740 SCOTTS VALLEY DR STE E 209 SCOTTS VALLEY CA 95066-4240	(831) 430-9300
MSE Plus – 5 by 6 ft (Steel mesh soil reinforcement with 5 ft high by 6 ft wide concrete face panels)	http://www.mseplus.com	SSL 4740 SCOTTS VALLEY DR STE E 209 SCOTTS VALLEY CA 95066-4240	(831) 430-9300
Criblock (Concrete cribs)		RETAINING WALLS COMPANY 1525 GRAND AVE SAN MARCOS CA 92083	(760) 471-2500
Port-O-Wall Precast Concrete Retaining Wall System (Full height precast panels on footing)	http://www.port-o-wall.com	PORT-O-WALL SYSTEMS, LLC 19201 SONOMA HWY PMB 182 SONOMA CA 95476	(707) 938-4516
ARES – 9 by 5 ft (Geogrid soil reinforcement with 9 ft wide by 5 ft high concrete face panels)	http://www.tensarcorp.com	TENSAR INTERNATIONAL CORPORATION 2500 NORTHWIND PKWY STE 500 ALPHARETTA GA 30009-2247	(770) 344-2000

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

underground utilities, overhead utilities, the requirements of pile embedment into rock, sound control, vibration monitoring, and traffic control.

Add to section 49-1.03:

1. Insert bridge no. and support locations for difficult pile installation. Be specific for each location.

Per LS Comments, match foundation report ** KG 7/10/14

** KG 6/24/14

**KG 10/24/13

Expect difficult pile installation due to the presence of dense sand, hard clay and weathered rock conditions shown in the following table:

Pile location		Conditions
Bridge no.	Support location	

{ XE "49-2.01C(4)_A05-20-11" }

Page 1 of 1

Section 49-2.01C(4). Use for driven piles when predrilling is required.

Add to section 49-2.01C(4):

1. Use for all piles in fills in excess of 5 feet or if predrilling is required due to a close proximity to an obstruction.

Drive piles in predrilled holes at the locations and to the bottom of hole elevations shown in the following table:

Bridge name or number	Abutment no.	Bottom of hole elevation
<u>Balfour Road UC</u>	<u>1 and 3</u>	<u>The native subgrade</u>

2. Use if piles must be driven through concrete footings that are to remain structurally functional.

~~Predrill holes through existing concrete footings for driving of steel piles at the locations shown. Do not damage the existing concrete to remain in place. Drilling methods and equipment must be authorized before starting the drilling.~~

{ XE "49-2.01A(3)(b)_A05-20-11" }

Page 1 of 2

Section 49-2.01A(3)(b). Use when a driving system submittal is requested by Geotechnical Services.

1. Specify bridge numbers and support locations (e.g. abutment 1, bent 2).

** KG 6/27/14

Add to section 49-2.01A(3)(b):

Before installing driven piles, submit a driving system submittal for each bridge structure, pile type for each of the support locations or control zones shown in the following table:

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

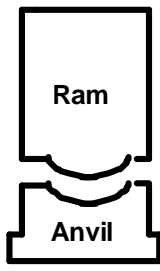
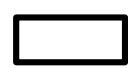
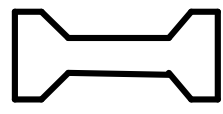
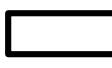

Bridge no.	Pile type	Support location or control zone

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

CALIFORNIA DEPARTMENT OF TRANSPORTATION
TRANSPORTATION LABORATORY

PILE AND DRIVING DATA FORM

Structure Name : _____ Contract No.: _____
Project: _____
Structure No.: _____ Pile Driving Contractor or
Dist./Co./Rte./Post Mi: _____ Subcontractor _____ (Pile Driven By)

 <p>Ram Anvil</p>	Hammer	<p>Manufacturer: _____ Model: _____ Type: _____ Serial No.: _____ Rated Energy: _____ at _____ Length of Stroke _____ Modifications: _____ _____</p>				
	Capblock (Hammer Cushion)	<p>Material: _____ Thickness: _____ in Area: _____ in² Modulus of Elasticity - E: _____ ksi Coefficient of Restitution - e: _____</p>				
	Pile Cap	<table border="1" style="display: inline-table; vertical-align: top;"><tr><td>Helmet</td></tr><tr><td>Bonnet</td></tr><tr><td>Anvil Block</td></tr><tr><td>Drivehead</td></tr></table> <p>Weight: _____ kips</p>	Helmet	Bonnet	Anvil Block	Drivehead
Helmet						
Bonnet						
Anvil Block						
Drivehead						
	Pile Cushion	<p>Material: _____ Thickness: _____ in Area: _____ in² Modulus of Elasticity - E: _____ ksi Coefficient of Restitution - e: _____</p>				
	Pile	<p>Pile Type: _____ Length (In Leads): _____ ft Lb/ft.: _____ Taper: _____ Wall Thickness: _____ in Cross Sectional Area: _____ in² Design Pile Capacity: _____ kips Description of Splice: _____ Tip Treatment Description: _____ _____</p>				

DISTRIBUTE:

- ☐ Translab,
Foundation Testing
- ☐ Translab,
Geotechnical Design
- ☐ Resident Engineer

Note: If mandrel is used to drive the pile, attach separate manufacturer's detail sheet(s) including weight and dimensions.

Submitted By: _____
Date: _____ Phone No.: _____

{ XE "51-1.01C(1)_A05-20-11" }
Page 1 of 1

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

1. Horizontal distances between the profile grade line and the edges of deck must be as shown
2. Girder widths and slab thicknesses must be as shown
3. Interior girder stems must remain vertical

{ XE "51-1.03F(5)(b)(i)_A04-19-13" }
Page 1 of 1

Section 51-1.03F(5)(b)(i). Use for new bridge decks and approach slabs in noise-sensitive areas. Do not use in freeze-thaw areas.

The Memo to Specification Engineer/Estimator should state whether the deck surfaces are in a noise-sensitive area. Except for bridge widenings, longitudinal tining of deck surfaces is not allowed in noise-sensitive area.

Replace the 1st paragraph in section 51-1.03F(5)(b)(i) with:

1. Use if all roadway surfaces are in a noise-sensitive area. Delete par. 2.

Except for bridge widenings, texture the bridge deck surfaces longitudinally by grinding and grooving.

2. Use if some roadway surfaces are in a noise-sensitive area and others are not. Insert names of bridges that are not in a noise-sensitive area. Create a list if necessary. Delete par. 1.

10/10/13 KG

~~Except for bridge widenings, texture the bridge deck surfaces longitudinally by grinding and grooving. You may texture the deck surface at _____ by longitudinal tining.~~

{ XE "51-1.03G(1)_A05-20-11" }
Page 1 of 2

Section 51-1.03G(1). Use for concrete surface textures.

Add to section 51-1.03G(1):

1. Use to specify a referee sample. Edit as necessary for type of texture. Insert location of referee sample.

** KG 6/27/14

The fractured fin concrete surface texture at _____ must match the texture, color, and pattern of the referee sample available for inspection by bidders at on the concrete barrier at nearby Lone Tree Way Undercrossing (Br. No. 28-0371R).

2. Use for small quantities of concrete surface texture or for other special situations. Insert location.

10/10/13 KG

~~Form liners are not required for the concrete surface texture at _____.~~

10/10/13 KG

Fractured fin texture must simulate the appearance of straight fin of concrete with a fractured concrete texture imparted to the raised surface between the fin. Grooves between fins must be continuous with no apparent curves or discontinuities. Variation of the groove from straightness must not exceed 1/4 inch for each 10 feet of groove. The texture must have random shadow patterns. Broken concrete at adjoining fins and groups of fins must have a random pattern. The texture must not have secondary patterns imparted by shadows or repetitive fractured surfaces.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

3. Use if ripped texture (reinforcing bar) is shown.

10/10/13 KG

Reinforcing bar ripped texture must simulate the appearance of concrete with embedded reinforcing bars and adhering concrete ripped from it. Bar imprints must be from no. 5 or 6 deformed bars and be continuous with no apparent curves or discontinuities. Space the imprints such that a fractured concrete texture is imparted to the surface between imprints but far enough apart to make the fractured concrete the predominate texture. Texture the surfaces between imprints that do not exhibit the fractured concrete texture. The texture must have random shadow patterns. Broken concrete between imprints and groups of imprints must have a random pattern. The texture must not have repetitive fractured surfaces or secondary shadow patterns.

4. Use if ripped texture (rope) is shown.

Rope ripped texture must simulate the appearance of concrete with vertically oriented embedded rope and adhering concrete ripped from it. Rope imprints must be from 3/4-inch hemp, nylon, or polypropylene twisted rope. Use only 1 type of rope for the entire texture. Imprint the spacing such that a fractured concrete texture is imparted to the entire surface between imprints but far enough apart to make the fractured concrete the predominate texture. Texture surfaces between imprints that do not exhibit the fractured concrete texture. The texture must have random shadow patterns. Broken concrete between imprints and groups of imprints must have a random pattern. The texture must not have repetitive fractured surfaces or secondary shadow patterns.

5. Use if ripped texture (wire fabric) is shown.

Wire fabric ripped texture must simulate the appearance of concrete from which expanded metal mesh fabric embedded below the formed surface has been ripped from the concrete. The embedment must be a uniform distance not less than 1/2 inch. Size the openings such that a fractured concrete texture with an amplitude of approximately 1/2 inch is imparted to the entire surface between imprints of the fabric. Texture the surfaces between imprints that do not exhibit the fractured concrete texture. The texture must have random shadow patterns. Broken concrete between imprints and groups of imprints must have a random pattern. The texture must not have repetitive fractured surfaces or secondary shadow patterns.

6. Use if scored texture is shown. Edit to agree with plans.

Scored texture must be a texture made of deep striations simulating a concrete surface formed with wooden surfaces having vertically oriented magnified grain that is very deeply weathered. Striations must impart a random pattern to the texture.

7. Use if chipped texture is shown.

Chipped texture must simulate the appearance of chipped concrete on approximately 3/4 of the surface area and a smooth, formed surface on the remaining 1/4 of the surface area. The chipped texture must have a random pattern to a depth of approximately 3/8 inch, but not to exceed 5/8 inch, exposing a fractured concrete texture in the chipped areas. The formed areas must be in a random pattern.

Add to section 51-1.04:

Payment for bar reinforcing steel, structure excavation and structure backfill used in constructing structural concrete, barrier slab is included in the payment for Structural Concrete, Barrier Slab.

Section 51-4.03B. Use for PC PS girders, box girders, and double T girders.

Per LS comments** KG 7/10/14

Replace item 3 in the list in the 4th paragraph of section 51-4.03B with:

1. Use if other than 1 inch minimum concrete thickness for I or double T girders is shown. Edit to match plans.

~~3. Except for box girders, a minimum of 3 inch of deck slab concrete is maintained between deck slab reinforcement and the top of PC I and double T girders~~

Re-evaluate when see plans for the Deer creek bridge?? **KG 10/24/13

Replace item 4 in the list in the 4th paragraph of section 51-4.03B with:

2. Use if other than 1 inch minimum concrete thickness for box girders is shown; edit to match plans.

~~4. For box girders, a minimum of ___ inch of deck slab concrete is maintained between the deck slab reinforcement and the top of expanded polystyrene in the area between the girder webs~~

3. Use if the designer recommends using a grout mix other than C 1107. Railway bridges may require an epoxy mortar instead.

10/10/13 KG

Replace the 6th paragraph of section 51-4.03B with:

~~Grout keyways after precast members are in final position. Grout must comply with _____. Before grouting, abrasive blast clean the keyways to expose clean aggregate and flush with water. Allow to dry to a surface dry condition immediately before placing the grout.~~

Pars 4–5. Use when I or T girders are erected over roadways, railways, or other locations where there is public access.

Add to section 51-4.03B:

4. Edit and describe bridge as needed. Edit bracing requirements and add special clauses for girders that are unstable due to curvature, shape, support conditions, or other reasons.

Per LS want for all girder bridges ** KG 7/10/14

**KG 10/24/13

~~Except for box girders and double T girders, provide temporary lateral bracing for precast girders over Balfour Road. Install bracing at each end of the girder segments and at the midspan. Bracing must be in place before releasing erection equipment and must remain in place until 48 hours after concrete diaphragms are placed.~~

5

Design temporary bracing to prevent overturning and resist the lateral pressures shown in the following table.

Structure height, H (feet above ground)	Lateral pressure ^a (psf)
0 < H ≤ 30	15
30 < H ≤ 50	20
50 < H ≤ 100	25
H > 100	30

^aApply the lateral pressure at the top of the girder in either direction.

Add to section 51-7.01B:

Concrete for minor concrete (pipe encasement) must comply with the specifications for minor concrete.

Add to section 51-7.01D:

Minor concrete (pipe encasement) is paid for as specified for minor concrete (minor structure).

[illegible]

~~52 REINFORCEMENT~~

[illegible]

~~53 SHOTCRETE~~

ΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛ

54 WATERPROOFING

ΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛ

~~55 STEEL STRUCTURES~~

AA

56 SIGNS

Replace item #1 in the 7th paragraph in section 56-2.01b(2) with:

1. Phrase
 - a. "Property of the State of California" when within State right of way
 - b. "Property of Contra Costa County" when within County right of way
 - c. "Property of City of Brentwood" when within City right of way

Electrical installations, including flashing beacons on sign structures, are included in the payment for erecting the sign structure.

ΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛΛ

~~66 CORRUGATED METAL PIPE~~

67 STRUCTURAL PLATE CULVERTS

68 SUBSURFACE DRAINS

Page 1 of 1

Section 68-5. Use if permeable material blanket is specified or shown on the plans.

Replace section 68-5 with:

1

Section 68-5 includes specifications for installing permeable material blankets.

2. Edit for the class of permeable material.

**** KG 7/03/14**

Permeable material for permeable material blanket must be Class 1 and must comply with section 68-2 except for payment.

**** KG 7/03/14**

~~Filter fabric must comply with section 88-1.02B.~~

4

**** KG 7/03/14**

Not Used

~~Place filter fabric as follows:~~

1. ~~Ensure the subgrade complies with the compaction and elevation tolerance specified for the material involved before placing the filter fabric on the subgrade.~~
2. ~~Handle and place filter fabric under the manufacturer's instructions.~~
3. ~~Align and place the fabric without wrinkles.~~
4. ~~Overlap or stitch adjacent borders of the fabric from 12 to 18 inches. The preceding roll must overlap the following roll in the direction the permeable material is being spread or must be stitched. If the~~

fabric is joined by stitching, the fabric must be stitched with yarn of a contrasting color. The size and composition of the yarn must be as recommended by the fabric's manufacturer. The stitches must number 5 to 7 per 1 inch of seam.

Section 72-11.01. Use for either of the following:

1. Test panel is required for slope paving
2. Slope paving is colored, but a test panel is not required

Pars. 1–6. Use if a test panel is required.

1. Use if a test panel is required for all slope paving locations. Delete par. 2.

Add to section 72-11.01A:

Construct a test panel at the job site before placing the permanent slope paving.

2. Use if a test panel is required for some slope paving locations and not others.
Delete par. 1.

**** KG 6/27/14**

Add to section 72-11.01A:

For the following slope paving locations, construct a test panel at the job site before placing the permanent slope paving at the following locations:

1. _____
2. _____

Pars. 3–6. Use with either par. 1 or 2. Edit to suit work.

3. Insert the sample panel number. Insert the location for the Department's sample panel. If the address is not listed in section 1, add it.

**** KG 6/28/14**

The color and texture of the test panel and the finished slope paving must match the Department's sample panel no. _____. The Department sample panel is available at District _____ and Offices of Structure Design, Documents Unit.

The surface exposed to view must have color and texture matching the appearance of similar masonry block slope paving found at nearby Lone Tree Way Undercrossing (Br. No. 28-0371R).

4

The test panel must be:

1. At least 4 by 6 feet
2. Constructed with the same materials for the permanent work
3. Finished and cured using the same methods for the permanent work

5

If the test panel is rejected, construct another test panel.

6

Replace the 3rd paragraph in section 72-11.01B with:

If the Department's sample panel is colored, color the slope paving by mixing a fine ground, synthetic mineral oxide into the concrete. The synthetic mineral oxide must be specifically manufactured for coloring concrete. The coloring agent must be uniformly and homogeneously mixed with the concrete.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Pars. 7 and 8. Use either par. 7 or 8 if slope paving is colored and a test panel is not required.

7. Use if the color is no. 30450 (tan) as shown in the standard specifications. Delete par 8.

**** KG 6/27/14**

Add to section 72-11.01B:

~~Color the slope paving.~~

~~8. Use if the color is not no. 30450 (tan).~~

~~If there is only one color of slope paving:~~

~~1. Replace the second sentence with "After curing and when air dry, the slope paving color must comply with color no. _____ of FED STD 595." Insert the color no.~~

~~2. Delete the table~~

~~3. Delete par. 7.~~

Replace the 3rd paragraph in section 72-11.01B with:

~~Color the slope paving by mixing a fine ground, synthetic mineral oxide into the concrete. The synthetic mineral oxide must be specifically manufactured for coloring concrete. The coloring agent must be uniformly and homogeneously mixed with the concrete. After curing and when air dry, the slope paving color must comply with the color number and corresponding location shown in the following table:~~

Color no. of FED STD 595	Slope paving location

{ XE "72-11.03_A05-20-11" }

Page 1 of 3

Section 72-11.03 Use for paving slopes with concrete pavers.

Replace section 72-11.03 with:

72-11.03 SLOPE PAVING WITH CONCRETE PAVERS

72-11.03A General

1

Section 72-11.03 includes specifications for constructing slope paving using concrete pavers.

72-11.03B Materials

72-11.03B(1) Concrete Pavers

2

10/10/13 KG

Concrete pavers for slope paving must be masonry blocks and comply with ASTM C 90 for solid units. The surface exposed to view must have a split face texture. The nominal size of the concrete pavers must be 8 by 2 by 16 inches.

The surface exposed to view must have color and texture matching the appearance of similar masonry block slope paving found at nearby Lone Tree Way Undercrossing (Br. No. 28-0371R).

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

72-11.03B(2) Cement

3

Cement must comply with section 90-1.02B(2).

72-11.03B(3) Mortar

4

Hydrated lime must comply with ASTM C 207, Type S.

5

Mortar sand must be commercial quality and free of organic impurities and lumps of clay and shale.

6

Mortar for laying concrete pavers must consist by volume of 1 part cement, 0–0.5 part hydrated lime, and 2.25–3 parts mortar sand. Add enough water to make a workable mortar. Accurately measure and thoroughly mix each batch of mortar. Do not retemper mortar more than one hour after mixing.

7

Reduce the amount of lime as necessary to prevent leaching and efflorescence on the finished surface.

8

For the mortar, you may use a proprietary, premixed packaged blend of cement, lime, and sand, without color, that requires only water to prepare for use as brick mortar or grout. Packages of the premixed mortar must show the manufacture's name, brand, weight, and color identification. Submit the manufacturer's instructions for mixing proportions and procedures.

72-11.03B(4) Bond Coat

9

The bond coat must be either dry set mortar or latex-portland cement mortar. Organic adhesive must not be used for the bond coat. Mix the bond coat under the manufacturer's instructions. The consistency of the mixture must be such that ridges formed with the recommended notched trowel do not flow or slump. You may rework the bond coat provided no water or materials are added.

72-11.03B(5) Grout

10

Grout must be suitable for grouting quarry tile and must comply with ANSI Standard: A 108.5. Grout must consist, by volume, of 1 part cement, up to 1/5 part lime, 2 parts of sand, and an amount of water to provide a grout with a consistency that can be forcibly compressed into joints.

11

You may use a proprietary portland cement grout suitable for grouting quarry tile.

72-11.03C Construction

72-11.03C(1) General

12

Joints must be straight and of uniform and equal width.

13

Protect surfaces of completed masonry, concrete, and other materials exposed to view from spillage, splatters, and other deposits of cementitious materials from masonry construction. Remove these deposits without damage to the materials or exposed surfaces. Stains, efflorescence, laitance, splashes, or spots on the faces of masonry exposed to view must be removed.

14

Cleaning agents must comply with the concrete paver manufacturer's instructions. Apply cleaning agents to a sample area acceptable to the Engineer. Before proceeding with cleaning beyond the sample area, the Engineer must accept the performance of the cleaning agent and the cleaning methods.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

72-11.03C(2) Installation Using a Bond Coat

15

Install concrete pavers on a bond coat over a mortar bedding.

16

Air blown mortar must not be used.

17

Roughen and clean surfaces of concrete against which concrete pavers are to be placed, exposing the stone aggregate. Immediately before placing the paver units, flush the concrete surface with water and allow it to dry to a surface dry condition.

18

Prepare concrete surfaces to receive a mortar setting bed under the specifications for horizontal construction joints in section 51-1.03D(4).

19

The setting bed of mortar must have a thickness of not less than 1 inch and must be finished parallel to the finished brick surface. Cure the setting bed of mortar for at least 24 hours before placing the bond coat.

20

Roughen and clean the surfaces of the cured setting bed. The surface must be free from laitance, coatings, oil, sand, dust, and loose particles.

21

Dampen the cured setting bed before placing the bond coat. The setting bed must not be soaked.

22

Float the bond coat onto the cured setting bed surface with sufficient pressure to cover the surface evenly with no bare spots. The surface area to be covered with the bond coat must be no greater than the area that can be covered with concrete pavers while the bond coat is still plastic.

23

Comb the bond coat mortar with a notched trowel within 10 minutes before installing concrete pavers. Do not install the concrete pavers on a skinned over mortar bond coat.

24

Back butter the concrete pavers immediately before installing the units. Firmly press the concrete pavers into the freshly notched bond coat. Tap the concrete pavers to a true surface in order to obtain 100 percent coverage by bond coat on the back of each unit.

25

Head and bed mortar joints must be 1/2 inch thick.

26

Remove spacers, strings, ropes, pegs, glue, paper, and face mounting material before grouting the concrete pavers. Grouting must not begin until at least 48 hours after installing concrete pavers.

27

Force a maximum amount of grout into the joints between and surrounding the concrete paver units. Tool the grout to a slightly concave cross section to a depth not more than 1/8 inch below the finished surface.

28

The finished grout must have a uniform color and must be smooth without voids, pinholes, or low spots.

29

Keep the concrete pavers continuously damp for at least 72 hours after grouting.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

72-11.03C(3) Installation on a Mortar Bedding

30

The top surface of the air-blown mortar or concrete base must be lightly and evenly scored horizontally and vertically with a metal scratcher having grooves not more than 1 inch apart.

31

Cure the air-blown mortar or concrete base by the water method for at least 2 days.

32

Lay and embed the concrete pavers in approximately 1-inch thick mortar. Embedment must be shoved tight so that mortar is flushed into the joints to a depth of approximately 1/2 inch.

72-11.03D Payment

33

Not Used

AA

73 CONCRETE CURBS AND SIDEWALKS

Add to section 39-1.01A of the RSS for section 39:

Temporary curb, gutter, sidewalk and curb ramp must comply with section 5-1.36A and the Contract for a permanent curb, gutter, sidewalk and curb ramp.

{ XE "73-3_A11-15-13" }
Page 1 of 1

Section 73-3. Use for concrete sidewalks, curb ramps, or driveway crossings designed as part of the pedestrian route.

Pars 1–2. Use to require preconstruction and post construction surveys whenever slopes and widths for curb ramps or driveways are modified from the Standard Plans. Project plans must designate the locations that will require the surveys.

1

Add to section 73-3.01C:

Within 2 business days of performing the surveys, submit preconstruction and post construction surveys signed and sealed by one of the following:

1. Land surveyor registered in the State
2. Civil engineer registered in the State

2

**** KG 6/27/14**

Add to section 73-3.01D:

For all locations ~~shown~~, perform a preconstruction survey to verify that forms and site constraints will allow the design dimensioning and slope requirements to be achieved. Upon completing construction of these facilities, perform a post construction survey and verify that design dimensioning and slope requirements were achieved. The post construction survey must include a minimum of 3 measurements

for each dimension and slope requirement shown. Individual measurements must be equally distributed across the specified slope or dimensional surface.

Before placing concrete, verify that forms and site constraints allow the required dimensioning and slopes shown. Immediately notify the Engineer if you encounter site conditions that will not accommodate the design details. Modifications ordered by the Engineer are change order work.

Welded wire fabric, of the size shown and complying with section 52-1.02C, must be placed in the textured paving areas as shown.

AA

AA

AA

Special Provisions

Section 76-1. Use if any section 76 SSPs are included.

Replace "Reserved" in section 76-1 with:

76-1.01 GENERAL

76-1.01A Summary

1

**** KG 7/01/14**

Section 76-1 includes general specifications for constructing groundwater monitoring and rehabilitating wells and for constructing exploration holes.

76-1.01B Definitions

2

casing string: Sections of blank well casing and well screen, with bottom cap and centralizers, combined as 1 piece.

ROWD: Report of Waste Discharge for the Regional Water Quality Control Board, as defined in the Water Code § 13260.

static conditions: When the plot of water level versus the logarithm of time is a flat line.

76-1.01C Submittals

76-1.01C(1) General

3

Submit permits before starting job site activities.

4. Insert name of specific Regional Water Quality Control Board.

**** KG 7/01/14**

Submit the following as informational submittals:

1. Copies of analytical test results and logs sent to CDPH. Do not send facsimiles.
2. Laboratory results for the formation samples.
3. Completed Well Completion Report, after completion of work and before Contract acceptance.
4. ANSI/AWWA A 100, "Water Wells." Submit before starting job site activities.
5. ROWD filed with the Central Valley Region (Region 5S) RWQCB if onsite discharge of chlorinated water. The payment for the ROWD filing is change order work.

76-1.01C(2) Product Data

5. Edit location if no OSD involvement.

**** KG 7/01/14**

Submit at least 5 copies of product data to the Engineer, Documents Unit. Each copy must be bound together and include an index. The index must include equipment names, manufacturers, and model numbers. Two copies will be returned. ~~Notify the Engineer of the submittal. Include in the notification the date and contents of the submittal.~~

6

Product data must include catalog cuts, performance data, installation instructions, and additional documentation.

7

Catalog cuts must include:

1. Manufacturer's name
2. Catalog or part number

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

3. Size
4. Chemical composition
5. MSDS information
6. Installation instructions

76-1.01D Quality Control and Assurance

76-1.01D(1) General

8. For exploration holes, delete par. 8 and add "Not Used."

Supply and operate pumping equipment used for well development tests and well tests. Pumping equipment for well development tests and well tests remains your property.

76-1.01D(2) Regulatory Requirements

9. Insert name of county. Insert name of specific Regional Water Quality Control Board if required.

**** KG 7/01/14**

Work must comply with:

1. Regulations of Contra Costa County
2. *Water Well Standards*, Bulletin 74-81
3. *Water Well Standards*, Bulletin 74-90
4. Water Code, §§ 13750.5–13753
5. Central Valley Region (Region 5S) RWQCB, waste discharge requirements

76-1.01D(3) Permits

10. Insert name of county.

**** KG 7/01/14**

Obtain permits required from Contra Costa County.

76-1.01D(4) Test Instrumentation

11. For exploration holes, delete par. 11 and add "Not Used."

Instrumentation for well tests must indicate water depth within 10 seconds of the time specified. Water depth measurements must be accurate to within 0.1 feet.

76-1.01D(5) Well Development Tests

Pars. 12–15. For exploration holes, delete pars. 12–15 and add "Not Used."

12. Insert maximum and minimum flow rates.

Pumping equipment for well development tests must have a power supply capable of operating continuously for at least 36 hours. Test pump must discharge at a rate of at least ____ gpm at the water level encountered in the well and be capable of reducing flow to no more than ____ gpm.

13

Perform step-drawdown tests under ANSI/AWWA A 100 Appendix E. Each step must be 3 hours except you may stop the test after 2 hours if the plot of drawdown versus the logarithm of time is a flat line.

14

Perform constant rate tests under ANSI/AWWA A 100 Appendix E. Each test must be 2 hours except you may stop the test if 3 successive plots of drawdown versus the logarithm of time is a flat line. Plot the water level versus the logarithm of time for each test.

15

Allow the water level in the well to return to static conditions between tests.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

76-1.01D(6) Well Tests

Pars. 16–21. For exploration holes, delete pars. 16–21 and add "Not Used."

16. Insert maximum and minimum flow rates.

**** KG 7/01/14**

Pumping equipment for well tests must have a power supply capable of operating continuously for at least 36 hours. The test pump must discharge at a rate of at least ____ gpm at the water level encountered in the well and be capable of reducing flow to no more than ____ gpm.

17

Perform well tests in the following order:

1. Static water-level test
2. Steady-state test
3. Recovery water-level test

18

Perform the static water level test with the pump off. Measure the water level in the well every 20 minutes until 3 consecutive readings are the same.

Steady-state test time is for 24 hours, followed by the recovery water level test for 6 hours. Adjust times in tables pars. 15 and 16 and in par. 41 if test period is longer.

19

Perform the steady-state test with the pump running continuously. Maintain the pump discharge rate within 5 percent during the test. Plot water level in feet versus time in minutes shown in the following table:

Time (t) (minutes)	Measure water level
t=0 (turn pump on)	Once
0 < t ≤ 12	Every minute
14 ≤ t ≤ 20	Every 2 minutes
25 ≤ t ≤ 50	Every 5 minutes
60 ≤ t ≤ 100	Every 10 minutes
120 ≤ t ≤ 300	Every 30 minutes
400 ≤ t < 1400	Every 100 minutes
t=1440 (turn pump off)	Once

20

Start the recovery water level test at t=1440 minutes with the pump off. Plot water level in feet versus time in minutes shown in the following table:

Time (t) (minutes)	Measure water level
1440 < t ≤ 1452	Every minute
1454 ≤ t ≤ 1460	Every 2 minutes
1465 ≤ t ≤ 1490	Every 5 minutes
1500 ≤ t ≤ 1540	Every 10 minutes
1560 ≤ t ≤ 1800	Every 30 minutes

21

If the test pump stops pumping for at least 1 percent of the elapsed time from t=0 to t=1440, the steady-state test has failed. Start the testing sequence over with the static water level test.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

76-1.01D(7) Water Quality Analysis

Pars. 22–23. For exploration holes, delete pars. 22–23 and add "Not Used."

22

Send water samples for analysis to a CDPH-certified laboratory. Analyze samples under 22 CA Code of Regs, Div 4, Ch 15.

23

Analysis must include the constituents listed in 22 CA Code of Regs in (1) § 64421; Primary Standards-Bacteriological Quality, (2) § 64431; Primary Standards-Inorganic Chemicals, (3) § 64444; Primary Standards-Organic Chemicals, (4) § 64449; Secondary Drinking Water Standards, and the following:

1. Bicarbonate
2. Carbonate
3. Hydroxide alkalinity
4. Calcium
5. Magnesium
6. Sodium
7. Total hardness
8. pH
9. Temperature
10. Turbidity

76-1.02 MATERIALS

76-1.02A General

24. For well rehabilitation, delete par. 24 and add "Not Used."

Do not use cable tool drilling methods.

76-1.02B Drilling Fluid

Pars. 25–26. For well rehabilitation, delete pars. 25–26 and add "Not Used."

25

Drilling fluid must be water.

26

If authorized, you may add small quantities of bentonite or organic base polymer material to the drilling fluid. Do not add toxic or dangerous substances. Before using additives, submit MSDS sheets and a work plan for removal of the additives from the well. Remove additives before Contract acceptance.

76-1.02C Gravel Pack

Pars. 27–28. For exploration holes, delete pars. 27–28 and add "Not Used."

27

Gravel pack material requirements and impurity levels must comply with ANSI/AWWA A 100. Test for gradation under ASTM C 136. Gravel pack material must be certified under NSF 61.

28

Store gravel material on a protective sheet with cover.

76-1.03 CONSTRUCTION

76-1.03A General

29

Notify the Engineer at least 10 days before mobilization.

30

Mobilization, demobilization, and final cleanup includes the following:

1. Moving onto the well site
2. Setting up equipment

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

3. Removing tools, equipment, and machinery
4. Removing excess materials
5. Removing cuttings, drilling fluid, and rubbish
6. Filling in sumps and excavations
7. Restoring ground to original condition unless otherwise shown

31

When the well site is unattended, cover the opening. Maintain the borehole integrity.

32

Potable water must be supplied in quantities such that a water shortage does not cause a delay in the work.

76-1.03B Formation Sample Collection

Pars. 33–35. For well rehabilitation, delete pars. 33–35 and add "Not Used."

33

Collect and store formation samples under ANSI/AWWA A 100. Collect formation samples (1) at least once every 5 feet, (2) at a change in formation, and (3) at an aquifer.

34

Formation samples must be stored onsite and available for the Engineer's review.

35

After completion of drilling, select a representative group of formation samples and send them to a Department Accredited Laboratory for analysis. Include a stratigraphic log. Lab results must include gradation curves for each sample.

76-1.03C Well Disinfection

36. For exploration holes, delete par. 36 and add "Not Used."

Disinfect wells under ANSI/AWWA A 100 § 4.9. Dispose of chlorinated water until the discharged water has no noticeable chlorine odor. Chlorinated water must be disposed of properly.

76-1.03D Video Survey

Pars. 37–40. For exploration holes, delete pars. 37–40 and add "Not Used."

37

Survey the well interior using a video camera from the ground surface to the bottom of drilled hole, then back to the surface. The survey must include a current date and time stamp and the depth of the video camera relative to the surface.

38

The video camera must have an attached light that clearly illuminates the casing or well screen being videotaped. The video camera must be mounted downward facing but must be able to clearly view all of the casing or well screen.

39

If anomalies exist in the casing or well screen, the survey must include close-up video screen capture or still photos of these areas.

40

The survey must be recorded on a DVD in a standard format and viewable on any PC with an operating system of Windows XP or newer.

76-1.04 PAYMENT

The Department does not pay for failed tests.

Section 76-5. Use for monitor wells.

Include SSP 76-1.

Certain locations require guard posts under *Water Well Standards*, DWR Bulletin 74-90 10F.

Replace "Reserved" in section 76-5 with:

76-5.01 GENERAL

76-5.01A Summary

1

Section 76-5 includes specifications for constructing monitor wells.

76-5.01B Definitions

2

monitor well: As defined in the Water Code § 13712.

76-5.01C Submittals

3

Submit product data for:

1. Protective casing and cover
2. Well cap
3. Blank well casing
4. Well screen
5. Gravel pack material
6. Annular space seal

4

Submit calculations for the computed volume of gravel material to be added.

76-5.02 MATERIALS

76-5.02A General

5

Concrete must be minor concrete.

76-5.02B Protective Casing

Pars. 6–7. For watertight vaults, delete pars. 6–7 and add "Not Used."

6

Protective casing must be steel and at least 4 feet long with a hinged cover. The casing cover must be steel and must have provisions for padlocking and permanent monitor well identification complying with *Water Well Standards*, Bulletin 74-90.

7

Furnish a padlock until Contract acceptance. The Department furnishes padlocks after Contract acceptance.

76-5.02C Well Cap

8

Well cap must be J-type, with wing nut and expandable gasket to form a watertight seal. Well cap must include an attachment eye on the bottom. Well cap must have permanent identification as a monitor well.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

76-5.02D Blank Well Casing

9. Insert schedule 40 or 80, or SDR rating.

**** KG 7/01/14**

Blank well casing must be PVC pipe casing. PVC pipe casing must be 40 PVC thermoplastic well casing pipe complying with ASTM F 480.

10

PVC joints must be flush threaded. Where lubrication is required, use the pipe manufacturers lubricant. Do not use solvent-welded joints.

76-5.02E Well Screen

11. The Designer reviews the gravel pack gradation, and the character and sieve analysis of the aquifers before authorization.

Determine the screen opening size based on aquifer and soil requirements. The well screen opening size must be authorized before installation.

12

Well screen connections must be threaded.

13. Insert schedule 40 or 80, or SDR rating.

**** KG 7/01/14**

Well screen must be 40 PVC complying with ASTM F 480.

14

PVC well screen must (1) be from the same manufacturer and have the same diameter as the blank well casing and (2) have flush threaded ends and machine-made evenly-spaced slotted openings perpendicular to the axis of the casing.

76-5.02F Filter Pack

15

Filter pack material must comply with the requirements for gravel pack material. Test for gradation under ASTM C 136.

76-5.02G Annular Space Seal

16. Insert name of county.

**** KG 7/01/14**

Unless otherwise specified by Contra Costa County, sealing materials must comply with ANSI/AWWA A 100 and be (1) neat cement, (2) bentonite, or (3) concrete. Do not use bentonite chips.

17. Use if a transition seal is shown.

The transition seal must be clean, washed, fine sand.

76-5.03 CONSTRUCTION

76-5.03A General

18

Maintain the daily drilling reports.

19. Use if well screen size and length are not shown.

Collect formation samples during drilling operations at least every 10 feet.

20

Construct the concrete base under *Water Well Standards*, Bulletin 74-90. Pour the base before the annular seal has set. Where the top of the monitor well is shown below grade, construct a watertight vault under *Water Well Standards*, Bulletin 74-90.

21

Do not disturb the well for 48 hours after placing sealing material and constructing the base.

22

23

24

25

26

27

28

29

30

AA

AA

Special Provisions

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Tie-in requirements must comply with section 10-1.02.

78-1.01B Submittals

Submit as specified in Section 5-1.23 of the 2010 Caltrans Standard Specifications.

78-1.01C Schedule of Values

Submit a schedule of values within 15 days after Contract approval.

Determine the quantities required to complete the work. Submit the quantities as part of the schedule of values.

Provide a schedule of values for each lump sum bid item.

Do not include costs for the traffic control system in the schedule of values.

The schedule of values must include type, size, and installation method for:

1. Pipe, including all appurtenances, joint restraints, fittings, adapters, elbows, wyes, tees, connections, saddles and all hardware, dewatering, excavation, backfill and bedding
2. Pipe removal, including all appurtenances, dewatering, excavation, backfill and bedding
3. Sheet piling, Shoring and Bracing
4. Thrust blocks
5. Trace wire and Warning tape
6. Disinfection and testing of lines
7. Valves, including appurtenance piping and valve boxes
8. Any required temporary structural section due to staging of work
9. All Service Tie-ins and tie-ins to existing waterline

78-3 POLYETHYLENE ENCASEMENT (FOR DIP FITTINGS ONLY)

78-3.01 GENERAL

All buried metallic piping, specials, and fittings other than valves with anodes, must be polyethylene encased, double wrapped. 8 mils thickness, sized to pipe diameter, AN IIAWWA-C105/A21.5. Ends taped off with vinyl pipe wrap tape 10-mil vinyl tape manufactured by Calpico Inc. (Calpico VI-10) or equal.

Polyethylene Encasement must be "Clear" non-colored polyethylene film, in either tubular or sheet form. The polyethylene film must have a minimum thickness of 8 mils and at no point be less than 10 percent of the nominal thickness. Polyethylene film must be manufactured from a Type 1, Class A raw polyethylene material conforming to "Polyethylene Encasement for Ductile-Iron Piping for Water and Other Liquids" (ANSI/AWWA C-105/A21.5). Manufactured by Fee Spec's-LP378D Northtown, Fulton Enterprise Inc., Global Polymer Tech, Unisource, or equal.

78-3.02 MATERIALS

Not Used

78-3.03 CONSTRUCTION

Not Used

78-3.04 PAYMENT

Not Used

**79 CONTRA COSTA WATER DISTRICT WORK – LOS VAQUEROS PIPELINE
MODIFICATIONS**

79-1 GENERAL

79-1.01 GENERAL

79-1.01A Summary

This Section pertains only to the work on the Los Vaqueros pipeline and the Concrete Cap (Type 3) for the City of Brentwood.

Restrictions for working within the Los Vaqueros right of way are defined in section 10-1.02.

Submit a schedule of values within 15 days after Contract approval.

Determine the quantities required to complete the work. Submit the quantities as part of the schedule of values.

Provide a schedule of values for each lump sum bid item.

Do not include costs for the traffic control system in the schedule of values.

79-1.01B Payment

Items in this section will be paid as follows:

ARV (Air Release Valve) Relocation (~~South~~) is paid by the lump sum for furnishing all labor material tools, equipment, and incidentals. This work includes performing all landowner coordination and notifications, surveying, staking, temporary fencing, protection of or removal and replacement of exiting utilities and other improvements, site preparation, excavation, temporary storage and disposal of excess materials, transportation of materials, bedding, furnishing ductile iron pipe and fittings, pipe installation, pipe appurtenances, valves, air vacuum and release valves, precast vault structures, import of back fill material as necessary, locator tape, backfill and compaction, testing and finish grading, marker posts, and surface restoration. Contractor quality control for all work performed under this bid item shall also be included.

Remove Blow off is paid by the lump sum for furnishing all labor material tools, equipment, and incidentals. This work includes performing all landowner coordination and notifications, surveying, staking, temporary fencing, protection of exiting utilities and other improvements, site preparation, excavation, temporary storage and disposal of excess materials, transportation of materials, demolition and removal and disposal of exiting blowoff concrete vault, demo demolition and removal and disposal of exiting steel pipe, import of back fill material as necessary, backfill and compaction, finish grading, and surface restoration. Contractor quality control for all work performed under this bid item shall also be included.

Concrete Cap (Type 1) is paid by the linear feet for furnishing all labor material tools, equipment, and incidentals. This work includes performing all landowner coordination and notifications, surveying, staking, temporary fencing, protection of exiting utilities and other improvements, site preparation, traffic control, excavation, temporary storage and disposal of excess materials, transportation of materials, reinforcement, concrete forms, import of back fill material as necessary, locator tape, backfill and compaction, testing and finish grading, and surface restoration. Contractor quality control for all work performed under this bid item shall also be included.

Concrete Cap (Type 2) is paid by the linear feet for furnishing all labor material tools, equipment, and incidentals. This work includes performing all landowner coordination and notifications, surveying, staking, temporary fencing, protection of exiting utilities and other improvements, site preparation, traffic control, excavation, temporary storage and disposal of excess materials, transportation of materials, reinforcement, concrete forms, import of back fill material as necessary, locator tape, backfill and compaction, testing and finish grading, and surface restoration. Contractor quality control for all work performed under this bid item shall also be included.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

Concrete Cap (Type 3) is paid by the linear feet for furnishing all labor material tools, equipment, and incidentals. This work includes performing all landowner coordination and notifications, surveying, staking, temporary fencing, protection of exiting utilities and other improvements, site preparation, traffic control, excavation, temporary storage and disposal of excess materials, transportation of materials, reinforcement, concrete forms, import of back fill material as necessary, locator tape, backfill and compaction, testing and finish grading, and surface restoration. Contractor quality control for all work performed under this bid item shall also be included.

Current Span Test Station Relocation (North) is paid by the lump sum for furnishing all labor material tools, equipment, and incidentals. This work includes performing all landowner coordination and notifications, surveying, staking, temporary fencing, protection of or removal and replacement of exiting utilities and other improvements, site preparation, excavation, temporary storage and disposal of excess materials, transportation of materials, bedding, furnishing conduit and wire, precast box structures, import of back fill material as necessary, backfill and compaction, testing and finish grading, marker posts, and surface restoration. Contractor quality control for all work performed under this bid item shall also be included.

Current Span Test Station Relocation (South) is paid by the lump sum for furnishing all labor material tools, equipment, and incidentals. This work includes performing all landowner coordination and notifications, surveying, staking, temporary fencing, protection of or removal and replacement of exiting utilities and other improvements, site preparation, excavation, temporary storage and disposal of excess materials, transportation of materials, bedding, furnishing conduit and wire, precast box structures, import of back fill material as necessary, backfill and compaction, testing and finish grading, marker posts, and surface restoration. Contractor quality control for all work performed under this bid item shall also be included.

79-2 EXCAVATION SUPPORT AND PROTECTION

79-2.01 GENERAL

79-2.01A Summary

This section includes requirements for designing, furnishing and installing, maintaining, and removing excavation support and protection.

- A. Where General Engineering Design Practice is specified, provide drawings and signed calculations and have design performed by civil or structural engineer registered in State where the Project is located:

Provide design calculations that clearly disclose assumptions made, criteria followed, and stress values used for the materials being used.

Furnish references acceptable to Engineer substantiating appropriateness of design assumptions, criteria, and stress values.

- B. Design requirements:

General:

- a. Design means for safe and stable excavations in accordance with general engineering design practice:
 - 1) The preceding requirement shall not apply to trench excavation support conforming to standards set forth in CCR Title 8.
- b. Design steel members and shoring involving materials other than steel in accordance with the building codes and the AISC Manual of Steel Design.
- c. Perform design in accordance with soil characteristics and design recommendations contained in a written geotechnical report issued and signed by a geotechnical engineer hired by the Contractor. Geotechnical engineer shall be registered in the state where the Project is located:
 - 1) Make copy of geotechnical report available at project site for Engineer's review.
 - 2) Retain and pay for geotechnical engineer's services.
 - 3) Obtain report based on soil samples, field and laboratory tests, and borings performed for the geotechnical report for the design of stability of excavations by the geotechnical engineer hired by Contractor.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

- d. When electing to design with material stresses for temporary construction higher than allowable stresses prescribed in the AISC Steel Construction Manual and building codes, increase in such stresses shall not exceed 10 percent of value of prescribed stresses.
 - e. Minimum safety factor used for design shall not be less than 1.5.
 - f. The calculated minimum depth of penetration of shoring below the bottom of the excavation shall be increased not less than 30 percent if the full value of passive pressure is used in the design.
 - g. The maximum height of cantilever shoring above the bottom of excavation shall not exceed 15 feet.
 - 1) Use braced shoring when the height of shoring above the bottom of excavation exceeds 15 feet.
 - h. The location of the point of fixity for shoring shall not be less than half the calculated minimum embedment depth below the bottom of the excavation.
 - i. Generally acceptable references for the design of shoring and excavations are as follows:
 - 1) Caltrans California Trenching and Shoring Manual.
 - 2) NAVFAC Design Manual 7.2.
 - 3) NAVFAC Design Manual 7.3.
 - 4) USS Steel Sheet Piling Design Manual.
 - 5) ASCE Guidelines of Engineering Practice for Braced and Tied-Back Excavations.
 - j. The maximum total deflection at any point on the shoring shall not be more than $[1/4]$ inch.
- Soldier piles and lagging:
- k. Provide lagging over the full face of the excavation. Joints between pieces of lagging shall be tight to prevent loss of soil.
 - l. Provide full face lagging all around penetrations through the lagging.
 - m. If the soldier piles are installed in predrilled holes, the predrilled holes shall be filled with control density backfill after the soldier piles are installed.
 - n. The effective width of driven soldier piles for passive soil resistance shall not exceed 2 times the width of the pile.
 - 1) The effective width of concrete encased soldier piles for passive soil resistance shall not exceed 2 times the width of the concrete encasement.
 - o. Fill voids behind lagging with gravel or other material acceptable to the Engineer.
 - p. Apply loads from tie back soil, rock, or deadman anchors concentrically to soldier piles or wales spanning between soldier piles.
 - 1) Wales shall be back-to-back double channels or other members acceptable to the Engineer.
 - 2) Eccentrically loaded with section soldier piles or wales are not acceptable.
 - q. Design soldier piles for downward loads including vertical loads from tie back anchors.
- Soil anchors, rock anchors, and deadmen anchors:
- r. Design tie back anchors for a safety factor of not less than 2 times the calculated load from the shoring.
 - s. Proof load all production anchors to not less than 125 percent of the calculated load from the shoring.
 - t. Lock off anchors at the calculated anchor load.
 - u. The length of soil anchors used to calculate resistance to load from the shoring shall not include any length within the potential active pressure soil failure zone behind the face of shoring.
 - v. Design tie rods for anchors for 130 percent of the calculated load from the shoring.
 - w. Design tie rods for anchors for 150 percent of the calculated load from the shoring when tie rod couplers are used and for other conditions where stress concentrations can develop.
- C. Performance requirements:
- General:
- a. Support faces of excavations and protect structures and improvements in vicinity of excavations from damage and loss of function due to settlement or movement of soils, alterations in ground water level caused by such excavations, and related operations.
 - b. Specified provisions:
 - 1) Complement, but do not substitute or diminish, obligations of Contractor for the furnishing of a safe place of work pursuant to provisions of the Occupational Safety and Health Act

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

of 1970 and its subsequent amendments and regulations and for protection of the Work, structures, and other improvements.

- 2) Represent minimum requirement for:
 - a) Number and types of means needed to maintain soil stability.
 - b) Strength of such required means.
 - c) Methods and frequency of maintenance and observation of means used for maintaining soil stability.

Provide safe and stable excavations by means of sheeting, shoring, bracing, sloping, and other means and procedures, such as draining and recharging groundwater and routing and disposing of surface runoff, required to maintain the stability of soils and rock.

Provide support for trench excavations for protection of workers from hazard of caving ground.

Provide shoring:

- c. Where, as result of excavation work and analysis performed pursuant to general engineering design practice, as defined in this Section:
 - 1) Excavated face or surrounding soil mass may be subject to slides, caving, or other types of failures.
 - 2) Stability and integrity of structures and other improvements may be compromised by settlement or movement of soils, or changes in soil load on structures and other improvements.
- d. For trenches 5 feet and deeper.
- e. For trenches less than 5 feet in depth, when there is a potential for cave-in.
- f. Where indicated on the Drawings.

For safe and stable excavations, use appropriate design and procedures for construction and maintenance to minimize settlement of supported ground and to prevent damage to structures and other improvements, including:

- g. Using stiff support systems.
- h. Following appropriate construction sequence.
- i. Preventing soil loss through or under support system:
 - 1) Provide support system that is tight enough to prevent loss of soil and extend deep enough to prevent heave or flow of soils from supported soil mass into the excavation.
- j. Providing surface runoff routing and discharge away from excavations.
- k. Where dewatering is necessary, recharge groundwater as necessary to prevent settlement in area surrounding excavation.
- l. Where sheet piling is used, use interlocking type sheets.
 - 1) The sheet piles shall be continuous and driven in interlock.
 - 2) If the bottom of the excavation is located below the water table, use "thumb and finger" type interlock.
- m. Not applying shoring loads to existing structures and other improvements.
- n. Not changing existing soil loading on existing structures and other improvements.
- o. Provide welded steel packing between soil retaining members such as sheet piles and wales and similar members when the gap exceeds 1/4 inch before the wales are loaded.

79-2.01B References

- A. American Institute of Steel Construction, Inc. (AISC):
Steel Construction Manual.
- B. American Society of Civil Engineers (ASCE):
Guidelines of Engineering Practice for Braced and Tied-Back Excavations.
- C. California Code of Regulations (CCR):
Title 8 - Industrial Relations.
 - a. Chapter 3.2. California Occupational Safety and Health Regulations (CAL/OSHA).
- D. California Labor Code (CLC).
- E. Department of the Navy Naval Facilities Engineering Command (NAVFAC):
Design Manual 7.2 - Foundations and Earth Structures.
Design Manual 7.3 - Soil Dynamics and Special Design Aspects
- F. State of California Department of Transportation (Caltrans):
Caltrans California Trenching and Shoring Manual.
- G. United States Steel Corporation (USS):
Steel Sheet Piling Design Manual.

79-2.01C Submittals

A. Shop drawings and calculations:

In accordance with requirements in CLC for trench excavations 5 feet or more in depth and for trenches less than 5 feet in depth when there is potential for cave-in. Submit in advance of excavation work, detailed drawings showing means for safe and stable excavations:

- a. Where such drawings vary from excavation support standards set forth in California Code of Regulations Title 8 - Construction Safety Orders, submit design calculations pursuant to general engineering design practice.]
- b. Provide means for safe and stable excavations that are not less effective than required in CCR Title 8 - Construction Safety Orders.

Perform design pursuant to general engineering design practice.

For excavations other than trenches, submit, in advance of excavation work, design calculations as performed pursuant to general engineering design practice, as specified in this Section, and detail drawing showing means for safe and stable excavations. In design calculations and detail drawing, cover, as a minimum:

- c. Excavations adjacent to structures and other improvements, and
- d. Excavations 5 feet or more in depth, or less than 5 feet in depth when there is potential for cave-in, at other locations.

Submit following:

- e. Provide calculations for the different load, support, and other conditions that occur during the sequence of installation of shoring, construction of facilities protected by the shoring, and sequence of removal of shoring.
- f. Provide sketches showing the condition at various stages of installation and removal of shoring.
- g. Show structures, pipelines, and other improvements located near the shoring, and the shoring on a plan.
- h. When utilities penetrate the shoring, submit an elevation of all sides of the shoring showing the locations of the penetrations.
 - 1) Submit details on ground support and sealing around utility penetrations.

B. Written geotechnical report on soil characteristics and design recommendations, as specified in this Section.

C. Control points and schedule of measurements:

Submit location and details of control points and method and schedule of measurements in accordance with requirements of this Section.

Promptly upon constructing control points and making measurements at such control points, as specified in this Section, submit copy of field notes with such measurements.

- a. The field notes shall show the current measurement and the change in measurement from the first measurement taken.

D. Detailed sequence of installation and removal of shoring:

Consider effects of ground settlement in the sequence of installation and removal of shoring. Provide sketches showing the conditions at various stages in the sequence of installation and removal of shoring.

E. Submit submittals for stability of excavations as a complete package and include all items required in this Section.

Incomplete submittals will not be reviewed and will be returned for resubmittal as a complete package.

79-2.01D Quality Assurance

Not Used

79-2.02 MATERIALS

Not Used

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

79-2.03 CONSTRUCTION

79-2.03A Sequencing and Scheduling

- A. Do not begin work on excavations, trenches, and means for providing stability of excavation and trenches until submittals have been accepted by Engineer and until materials necessary for installation are on site.
- B. Submit submittals a minimum of 30 days prior to the scheduled date to begin excavation work.
- C. Do not begin construction of any shoring or excavation operations until:
Control points as specified in this Section and as indicated on the Drawings on existing structures and other improvements have been established and surveyed to document initial elevations and locations.

79-2.03B Installation and Removal

- A. Install means for providing safe and stable excavations as indicated in the submittals.
- B. Except for concrete encased soldier piles, slurry walls, and similar shoring systems, remove shoring by completion of the Work.
Select shoring system and method of removal, which will minimize soil that sticks to shoring from creating large voids and causing settlement.
To prevent settlement caused by pulling shoring, fill voids with sand, pea gravel, or pressure injected grout.
The methods used shall prevent settlement.
Pressure preservative treated wood lagging may be left in place when acceptable to the Engineer.
- C. Where loss of soil occurs, plug gap in shoring and replace lost soil with fill material acceptable to Engineer.
- D. Where measurements and observations indicate possibility of failure or excessive movement of excavation support, determined in accordance with general engineering design practice, take appropriate action immediately
- E. Establish control points on shoring and on structures and other improvements in vicinity of excavation for measurement of horizontal and vertical movement:
Set control points on shoring support system:
 - a. Set points at distances not exceeding 25 feet at each support level.
 - b. Support levels shall be levels of tie-backs, wales, bottom of excavation, and other types of supports.Set control points in corners of existing structures and on curbs, manholes, and other improvements indicated on the Drawings.
- F. Provide plumb bobs with horizontal targets indicating original position of plumb bobs in relation to shoring at control points located on shoring.
- G. Perform horizontal and vertical survey and measurement of control points at least once every week.

79-3 TRENCHING

79-3.01 GENERAL

79-3.01A Summary

This section includes: Trench excavation, fine grading, pipe bedding, backfilling, and compaction for the following, including requirements for ditch crossings:

Pipes.

Direct buried electrical and control conduits.

Manholes, valves, or other accessories.

Potable water pipe appurtenances

79-3.01B References

- A. ASTM International (ASTM):
 - D 1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand Cone Method.
 - D 1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
 - D 6938 – Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

79-3.01C Submittals

- A. Lab certification.
- B. Confirmation test reports
- C. Product data:
 - Material source.
 - Gradation.
 - Testing data.
- D. Quality control for aggregate base course:
 - Test reports: Reports for tests required by Sections of the Caltrans 2010 Standard Specifications.
 - Certificates of Compliance: Certificates as required by Sections of the Caltrans Standard Specifications

79-3.01D Quality Assurance

- A. Initial compaction demonstration:
 - Adequacy of compaction equipment and procedures: Demonstrate adequacy of compaction equipment and procedures before exceeding 200 linear feet of trench backfill.
 - Compaction sequence requirements: Until specified degree of compaction on previously specified amounts of earthwork is achieved, do not perform additional earthwork of the same kind.
 - After satisfactory conclusion of initial compaction demonstration and at any time during construction, provide confirmation tests as specified under "FIELD QUALITY CONTROL."

79-3.02 MATERIALS

79-3.02A Soil and Rock Materials

- A. Aggregate base course material: Caltrans 2010 Standard Specification Section 26-1.02B
- B. Native Material:
 - Sound, earthen material passing 1-inch sieve.
 - Percent of material by weight passing Number 200 sieve shall not exceed 30 when tested in accordance with ASTM D 422.
 - Expansion index less than 35 when tested in accordance with ASTM D 4829.
- C. Sand: Caltrans 2010 Standard Specification Section 19-3.02E.

79.302B Controlled Low-Strength Material: Caltrans 2010 Standard Specification Section 19-3.02F

79-3.03 CONSTRUCTION

79-3.03A Preparation

- A. Embankment condition:
 - Exists where width of trench exceeds limits specified in this Section.
 - Before laying pipes in fill, place fill and compact it to not less than 2 feet above top of pipe.
 - After placing and compacting fill, excavate pipe trench through fill.
- B. Protection: Stabilize trench excavations

79-3.03B Installation

- A. Trench excavation:
 - General requirements:
 - a. If, because of soil conditions, safety requirements, or other reasons, trench width at top of pipe is increased beyond width specified in this Section, upgrade laying conditions or install stronger pipe designed in conformance with Specifications for increased trench width, without additional cost to Owner.
 - b. Excavate bottom of trench to depth indicated on the Drawings. The bottom of the trench excavation shall be firm and dry.
 - The trench may be excavated by machinery to the grade indicated on the Drawings provided that the soil material remaining in the bottom of the trench is no more than slightly disturbed.
 - Rock:
 - c. Pipe: If bottom of trench excavation is found to consist of rock or any material that by reason of its hardness cannot be excavated to provide uniform bearing surface, remove such rock or

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

other material to a depth of not less than 4 inches below bottom of fine grading material. Backfill overcut with aggregate base course material compacted to 95 percent of maximum density up to bottom of fine grading material.

- d. Direct buried electrical and control conduits: If bottom of trench excavation is found to consist of rock or any material that by reason of its hardness cannot be excavated to provide uniform bearing surface, remove such rock or other material to a depth of not less than 4 inches below bottom of conduit bedding material. Backfill overcut with aggregate base course material up to bottom of conduit bedding material.
- e. Electrical and control ductbanks: If bottom of trench excavation is found to consist of rock or any material that by reason of its hardness cannot be excavated to provide uniform bearing surface, remove such rock or other material to a depth of not less than 4 inches below bottom of concrete ductbank. Backfill overcut with aggregate base course material up to bottom of concrete ductbank.

Overcut of trench bottom: Where the bottom of the trench is excavated below the depth indicated on the Drawings, restore trench bottom to proper grade by back filling with aggregate base course material compacted to 95 percent of maximum density, at no additional cost to Owner.

Soft or unstable material:

- f. If bottom of excavation is found to consist of soft or unstable material which is incapable of providing proper support, remove such material to a depth and for the length required, as determined by the Engineer. Backfill trench to bottom of fine grading material with aggregate base course material compacted to 90 percent of maximum density.

Trench widths:

- g. Minimum clear width of trench for pipe (measured at top of pipe):
 - 1) For pipe sizes 4 inches to and including 24 inches: Not less than outside diameter of pipe plus 18 inches.
 - 2) For pipe sizes larger than 24 inches: Not less than outside diameter of pipe plus 24 inches.
- h. Maximum clear width of trench for pipe (measured at top of pipe):
 - 1) For pipe sizes 4 inches to and including 24 inches: Not to exceed outside diameter of pipe plus 24 inches.
 - 2) For pipe sizes larger than 24 inches: Not to exceed outside diameter of pipe plus 36 inches.

For manholes, valves, or other accessories:

- i. Provide excavations sufficient to leave at least 12 inches clear between their outer surfaces and sides of trench or shoring.
- j. Backfilling of manhole excavation: Conform to backfilling requirements as specified for trenches in this Section.
- k. Backfill under manholes, vaults, tanks, or valves with aggregate base course material. Do not backfill with soil.
- l. Fill any unauthorized excess excavation below elevation indicated on the Drawings for foundation of any structure with aggregate base course material at no additional cost to Owner.

Potable water pipe appurtenances:

- m. Lay in trenches separate from those used for sewers.
- n. Unless otherwise specified or indicated on the Drawings, lay in trenches having cover of not less than 3 feet below surface of ground and located at distance of not less than 10 feet from any parallel sewer trench.

At road crossings or existing driveways:

- o. Make provision for trench crossings at these points, either by means of backfills, tunnels, or temporary bridges.

B. Dewatering: Must comply with Caltrans 2010 Standard Specifications.

C. Pipe fine grading:

Schedule fine grading material or aggregate base as specified in this Section.

For pipes 16 inches in nominal diameter and under.

- a. Place 4 inches of fine grading material below bottom of pipe.
- b. Place fine grading material at uniform density, with minimum possible compaction.

For pipe over 16 inches in diameter.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

- c. Place 4 inches, or 1/12 the outside diameter of pipe, whichever is greater, of fine grading material below bottom of pipe.
 - d. Place fine grading material at uniform density, with minimum possible compaction.
- Bell or coupling holes:
- e. Dig holes after trench bottom has been graded.
 - f. Excavate holes only as necessary for making joints and to ensure that pipe rests upon prepared trench bottom and not supported by any portion of the joint.
- Depressions for joints, other than bell-and-spigot must be in accordance with recommendations of joint manufacturer for particular joint used.
- D. Pipe bedding:
Schedule bedding material as specified in this Section.
After pipe laid:
- a. Place bedding material under and around pipe in 6 inch maximum lifts of bedding material, to level 12 inches above top of pipe. Compact to 90 percent of maximum density.
- Pipe displacement:
- b. Take necessary precautions in placement and compaction of bedding material to prevent displacement of piping.
 - c. In event there is movement or floating of the piping, re-excavate, re-lay, and backfill the pipe.
- E. Trench backfill above pipe bedding, electrical and control conduit bedding, and electrical and control ductbanks:
Under structures: Backfill trench up to underside of structure with aggregate base course material as specified in this Section compacted to 95 percent of maximum density
Cuts across roadways and paved streets: Backfill trench to underside of pavement with aggregate base course material as specified in Section 02318 compacted to 95 percent of maximum density or controlled low-strength material as shown on the Drawings
Under and parallel to roadways, paved areas, or storage areas:
- a. Backfill trench up to within 2 feet of finish grade with native material compacted to 95 percent of maximum density.
 - b. Then backfill from 2 feet below finish grade to finish grade, or underside of aggregate base course or pavement as indicated on the Drawings with aggregate base course material as specified in Section 79-302318, compacted to 95 percent of maximum density or controlled low-strength material as shown on the Drawings.
- In areas outside the improved section of roadways or in open country: Backfill to finish grade with native material as specified in Section 79-302318, compacted to 90 percent of maximum density.
Through earth slopes adjacent to, or supporting structures: Backfill to finish grade with aggregate base course material or select material compacted to 95 percent of maximum density.
- F. Under existing intersecting pipes or conduits larger than 3 inches in diameter:
Backfill from bottom of new pipe trench to spring line of intersecting pipe or conduit with controlled low-strength material as specified in Section 19-3.02E.
Extend controlled low-strength material as specified in 19-3.02E two feet on either side of intersecting pipe or conduit to ensure that material remains in place while other backfill is being placed.
Backfill remainder of trench as specified in "Trench backfill above pipe bedding and for conduits and duck banks" above.
- G. Compaction:
In-place density of compacted trench backfill, and bedding determined in accordance with ASTM D 1556, or with ASTM D 6938.
Maximum density obtained in laboratory when tested in accordance with ASTM D 1557.
Consolidation: Do not use water settling methods such as flooding, poling, or jetting.
- H. Excess material: Remove excess excavated material from the Project site and dispose of legally off site.

79-4 FILTER FABRIC

79-4.01 GENERAL

79-4.01A Summary

Filter fabric must be a nonwoven geotextile fabric manufactured from polypropylene fibers.

Submit a certificate of compliance for each delivery of filter fabric.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

79-4.01B References

- A. ASTM International (ASTM):
D 4355 - Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus.
D 4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
D 4533 - Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
D 4632 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
D 4751 - Standard Test Method for Determining Apparent Opening Size of a Geotextile.
D 5261 - Standard Test Method for Measuring Mass per Unit Area of Geotextiles.
D 6241 - Standard Test Method for the Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe.

79-4.01C Submittals

- A. Product data.
B. Samples.
C. Quality control submittals:
Certificates of Compliance.
Manufacturer's Instructions.

79-4.01D Quality Assurance

Not Used.

79-4.02 MATERIALS

Filter fabric must be a nonwoven geotextile fabric manufactured from polypropylene fibers.

Physical properties: Meet the following minimum requirements:

Property ⁽¹⁾	Test Method	Unit	Requirements ⁽¹⁾
Minimum Weight	ASTM D 5261	oz	4.0
Grab Tensile Strength	ASTM D 4632	lbs	100
Grab Elongation	ASTM D 4632	%	50
Trapezoid Tear Strength	ASTM D 4533	lbs	50
CBR Puncture Resistance	ASTM D 6241	lbs	300
UV Resistance (strength retained at 500 hrs)	ASTM D 4355	%	70
Apparent Opening Size (AOS)	ASTM D 4751	US sieve	70
Permittivity	ASTM D 4491	sec ⁻¹	1.7
Flow Rate	ASTM D 4491	gpm/ft ²	130
(1) Minimum average roll values.			

79-4.03 CONSTRUCTION

During grading operations, take care not to disturb the subgrade. This may require use of lightweight dozers for low strength soils such as saturated, cohesionless, or low cohesion soils.

Prior to placement of fabric prepare surface to smooth condition free of debris, depressions, or obstructions that may damage the fabric.

Install per manufacturer's recommendations and under the following:

- A. Place the filter fabric smoothly without folds or wrinkles.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

- B. Use special care when placing the filter in contact with the soil so that no void spaces occur between the filter and the prepared surface.
- C. Overlap the parallel rolls and ends of rolls a minimum of 24 inches and not less than manufacturer's instructions.
- D. Do not drag filter fabric across subgrade.
- E. Make overlaps at ends of rolls in the direction of the aggregate placement with the previous roll on top.
- F. Use lightweight dozers if necessary. Do not allow equipment directly on filter fabric.

Before covering, the condition of the fabric will be observed by the Engineer to determine that no holes or rips exist in the fabric.

Repair all holes and rips by placing a new layer of fabric extending beyond the defect in all directions a distance equal to the minimum overlap required for adjacent rolls.

79-5 CONCRETE FORMWORK

79-5.01 GENERAL

79-5.01A Summary

This section includes specifications for concrete formwork and paper void forms.

79-5.01B References and Definitions

- A. ASTM International (ASTM):
 - 1. A 121 - Standard Specification for Metallic-Coated Carbon Steel Barbed Wire.
 - 2. A 123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 3. A 153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 4. A 385 - Standard Practice for Providing High-Quality Zinc Coatings (Hot-Dip).
 - 5. A 392 - Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric.
 - 6. A 702 - Standard Specification for Steel Fence Posts and Assemblies, Hot-Wrought.
 - 7. F 626 - Standard Specification for Fence Fittings.
 - 8. F 668 - Standard Specification for Polyvinyl Chloride (PVC) and Other Organic Polymer-Coated Steel Chain-Link Fence Fabric.
 - 9. F 1043 - Standard Specification for Strength and Protective Coatings on Steel Industrial Chain Link Fence Framework.
 - 10. F 1184 - Standard Specification for Industrial and Commercial Horizontal Slide Gates.
- B. State of California Department of Transportation (Caltrans).

Green concrete: Concrete with less than 100 percent of the minimum specified compressive strength f'_c .

79-5.01B Submittals

Submit in such detail as the Engineer may require your proposed forming system. Alternate combinations of plywood thickness and stud spacing may be submitted.

Submit product data and manufacturer's installation instructions for corrugated paper formwork and accessories.

For the Form release agent you must submit a certification for conformance to NSF 61.

79-5.01D Quality Assurance

Use only forming systems by manufacturers having a minimum of 5 years' experience, except as otherwise specified, or accepted in writing by the Engineer.

79-5.02 MATERIALS

- A. Form ties:
 - Provide form ties for forming system selected that are manufactured by recognized manufacturer of concrete forming equipment.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

- Do not use wire ties or wood spreaders of any form.
Provide ties of type that accurately tie, lock, and spread forms.
Provide form ties of such design that when forms are removed, they locate no metal or other material within 1-1/2 inches of the surface of the concrete.
Do not allow holes in forms for ties to allow leakage during placement of concrete.
- B. Cone-snap ties:
Cone-snap ties shall form a cone shaped depression in the concrete with a minimum diameter of 1 inch at the surface of the concrete and 1-1/2 inches deep.
Provide neoprene waterseal washer that is located near the center of the concrete.
- C. Taper ties:
Neoprene plugs for taper tie holes: Size so that after they are driven, plugs are located in center third of wall thickness.
- D. Built-up plywood forms:
Built-up plywood forms may be substituted for prefabricated forming system subject to following minimum requirements:
- a. Size and material:
 - 1) Full size 4- foot by 8-foot plywood sheets, except where smaller pieces are able to cover entire area.
 - 2) Sheet construction: 5-ply plywood sheets, 3/4-inch nominal, made with 100 percent waterproof adhesive, and having finish surface that is coated or overlaid with surface which is impervious to water and alkaline calcium and sodium hydroxide of cement.
 - b. Wales: Minimum 2- inch by 4-inch lumber.
 - c. Studding and wales: Contain no loose knots and be free of warps, cups, and bows.
- E. Steel or steel framed forms:
Steel forms: Provide forms that are:
- a. Rigidly constructed and capable of being braced for minimum deflection of finish surface.
 - b. Capable of providing finish surfaces that are flat without bows, cups, or dents.
- Steel framed plywood forms:
- c. Provide forms that are rigidly constructed and capable of being braced.
 - d. Plywood paneling: 5-ply, 5/8-inch nominal or 3/4-inch nominal, made with 100 percent waterproof adhesive, and having finish surface that is coated or overlaid with surface which is impervious to water and alkaline calcium and sodium hydroxide of cement.
- F. Form release agent must be effective, non-staining, bond-breaking coating compatible with form surfaces and concrete mixes used.
- G. Incidentals:
External angles:
- a. Where not otherwise indicated on the Drawings, provide with 3/4-inch bevel, formed by utilizing true dimensioned wood or solid plastic chamfer strip on walkways, slabs, walls, beams, columns, and openings.
 - b. Provide 1/4-inch bevel formed by utilizing true dimensioned wood or solid plastic chamfer strip on walkways, walls, and slabs at expansion, and construction joints.
- Keyways: Steel, plastic, or lumber treated with form release oil, applied according to label directions.
- H. Paper void products shall be designed to offer an approximate response to moisture by specifying the interior components' makeup as follows:
Extra Fast – Non-wax impregnated, plain kraft paper and a water-soluble adhesive
Fast – Non-wax impregnated, plain kraft paper and a moisture-resistant adhesive
Moderate – Plain kraft paper with a wax impregnated medium, but non-wax impregnated liners and a moisture-resistant adhesive
Slow – Plain kraft paper with wax impregnated medium / liners and a moisture-resistant adhesive
Extra Slow – Wet-strength paper with wax impregnated medium / liners and a moisture-resistant adhesive
- I. The standard strengths of paper void products shall be designed for any average working load ranging from approx. 800 p.s.f. – 2,000 p.s.f. in increments of about 200 lbs. Custom strengths up to 7,000 p.s.f. are available upon request.
- J. Paper void products shall be available in ready-to-use, factory-glued assembled form, as well as knockdown (K.D.) form for shipping. The standard length of each piece shall be 60". Pieces are easily crosscut with a handsaw to fit as required. Available void depths range from 1" to 18". Pieces can be stacked in layers to achieve depths greater than 18".

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

K. Prefabricated void forms

Paper void Forms:

- a. Function: used to create void space directly under structural concrete slabs.
- b. Composition: corrugated paper material with a moisture resistant exterior, and having an interior fabrication of a uniform, cellular configuration, composed of Moderate moisture response components.
- c. Depth: 12-inches.
- d. Profile: rectangular shape in cross section.
- e. Strength:
- f. Capable of sustaining an average working load of 600 p.s.f. for slab thickness of 42 inches based on manufacturer's recommendations.
- g. Capable of sustaining an average working load of 400 p.s.f. for slab thickness of 30 inches based on manufacturer's recommendation

Protective Cover Board - plywood – distributes working load, bridges small gaps, and protects void material from puncture and other damage during concrete placement.

Manufacturer: SlabVoid®, as manufactured by SureVoid Products, Inc., or equal.

79-5.03 CONSTRUCTION

Do not place any concrete until all forms have been thoroughly checked for alignment, level, strength, and to assure accurate location of all mechanical and electrical inserts or other embedded items.

79-5.03A Installation

A. Forms and accessories:

Vertical forms:

- a. Remain in place minimum of 24 hours after concrete is placed.
- b. If, after 24 hours, concrete has sufficient strength and hardness to resist surface or other damage, forms may be removed.

Other forms supporting concrete and shoring: Remain in place as follows:

- c. Sides of footings: 24 hours minimum.
- d. Vertical sides of beams, girders, and similar members: 48 hours minimum.
- e. Bottom of slabs, beams, and girders: Until concrete strength reaches specified strength $f'c$ or until shoring is installed.
- f. Shoring for slabs, beams, and girders: Shore until concrete strength reaches specified strength.
- g. Wall bracing: Brace walls until concrete strength of beams and slabs laterally supporting wall reaches specified strength.

Green concrete: No heavy loading on green concrete will be permitted.

Immediately after forms are removed, carefully examine concrete surfaces, and repair any irregularities in surfaces and finishes as specified in Section 79-703300.

B. Form ties:

Cone-snap ties: Tie forms together at not more than 2-foot centers vertically and horizontally. After forms are removed from wall, fill tie holes as follows:

- a. Remove form ties from surfaces.
- b. Roughen cone shaped tie holes by heavy sandblasting before repair.
- c. Dry pack cone shaped tie holes with dry-pack mortar as specified in Section 03600.

Taper ties:

- d. After forms and taper ties are removed from wall, plug tie holes with neoprene plug as follows:
- e. Heavy sandblast and then clean tie holes.
- f. After cleaning, drive neoprene plug into each of taper tie holes with steel rod. Final location of neoprene plug shall be in center third of wall thickness. Bond neoprene plug to concrete with epoxy.
- g. Locate steel rod in cylindrical recess, made in plug, during driving.
 - 1) At no time are plugs to be driven on flat area outside cylindrical recess.

Dry-pack of taper tie holes: After installing plugs in tie holes:

- h. Coat tie hole surface with epoxy bonding agent and fill with dry-pack mortar as specified in Section 03600.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CTA Contract No. XXX

- i. Place dry-pack mortar in holes in layers with thickness not exceeding tie hole diameter and heavily compact each layer.
 - j. Dry-pack the outside of the hole no sooner than 7 days after the inside of the hole has been dry packed.
 - k. Wall surfaces in area of dry-packed tie holes: On the water side of water containing structures and the outside of below grade walls:
 - 1) Cover with minimum of 10 mils of epoxy gel.
 - 2) Provide epoxy gel coating on wall surfaces that extend minimum of 2 inches past dry-pack mortar filled tie holes.
 - 3) Provide finish surfaces that are free from sand streaks or other voids
- C. Built-up plywood forms:
- Studding:
- a. Spaced at 16 inches or 24 inches on center.
 - b. Closer spacing may be required depending upon strength requirements of the forms, in order to prevent any bulging surfaces on faces of finished concrete work.
 - c. Install studs perpendicular to grain of exterior plys of plywood sheets.
- Wales: Form wales of double lumber material with minimum size as specified in this Section.
- Number of form reuses: Depends upon durability of surface coating or overlay used, and ability to maintain forms in condition such that they are capable of producing flat, smooth, hard, dense finish on concrete when stripped.
- D. Steel or steel framed forms:
- Steel forms:
- a. Adequately brace forms for minimum deflection of finish surface.
- Steel framed plywood forms:
- b. Rigidly construct and brace with joints fitting closely and smoothly.
 - c. Number of form reuses: Depends upon durability of surface coating or overlay used.
- Built-up plywood forms: As specified in this Section may be used in conjunction with steel forms or steel framed plywood forms for special forming conditions such as corbels and forming around items which will project through forms.
- E. Bracing and alignment of forms:
- Line and grade: Limit deviations to tolerances which will permit proper installation of structural embedded items or mechanical and electrical equipment and piping.
- Formwork:
- a. Securely brace, support, tie down, or otherwise hold in place to prevent movement.
 - b. Make adequate provisions for uplift pressure, lateral pressure on forms, and deflection of forms.
- When second lift is placed on hardened concrete: Take special precautions in form work at top of old lift and bottom of new lift to prevent:
- c. Spreading and vertical or horizontal displacement of forms.
 - d. Grout "bleeding" on finish concrete surfaces.
- Pipe stubs, anchor bolts, and other embedded items: Set in forms where required.
- Cracks, openings, or offsets at joints in formwork: Close those that are 1/16-inch or larger by tightening forms or by filling with acceptable crack filler.
- F. Incidentals:
- Keyways: Construct as indicated on the Drawings.
- Reentrant angles: May be left square.
- Level strips: Install at top of wall concrete placements to maintain true line at horizontal construction joints.
- Inserts:
- a. Encase pipes, anchor bolts, steps, reglets, castings, and other inserts, as indicated on the Drawings or as required, in concrete.
- G. Slab Void Forms:
- Store void forms and accessories in accordance with manufacturer's recommendations.
- Prepare ground surface on an even plane. There should be no capillary break below the void form unless otherwise directed by the designing engineer or architect.
- Assemble knockdown (K.D.) products as recommended by manufacturer to develop designed strengths.
- Install slab void forms and accessories in accordance with manufacturer's recommendations.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Place a layer of protective cover board over void forms to distribute working load, bridge small gaps, and protect them from puncture and other damage during concrete placement.

Protect void forms from moisture, and replace wet or damaged pieces before placing concrete.

Immediately protect slab ends after forms have been stripped with a retainer. This will help deter moisture from escaping and keep backfill material from migrating into the voided area. The retainer should be installed per the manufacturer's recommendations.

Maintain moisture and humidity levels beneath the slab after the concrete sets.

79-5.03B Tolerances

- A. Finished concrete shall conform to shapes, lines, grades, and dimensions indicated on the Drawings.
B. Construct work within the tolerances in accordance with ACI 117, except as modified in the following paragraphs or as indicated on the Drawings.

General:

- a. At certain locations in the Work, tolerances required for equipment placement and operation may be more restrictive than the general tolerance requirements of this Section.
b. Confirm equipment manufacturers' required tolerances for location and operation of equipment that will be installed, and construct concrete to satisfy those requirements.

Slabs:

- c. Slope: Uniformly sloped to drain when slope is indicated on the Drawings.
d. Slabs indicated to be level: Have maximum vertical deviation of 1/8-inch in 10-foot horizontal length without any apparent changes in grade.

Inserts and embedments:

- e. Set inserts and embedments to tolerances required for proper installation and operation of equipment or systems to which insert pertains.
f. Maximum tolerances: As follows:

Item	Tolerance
Sleeves and inserts	Plus 1/8 Minus 1/8 inches.
Anchor bolts:	
Projected ends	Plus 1/4 Minus 0.0 inches.
Axial alignment	Not more than 2 degrees off the axis indicated on the Drawings.
Setting location	Plus 1/16 Minus 1/16 inches.

- C. Remove and replace work that does not conform to required tolerances. Procedures and products employed in and resulting from such re-work shall be acceptable to the Engineer.

79-6 CONCRETE REINFORCING

79-6.01 GENERAL

79-6.01A Summary

This section includes:

- A. Bar supports.
B. Reinforcing bars.
C. Thread bars.
D. Tie wires

Deliver bars bundled and tagged with identifying tags. Deliver reinforcing bars lacking grade identification marks accompanied by manufacturer's guarantee of grade at site acceptance.

Do not place concrete until samples and product data for bar supports have been accepted by the Engineer.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

79-6.01B References and Definitions

- A. American Concrete Institute (ACI):
 - 1. 315 - Details and Detailing of Concrete Reinforcement.
 - 2. 318 - Building Code Requirements for Structural Concrete and Commentary.
 - 3. 350 - Code Requirements for Environmental Engineering Concrete Structures and Commentary.
- B. American Welding Society (AWS):
 - 1. D1.4 - Structural Welding Code - Reinforcing Steel.
- C. ASTM International (ASTM):
 - 2. A 185 - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
 - 3. A 615 - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement.
 - 4. A 706 - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.

Give away bars: Bars that are not required by Contract Documents, but are installed by the Contractor to support the required reinforcing bars.

79-6.01C Submittal

- A. Shop drawings:
 - Changes to reinforcing steel contract drawing requirements:
 - a. Indicate in separate letter submitted with shop drawings any changes of requirements indicated on the Drawings for reinforcing steel.
 - b. Such changes will not be acceptable unless the Engineer has accepted such changes in writing.
 - Reinforcement shop drawings:
 - c. Review of reinforcement shop drawings by the Engineer will be limited to general compliance with the Contract Documents.
 - d. Submit reinforcement shop drawings in a complete package for each specific structure. Partial submittals will be rejected.
- B. Samples:
 - Bar support chairs: Submit samples of chairs proposed for use along with letter stating where each type of chair will be used.

79-6.02 MATERIALS

Shop assembly:

- 1. Cut and bend bars in accordance with provisions of ACI 315, ACI 318, and ACI 350.
- Bend bars cold.
Provide bars free from defects and kinks and from bends not indicated on the Drawings.

- A. Bar supports:
 - Wire bar supports located between reinforcing bars and face of concrete:
 - a. Stainless steel. Type 304 stainless steel bar supports.
 - 1) Support reinforcing for concrete placed on ground using bar support chairs with Type 304 stainless steel plates for resting on ground welded to the chairs.
 - Wire bar supports located between mats of reinforcing bar must be steel bar supports
- B. Reinforcing bars:
 - Reinforcing bars to be embedded in concrete:
 - a. ASTM A 615 Grade 60 deformed bars
 - 2) Actual yield strength based on mill tests of reinforcement provided shall not exceed the minimum yield strength specified in this Section by more than 18,000 pounds per square inch.
 - 3) Ratio of the actual ultimate tensile strength to the actual tensile yield strength of the reinforcement shall not be less than 1.25
 - Reinforcing bars that are required to be welded must be low alloy ASTM A 706 Grade 60 deformed bars.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

Reinforcing bars that are required to resist earthquake-induced flexural and axial forces in concrete frame members and in concrete shear wall boundary members must be low alloy ASTM A 706 Grade 60 deformed bars.

C. Tie wires: Annealed steel.

D. Welded wire fabric reinforcement:

In accordance with ASTM A 185.

Fabric may be used in place of reinforcing bars if accepted by the Engineer.

Provide welded wire fabric in flat sheet form.

Provide welded wire fabric having cross-sectional area per linear foot of not less than cross-sectional area per linear foot of reinforcing bars indicated on the Drawings.

79-6.03 CONSTRUCTION

Verify that reinforcing bars and welded wire fabric are new stock free from rust scale, loose mill scale, excessive rust, dirt, oil, and other coatings which adversely affect bonding capacity when placed in the work. Thin coating of red rust resulting from short exposure on the reinforcing bars will not be considered objectionable. Thoroughly clean any bars having rust scale, loose mill scale, or thick rust coat. Clean reinforcement materials by removing concrete or other deleterious coatings from dowels and other projecting bars by wire brushing or sandblasting before bars are embedded in subsequent concrete placement.

A. Installation

Reinforcing bars:

- a. No field bending of bars will be allowed.
- b. Hoop bars shall be rolled to the radius of the structure.
- c. Welding:
 - 1) Weld reinforcing bars where indicated on the Drawings or acceptable to the Engineer.
 - 2) Perform welding in accordance with AWS D1.4 and welding procedures accepted by the Engineer. Conform to requirements for minimum preheat and interpass temperatures.
 - 3) Submit welding procedures.
 - 4) Do not tack weld reinforcing bars.

Placing reinforcing bars:

- d. Accurately place bars to meet tolerances of ACI 318 and adequately secure them in position.
- e. Lap bars at splices as indicated on the Drawings or specified.
 - 1) Unless specifically otherwise indicated on the Drawings, install bars at lap splices in contact with each other and fasten together with tie wire.
 - 2) Where reinforcing bars are to be lap spliced at concrete joints, ensure that bars project from first concrete placement a length equal to or greater than the minimum lap splice length indicated on the Drawings.
 - 3) Where lap splice lengths are not indicated on the Drawings, provide lap splice lengths in accordance with ACI 318 and ACI 350.
- f. Bar supports:
 - 1) Provide a sufficient number to prevent sagging, to prevent shifting, and to support loads during construction; but in no case less than quantities and at locations as indicated in ACI 315.
 - 2) Do not use brick, broken concrete masonry units, spalls, rocks, wood or similar materials for supporting reinforcing steel.
 - 3) Do not use give away bars that have less cover than required by the Contract Documents. Do not adjust location of reinforcement required by the Contract Documents to provide cover to the giveaway bars.
- g. If not indicated on the Drawings, provide protective concrete cover in accordance with ACI 318 and ACI 350.

Tying of bar reinforcement:

- h. Fasten bars securely in place with wire ties.
- i. Tie bars sufficiently often to prevent shifting.
- j. Provide at least 3 ties in each bar length. Do not apply to dowel lap splices or to bars shorter than 4 feet, unless necessary for rigidity.
- k. Tie slab bars at every intersection around periphery of slab.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

- l. Tie wall bars and slab bar intersections other than around periphery at not less than every fourth intersection, but at not greater than following maximum spacings:

Bar Size	Slab Bar Spacing Inches	Wall Bar Spacing Inches
Bars Number 5 and Smaller	60	48
Bars Number 6 through Number 9	96	60
Bars Number 10 and Number 11	120	96

- m. After tying wire ties, bend ends of wire ties in towards the center of the concrete section.
1) The cover for wire ties shall be the same as the cover requirements for reinforcing bars.

Welded wire fabric reinforcement:

- n. Install necessary wiring, spacing chairs, or supports to keep welded wire fabric in place while concrete is being placed.
o. Bend fabric as indicated on the Drawings or required to fit work.
p. Unroll or otherwise straighten fabric to make flat sheet before placing in the Work.
q. Lap splice welded wire fabric as indicated on the Drawings.
r. If lap splice length is not indicated on the Drawings, splice fabric in accordance with ACI 318 and ACI 350.

79-7 CAST-IN-PLACE CONCRETE

79-7.01 GENERAL

79-7.01A Summary

This section includes specifications for cast-in-place concrete pipe.

Except as otherwise specified, provide concrete composed of portland cement, fly ash, fine aggregate, coarse aggregate, admixtures and water so proportioned and mixed as to produce plastic, workable mixture in accordance with requirements as specified in this Section and suitable to specific conditions of placement.

Proportion materials in a manner that will secure lowest water-cementitious materials ratio that is consistent with good workability, plastic and cohesive mixture, and a mixture that is within specified slump range.

Proportion fine and coarse aggregates in manner such as not to produce harshness in placing or honeycombing.

It is the intent of this Section to secure for every part of the Work concrete with homogeneous mixture, which when hardened will have required strength, watertightness, and durability:

It is recognized that some surface hairline cracks and crazing will develop in the concrete surfaces.

Construction, and expansion joints have been specified and positioned in structures as indicated on the Drawings, and curing methods specified, for purpose of reducing number and size of cracks, due to normal expansion and contraction expected from specified concrete mixes.

Repair cracks which develop in walls or slabs and repair cracks which show any signs of leakage until all leakage is stopped.

Walls or slabs, as specified above, that leak or sweat because of porosity or cracks too small for successful pressure injection with epoxy: Seal on water or weather side by coatings of surface sealant system, as specified in this Section.

Pressure injection and sealing: Continue as specified above until structure is watertight and remains watertight for not less than 1 year after final acceptance or date of final repair, whichever occurs later in time.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

Workmanship and methods: Provide concrete work, including detailing of reinforcing, conforming with best standard practices and as set forth in ACI 318, ACI 350, Manual of Concrete Practices, and recommended practices.

79-7.01B References and Definitions

- A. American Concrete Institute (ACI):
 - 1. 305 - Hot Weather Concreting Standard.
 - 2. 306 - Cold Weather Concreting Standard.
 - 3. 318 - Building Code Requirements for Structural Concrete and Commentary.
 - 4. 350 - Code Requirements for Environmental Engineering Concrete Structures and Commentary.
 - 5. Manual of Concrete Practice.
- B. ASTM International (ASTM):
 - 1. C 31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 - 2. C 33 - Standard Specification for Concrete Aggregates.
 - 3. C 39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - 4. C 40 - Standard Test Method for Organic Impurities in Fine Aggregates for Concrete.
 - 5. C 42 - Standard Test Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
 - 6. C 88 - Standard Test Method of Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
 - 7. C 94 - Standard Specification for Ready-Mixed Concrete.
 - 8. C 114 - Standard Test Methods for Chemical Analysis of Hydraulic Cement.
 - 9. C 117 - Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing.
 - 10. C 123 - Standard Test Method for Lightweight Particles in Aggregate.
 - 11. C 131 - Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
 - 12. C 136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - 13. C 142 - Standard Test Method for Clay Lumps and Friable Particles in Aggregate.
 - 14. C 143 - Standard Test Method for Slump of Hydraulic-Cement Concrete.
 - 15. C 150 - Standard Specification for Portland Cement.
 - 16. C 156 - Standard Test Method for Water Loss [from a Mortar Specimen] Through Liquid Membrane-Forming Curing Compounds for Concrete.
 - 17. C 157 - Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete.
 - 18. C 171 - Standard Specifications for Sheet Materials for Curing Concrete.
 - 19. C 172 - Standard Practice for Sampling Freshly Mixed Concrete.
 - 20. C 173 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
 - 21. C 260 - Standard Specification for Air-Entraining Admixtures for Concrete.
 - 22. C 289 - Standard Test Method for Potential Alkali-Silica Reactivity of Aggregates (Chemical Method).
 - 23. C 295 - Standard Guide to Petrographic Examination of Aggregates for Concrete.
 - 24. C 309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - 25. C 311 - Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use in Portland-Cement Concrete.
 - 26. C 494 - Standard Specification for Chemical Admixtures for Concrete.
 - 27. C 618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
 - 28. D 75 - Standard Practice for Sampling Aggregates.
 - 29. D 2103 - Standard Specification for Polyethylene Film and Sheeting.
- C. NSF International (NSF):
 - 1. 61 - Drinking Water System Components - Health Effects.

Alkali: Sum of sodium oxide and potassium oxide calculated as sodium oxide.

Cementitious materials: Portland cement and fly ash.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

Cold weather: A period when for more than 3 consecutive days, the average daily outdoor temperature drops below 40 degrees Fahrenheit. The average daily temperature is the average of the highest and lowest temperatures during the period from midnight to midnight. When temperatures above 50 degrees Fahrenheit occur during more than half of any 24-hour duration, the period shall no longer be regarded as cold weather.

Cold weather concreting: Operations for placing, finishing, curing, and protection of concrete during cold weather.

Green concrete: Concrete with less than 100 percent of the specified strength.

Hairline crack: Crack with a crack width of less than 4 thousandths of an inch.

Hot weather: A period when project conditions such as low humidity, high temperature, solar radiation, and high winds, promote rapid drying of freshly placed concrete.

Hot weather concreting: Operations for placing, finishing, curing, and protection of concrete during hot weather.

79-7.01C Submittals

- A. Cement mill tests: Include alkali content, representative of each shipment of cement for verification of compliance with specified requirements.
- B. Cold weather concreting:
 - Procedures for the production, transportation, placement, protection, curing, and temperature monitoring for concrete during cold weather.
 - Procedures to be implemented upon abrupt changes in weather conditions or equipment failures.
- C. Concrete mixes: Full details, including mix design calculations for concrete mixes proposed for use for each class of concrete:
 - Include information on correction of batching for varying moisture contents of fine aggregate.
 - Source quality test records with mix design submittal must include calculations for required compressive strength (f'cr) based on source quality test records.
- D. Concrete aggregate tests: Certified copies in triplicate of commercial laboratory tests not more than 90 days old of all samples of concrete aggregates:
 - Coarse aggregate:
 - a. Abrasion loss.
 - b. Clay lumps and friable particles.
 - c. Coal and lignite.
 - d. Materials finer than 200 sieve.
 - e. Reactivity.
 - f. Shale and chert.
 - g. Soundness.
 - Fine aggregate:
 - h. Clay lumps.
 - i. Color.
 - j. Decantation.
 - k. Reactivity.
 - l. Shale and chert.
 - m. Soundness.
- E. Drying shrinkage test data.
- F. Fine or coarse aggregate batched from more than 1 bin: Analyses for each bin, and composite analysis made up from these, using proportions of materials to be used in mix.
- G. Fly ash Certificate of Compliance: Identify source of fly ash and certify compliance in accordance with ASTM C 618.
- H. For conditions that promote rapid drying of freshly placed concrete such as low humidity, high temperature, and wind: Corrective measures for use prior to placing concrete.
- I. Hot weather concreting: Procedures for production, placement, finishing, curing, protection, and temperature monitoring for concrete during hot weather and appropriate corrective measures.
- J. Heating equipment for cold weather concreting: Information on type of equipment used for heating materials and new concrete in process of curing during excessively cold weather.
- K. Information on mixing equipment.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

- L. Product data: Submit data completely describing products.
- M. Sequence of concrete placing: Submit proposed sequence of placing concrete showing proposed beginning and ending of individual placements.
- N. Sieve analysis: Submit sieve analyses of fine and coarse aggregates being used in triplicate at least every 3 weeks and at any time there is significant change in grading of materials.
- O. Trial batch test data:
 - Submit data for each test cylinder.
 - Submit data that identifies mix and slump for each test cylinder.
- P. Weather monitoring: Records of:
 - Relative humidity.
 - Site ambient temperature.
 - Wind speed.
- Q. Temperature of freshly placed concrete.

79-7.01D Quality Assurance

- A. Monitoring weather conditions:
 - Install an outdoor weather station capable of measuring and recording ambient temperature, wind speed, and humidity. Furnish instruments accurate to within 2 degrees Fahrenheit, 5 percent relative humidity, and 1 mile per hour wind speed.
 - Measure and record temperature of fresh concrete. Furnish and use sufficient number of maximum and minimum self-recording thermometers to adequately measure temperature of concrete.
 - Monitor and keep records of the weather forecast starting at least 48 hours prior to placing concrete in order to allow enough time for taking appropriate measures pertaining to Hot or Cold weather concreting.
- B. Hot weather concreting:
 - Initiate evaporation control measures when concrete and air temperatures, relative humidity of the air, and the wind velocity have the capacity to evaporate water from a free surface at a rate that is equal to or greater than 0.2 pounds per square feet per hour. Determine evaporation rate using the Menzel Formula and monograph in ACI 305 3.1.3.
 - When ambient air temperature is above 85 degrees Fahrenheit: Prior to placing concrete, cool forms and reinforcing steel by water cooling to below 90 degrees Fahrenheit.
 - Monitor weather conditions at the site including air temperature, humidity, and wind speed, to assess the need for evaporation control measures begin monitoring site conditions no later than 1 hour before the start of concrete placement. Continue to monitor site conditions at intervals of 30 minutes until concrete curing has begun.
 - Temperature of concrete mix at time of placement: Keep temperature below 90 degrees Fahrenheit by methods which do not impair quality of concrete.
 - For conditions that promote rapid drying of freshly placed concrete such as low humidity, high temperature, and wind: Take corrective measures to minimize rapid water loss from concrete: Furnish and use sufficient number of maximum and minimum self-recording thermometers to adequately measure temperature around concrete.
- C. Cold weather concreting:
 - Concrete placed below ambient air temperature of 45 degrees Fahrenheit and falling or below 40 degrees Fahrenheit: You must make provision for heating water.
 - Follow recommendations of ACI 306 for preparation, placement, and protection of concrete during cold weather.
 - If materials have been exposed to freezing temperatures to degree that any material is below 35 degrees Fahrenheit: Heat such materials.
 - Heating water, cement, or aggregate materials: Do not heat in excess of 160 degrees Fahrenheit.
- D. Protection of concrete in forms:
 - Do not remove forms from concrete when outside ambient air temperature is below 50 degrees Fahrenheit until concrete has attained its minimum specified compressive strength. Evidence of strength shall be based on by testing of cylinders stored in the field under equivalent conditions to those at the concrete structure.
 - Protect by means of covering with tarpaulins, or other acceptable covering acceptable to Engineer.
 - Provide means for circulating warm moist air around forms in manner to maintain temperature of 50 degrees Fahrenheit for at least 5 days.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

79-7.02 MATERIALS

79-7.02A General

A. Admixtures:

General:

- a. Do not use admixtures of any type, except as specified, unless written acceptance has been obtained from the Engineer.
- b. Admixtures shall be compatible with concrete and other admixtures. Admixtures other than pozzolans shall be the products of a single manufacture to ensure compatibility.
- c. Do not use admixtures containing chlorides calculated as chloride ion in excess of 0.5 percent by weight of cement.
- d. Use in accordance with manufacturer's recommendations. Add each admixture to concrete mix separately.

Air entraining admixture:

- e. Provide concrete with 5 percent, within 1 percent, entrained air of evenly dispersed air bubbles at time of placement.
- f. In accordance with ASTM C 260.

Water reducing admixture:

- g. May be used at the Contractor's option.
- h. In accordance with ASTM C 494, Type A or Type D.
- i. Not contain air-entraining agents.
- j. Liquid form before adding to the concrete mix.
- k. No decrease in cement is permitted as result of use of water reducing admixture.

Superplasticizers: Are not to be used without acceptance by Engineer.

B. Aggregate:

General:

- a. Provide concrete aggregates that are sound, uniformly graded, and free of deleterious material in excess of allowable amounts specified.
- b. Grade aggregate in accordance with ASTM C 136 and D 75.
- c. Provide unit weight of fine and coarse aggregate that produces in place concrete with weight of not less than 140 pounds per cubic foot.
- d. Do not use aggregate made from recycled materials such as crushed and screened hydraulic-cement concrete, brick, and other construction materials.

Fine aggregate:

- e. Provide fine aggregate for concrete or mortar consisting of clean, natural sand or of sand prepared from crushed stone or crushed gravel.
- f. Except as otherwise specified, grade fine aggregate from coarse to fine in accordance with ASTM C 33.
- g. Do not provide aggregate having deleterious substances in excess of following percentages by weight of contaminating substances.
 - 1) In no case shall total exceed percent listed.

<u>Item</u>	<u>Test Method</u>	<u>Percent</u>
Removed by decantation (dirt, silt, etc.)	ASTM C 117	3
Shale or Chert	ASTM C 123 ASTM C 295*	1 1
Clay Lumps	ASTM C 142	1

* Test Method C 123 is used to identify particles in the sample lighter than 2.40 Specific Gravity. Test Method C 295 is used to identify which of the lightweight particles are shale or chert. If the results of Test Method C 123 are less than 1 percent, Test Method C 295 is not required.

Coarse aggregate:

- h. Provide coarse aggregate consisting of gravel or crushed stone made up of clean, hard, durable particles free from calcareous coatings, organic matter, or other foreign substances.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

- i. Not exceeding 15 percent by weight, of thin or elongated pieces having length greater than 5 times average thickness.
- j. Deleterious substances: Not in excess of following percentages by weight, and in no case having total of all deleterious substances exceeding 2 percent.

<u>Item</u>	<u>Test Method</u>	<u>Percent</u>
Shale or chert	ASTM C 123 ASTM C 295**	1.25 1
Coal and lignite	ASTM C 123	1/4
Clay lumps and friable particles	ASTM C 142	1/4
Materials finer than Number 200 sieve	ASTM C 117	1/2*

*Except when material finer than Number 200 sieve consists of crusher dust, maximum amount shall be 1 percent.

** Test Method C 123 is used to identify particles in the sample lighter than 2.40 Specific Gravity. Test Method C 295 is used to identify which of the lightweight particles are shale, chert, coal, or lignite. If the results of Test Method C 123 are less than 1.25 percent (the minimum combined percentage of shale, chert, coal and lignite), Test Method C 295 is not required.

- k. Grading:
 - 1) Aggregate for Class A, B, C, and D concrete: In accordance with ASTM C 33, Size Number 57, except as otherwise specified or authorized in writing by the Engineer.
 - 2) Aggregate for Class CE concrete for encasement of electrical conduits must be graded in accordance with ASTM C 33, Size Number 8.

Concrete sealer:

- l. Manufacturers: One of the following or equal:
 - 1) Euclid Chemical Company: Diamond Hard.
 - 2) L&M Construction Chemicals: SealHard.

Conduit encasement coloring agent:

- m. Color: Red color concrete used for encasement of electrical ducts, conduits, and similar type items.
- n. Manufacturers: One of the following or equal:
 - 1) Davis Company, #100 Utility Red.
 - 2) I. Reiss Company, Inc., equivalent product.
 - 3) Euclid Chemical Company, Increte Division, "Colorcrete Brick Red."
- o. Conduit encasement concrete: Mix into each cubic yard of concrete 10 pounds of coloring agent.

Evaporation retardant:

- p. Manufacturers: One of the following or equal:
 - 1) BASF, Cleveland, Ohio, Confilm.
 - 2) Euclid Chemical Company, Cleveland, Ohio, Eucobar.

Fly ash:

- q. Fly ash in accordance with ASTM C 618, Class F, may be used in concrete made with Type II portland cement.
- r. Maximum of 15 percent by weight of fly ash to total weight of cementitious materials.
 - 1) The total weight of cementitious materials shall not be less than minimum cementitious materials listed in Table A.
- s. Do not use in concrete made with portland-pozzolan cement.
- t. Loss on ignition: Not exceed 4 percent.
- u. In accordance with NSF 61.

Keyway material: Steel, plastic, or lumber.

Nonslip abrasive:

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

- v. Aluminum oxide abrasive size 8/16, having structure of hard aggregate that is, homogenous, nonglazing, rustproof, and unaffected by freezing, moisture, or cleaning compounds.
- w. Manufacturers: One of the following or equal:
 - 1) Exolon Company, Tonawanda, New York.
 - 2) Abrasive Materials, Incorporated, Hillsdale, Michigan.
 - 3) "Non-Slip Aggregate", Euclid Chemical Company, Cleveland, Ohio.

Portland cement:

- x. Conform to specifications and tests in accordance with ASTM C 150, Types II or III, low alkali, except as specified otherwise.
- y. Have total alkali containing not more than 0.60 percent.
- z. Exposed concrete in any individual structure: Use only one brand of portland cement.
- aa. Cement for finishes or repairs: Provide cement from same source and of same type as concrete to be finished or repaired.
- bb. In accordance with NSF 61.

Sheet membrane for curing:

- cc. Polyethylene film:
 - 1) In accordance with ASTM C 171.
 - 2) Color: White.
 - 3) Thickness: Nominal thickness of polyethylene film shall not be less than 0.0040 inches when measured in accordance with ASTM D 2103. Thickness of polyethylene film at any point shall not be less than 0.0030 inches.
 - 4) Loss of moisture: Not exceed 0.055 grams per square centimeter of surface when tested in accordance with ASTM C 156.

Sprayed membrane curing compound: Clear type with fugitive dye in accordance with ASTM C 309, Type 1D.

Surface sealant system: Manufacturers: One of the following or equal:

- dd. Radcon Laboratories, Inc., Las Vegas, Nevada, Formula Number 7.
- ee. IPA Systems, Philadelphia, Pennsylvania, Duripal.

Water:

- ff. Water for concrete, Washing Aggregate, and Curing Concrete: Clean and free from oil and deleterious amounts of alkali, acid, organic matter, or other substances.
- gg. Chlorides and sulfate ions:
 - 1) Water for conventional reinforced concrete: Use water containing not more than 1,000 milligrams per liter of chlorides calculated as chloride ion, nor more than 1,000 milligrams per liter of sulfates calculated as sulfate ion.
 - 2) Water for prestressed or post-tensioned concrete: Use water containing not more than 650 milligrams per liter of chlorides calculated as chloride ion, or more than 800 milligrams per liter of sulfates calculated as sulfate ion.

79-7.02B Equipment

A. Mixing concrete:

Mixers may be of stationary plant, paver, or truck mixer type.

Provide adequate equipment and facilities for accurate measurement and control of materials and for readily changing proportions of material.

Mixing equipment:

- a. Capable of combining aggregates, cementitious materials, and water within specified time into thoroughly mixed and uniform mass and discharging mixture without segregation.
- b. Maintain concrete mixing plant and equipment in good working order and operated at loads, speeds, and timing recommended by manufacturer or as specified.
- c. Proportion cementitious materials and aggregate by weight.

B. Machine mixing:

Batch plant shall be capable of controlling delivery of all material to mixer within 1 percent by weight of individual material.

If bulk cementitious materials are used, weigh them on separate visible scale which will accurately register scale load at any stage of weighing operation from zero to full capacity.

Prevent cementitious materials from coming into contact with aggregate or with water until materials are in mixer ready for complete mixing with all mixing water.

Procedure of mixing cementitious materials with sand or with sand and coarse aggregate for delivery to project site, for final mixing and addition of mixing water will not be permitted.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

Retempering of concrete will not be permitted.

Discharge entire batch before recharging.

Volume of mixed material per batch: Not exceed manufacturer's rated capacity of mixer.

Mixers:

- a. Perform mixing in batch mixers of acceptable type.
- b. Equip each mixer with device for accurately measuring and indicating quantity of water entering concrete, and operating mechanism such that leakage will not occur when valves are closed.
- c. Equip each mixer with device for automatically measuring, indicating, and controlling time required for mixing:
 - 1) Interlock device to prevent discharge of concrete from mixer before expiration of mixing period.

C. Transit-mixed concrete:

Mix and deliver in accordance with ASTM C 94.

Total elapsed time between addition of water at batch plant and discharging completed mix:

- a. Not to exceed 90 minutes.
- b. Elapsed time at project site shall not exceed 30 minutes.

Under conditions contributing to quick setting, total elapsed time permitted may be reduced by the Engineer.

Equip each truck mixer with device interlocked to prevent discharge of concrete from drum before required number of turns and furnish device that is capable of counting number of revolutions of drum.

Continuously revolve drum after it is once started until it has completely discharged its batch:

- c. Do not add water until drum has started revolving.
- d. Right is reserved to increase required minimum number of revolutions or to decrease designated maximum number of revolutions allowed, if necessary, to obtain satisfactory mixing. The Contractor will not be entitled to additional compensation because of such increase or decrease.

D. Other types of mixers: In case of other types of mixers, mixing shall be as follows:

Mix concrete until there is uniform distribution of materials, and discharge mixer completely before recharging.

Neither speed nor volume loading of mixer shall exceed manufacturer's recommendations.

Continue mixing for minimum of 1-1/2 minutes after all materials are in drum, and for batches larger than 1 cubic yard increase minimum mixing time 15 seconds for each additional cubic yard or fraction thereof.

79-7.02C Mixes

A. Measurements of materials:

Measure materials by weighing, except as otherwise specified or where other methods are specifically authorized in writing by the Engineer.

Furnish apparatus for weighing aggregates and cementitious materials that is suitably designed and constructed for this purpose.

Accuracy of weighing devices: Furnish devices that have capability of providing successive quantities of individual material that can be measured to within 1 percent of desired amount of that material.

Measuring or weighing devices: Subject to review by the Engineer. Shall bear valid seal of the Sealer of Weights and Measures having jurisdiction.

Weighing cementitious materials:

- a. Weigh cementitious materials separately.
- b. Cement in unbroken standard packages (sacks): Need not be weighed.
- c. Weigh bulk cementitious materials and fractional packages.

Measure mixing water by volume or by weight.

B. Concrete proportions and consistency:

Provide concrete that can be worked readily into corners and angles of forms and around reinforcement without excessive vibration and without permitting materials to segregate or free water to collect on surface.

Prevent unnecessary or haphazard changes in consistency of concrete.

Ratio of coarse aggregate to fine aggregate: Not less than 1.0 or more than 2.0 for all concrete Classes, with exception of Class CE.

Aggregate:

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

- a. Obtain aggregate from source that is capable of providing uniform quality, moisture content, and grading during any single day's operation.
Maximum concrete mix water to cementitious materials ratio, minimum cementitious materials content, and slump range: Conform to values specified in Table A in this Section.
Concrete batch weights: Control and adjust to secure maximum yield. At all times, maintain proportions of concrete mix within specified limits.
Mix modification: If required, by the Engineer, modify mixture within limits set forth in this Section.
- C. Concrete mixes:
Proportioning of concrete mix: Proportion mixes based on required compressive strength f'_{cr} .
Mixes:
- a. Adjusting of water: After acceptance, do not change mixes without acceptance by Engineer, except that at all times adjust batching of water to compensate for free moisture content of fine aggregate.
 - b. Total water content of each concrete class: Not exceed those specified in Table A in this Section.
 - c. Checking moisture content of fine aggregate: Furnish satisfactory means at batching plant for checking moisture content of fine aggregate.
- Change in mixes: Submit new mix design and perform new trial batch and test program as specified in this Section.
- D. Classes of concrete:
Provide concrete consisting of 5 classes: Classes A, B, C, D, and CE. Use where specified or indicated on the Drawings.
Weight of concrete classes: Provide classes of concrete having minimum weight of 140 pounds per cubic foot.
Class B concrete: Class B concrete may be substituted for Class A concrete, when high-early strength concrete is needed in areas specifically accepted by the Engineer and that do not require sulfate resistant concrete.
Class C concrete: Class C concrete may be used for fill for unauthorized excavation, for thrust blocks and ground anchors for piping, for bedding of pipe, and where indicated on the Drawings.
Class D concrete: Use Class D for precast concrete items.
Class CE concrete: Use Class CE for electrical conduit encasements.
All other concrete, unless specified or otherwise indicated on the Drawings: Use Class A concrete.

**TABLE A
CONCRETE
WITH AIR ENTRAINMENT**

Class	Specified Compressive Strength f'_c at 28 Days (Pounds per Square Inch)	Water-to-Cementitious Materials Ratio	Cementitious Materials per Cubic Yard of Concrete by Weight (Pounds)	Slump Range (Inches)
A	4,000	0.40 to 0.45	564 to 658	2 to 4
B (Type III cement)	4,000	0.40 to 0.45	564 to 658	2 to 4
C	2,500	Maximum 0.62	Minimum 423	3 to 6
D	4,500	0.40 to 0.45	564 to 658	2 to 4
CE	2,500	Maximum 0.62	Minimum 564	3 to 6

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

TABLE A CONCRETE WITHOUT AIR ENTRAINMENT				
Class	Specified Compressive Strength f'_c at 28 Days (Pounds per Square Inch)	Water-to-Cementitious Materials Ratio	Cementitious Materials per Cubic Yard of Concrete by Weight (Pounds)	Slump Range (Inches)
A	4,000	0.40 to 0.53	564 to 658	2 to 4
B (Type III cement)	4,000	0.40 to 0.53	564 to 658	2 to 4
C	2,500	Maximum 0.71	Minimum 423	3 to 6
D	4,500	0.40 to 0.45	564 to 658	2 to 4
CE	2,500	Maximum 0.71	Minimum 564	3 to 6

TABLE A CONCRETE				
Class	Specified Compressive Strength f'_c at 28 Days (Pounds per Square Inch)	Water-to-Cementitious Materials Ratio	Cementitious Materials per Cubic Yard of Concrete by Weight (Pounds)	Slump Range (Inches)
A	3,500	0.40 to 0.58	564 to 658	2 to 4
B (Type III cement)	3,500	0.40 to 0.58	564 to 658	2 to 4
C	2,500	Maximum 0.71	Minimum 423	3 to 6
D	4,500	0.40 to 0.45	564 to 658	2 to 4
CE	2,500	Maximum 0.71	Minimum 564	3 to 6

Pumped concrete: Provide pumped concrete that complies with all requirements of this Section. Do not place concrete with slump outside limits indicated in Table A.

Classes:

- a. Classes A, C, D, and CE concrete: Make with Type II low alkali portland cement.
- b. Class B concrete: Make with Type III low alkali portland cement.
- c. Admixtures: Provide admixtures as specified in this Section.

E. Air entraining admixture:

Add agent to batch in portion of mixing water.

Batch solution by means of mechanical batcher capable of accurate measurement.

79-7.02D Source Quality

A. Tests:

Trial batches:

- a. After concrete mix designs have been accepted by Engineer, have trial batches of the accepted Class A, Class B, and Class D concrete mix designs prepared by testing laboratory acceptable to the Engineer.
- b. Prepare trial batches using cementitious materials and aggregates proposed to be used for the Work.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

- c. Prepare trial batches with sufficient quantity to determine slump, workability, consistency, and finishing characteristics, and to provide sufficient test cylinders.
- d. Test cylinders: Provide cylinders having 6-inch diameter by 12-inch length and that are prepared in accordance with ASTM C 31 for tests specified in this Section.
- e. Determine slump in accordance with ASTM C 143.
- f. Test cylinders from trial batch:
 - 1) Test 8 cylinders for compressive strength in accordance with ASTM C 39:
 - a) Test 4 cylinders at 7 days and 4 at 28 days.
 - b) Establish ratio between 7 day and 28 day strength for mix. 7-day strength may be taken as satisfactory indication of 28-day strength provided effects on concrete of temperature and humidity between 7 day and 28 day are taken into account.
 - 2) Average compressive strength of 4 test cylinders tested at 28 days: Equal to or greater than required average compressive strength (f'_{cr}) on which concrete mix design is based.
- g. If trial batch tests do not meet specified requirements for slump, strength, workability, consistency, drying shrinkage, and finishing, change concrete mix design proportions and, if necessary, source of aggregate.
 - 1) Perform additional trial batches and tests until an acceptable trial batch is produced that meets requirements of this Section.
- h. Perform test batches and tests required to establish trial batches and acceptability of materials without change in Contract Price.
- i. Do not place concrete until the concrete mix design and trial batch have been accepted by Engineer.

Required average compressive strength:

- j. Determine required average compressive strength (f'_{cr}) for selection of concrete proportions for mix design, for each class of concrete, using calculated standard deviation for its corresponding specified compressive strength (f'_c) in accordance with ACI 318 and ACI 350.
- k. When test records of at least 30 consecutive tests that span period of not less than 45 calendar days are available, establish standard deviation as in accordance with ACI 318 and ACI 350 and as modified in this Section.
- l. Provide test records from which to calculate standard deviation that represent materials, quality control procedures, and conditions similar to materials, quality control procedures, and conditions expected to apply in preparation of concrete for the Work.
- m. Provide test records with materials and proportions that are more restricted than those for the Work.
- n. Specified compressive strength (f'_c) of concrete used in test records: Within 1,000 pounds per square inch of that specified for the Work.
- o. When lacking adequate test records for calculation of standard deviation meeting requirements, determine required average compressive strength f'_{cr} from following Table B.

TABLE B	
REQUIRED AVERAGE COMPRESSION STRENGTH	
Specified Compressive Strength f'_c (pounds per square inch)	Required Average Compressive Strength f'_{cr} (pounds per square inch)
Less than 3,000	$f'_c + 1,000$
3,000 to 5,000	$f'_c + 1,200$
Over 5,000	$1.10f'_c + 700$

Aggregate:

- p. Testing of concrete aggregate is at Contractor's expense.
- q. If there is change in aggregate source or if there is a significant change in aggregate quality or sieve analysis from same source, submit new set of design mixes covering each class of concrete and prepare new trial batches before further placing of concrete.
- r. Sieves: Use sieves with square openings for testing grading of aggregates.
- s. Sample aggregate in accordance with ASTM C 136 and D 75.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

- t. Fine aggregate:
 - 1) Provide fine aggregate that does not contain strong alkali nor organic matter which gives color darker than standard color when tested in accordance with ASTM C 40.
 - 2) Provide aggregate having soundness in accordance with ASTM C 33 when tested in accordance with ASTM C 88.
 - 3) Provide aggregate complying with reactivity requirements in accordance with ASTM C 33 when tested in accordance with ASTM C 289.
- u. Coarse aggregate:
 - 1) Soundness when tested in accordance with ASTM C 88: Have loss not greater than 10 percent when tested with sodium sulfate.
 - 2) Abrasion Loss: Not exceed 45 percent after 500 revolutions when tested in accordance with ASTM C 131.
 - 3) Reactivity: Not exceed limits specified in Appendix of ASTM C 33 when tested in accordance with ASTM C 289.
 - 4) Sample and test fly ash in accordance with ASTM C 311.
 - 5) Portland cement: Determination of alkali content: In accordance with ASTM C 114.

79-7.03 CONSTRUCTION

79-7.02A Installation

- A. Liquid evaporation retardant:

Under conditions that result in rapid evaporation of moisture from the surface of the concrete, immediately after the concrete has been screeded, coat the surface of the concrete with a liquid evaporation retardant.

Apply the evaporation retardant again after each work operation as necessary to prevent drying shrinkage cracks.

Conditions which result in rapid evaporation of moisture may include one or more of the following:

 - a. Low humidity.
 - b. Windy conditions.
 - c. High temperature.
- B. Surface sealant system:

Apply as recommended by manufacturer published instructions.

Where concrete continues to sweat or leak, apply additional coats of surface sealant until the sweating or leaks stop.
- C. Joints and bonding:

As far as practicable construct concrete work as monolith.

Locations of construction, expansion, and other joints are indicated on the Drawings or as specified in this Section.

Construction joints:

 - a. Where construction joints are not indicated on the Drawings, provide construction joints in slabs and walls at intervals not greater than 35 feet.
 - b. In order to preserve strength and watertightness of structures, make no other joints, except as authorized the Engineer.
 - c. At construction joints, thoroughly clean concrete of laitance, grease, oil, mud, dirt, curing compounds, mortar droppings, or other objectionable matter by means of heavy sandblasting.
 - d. Cleaning of construction joints:
 - 1) Wash construction joints free of sawdust, chips, and other debris after forms are built and immediately before concrete or grout placement.
 - 2) Should formwork confine sawdust, chips, or other loose matter in such manner that it is impossible to remove them by flushing with water, use vacuum cleaner for their removal, after which flush cleaned surfaces with water.
 - 3) Provide cleanout hole at base of each wall and column for inspection and cleaning.
 - e. At horizontal joints: As initial placement over cold joints, thoroughly spread bed of cement grout as specified in **Section 03600** (with a thickness of not less than 1/2 inch nor more than 1 inch.

Keyways in joints:

 - f. Provide keyways in joints as indicated on the Drawings.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

- g. Treat lumber keyway material with form release coating, applied in accordance with manufacturer's instructions.

Construction, and expansion Joints:

- h. Constructed where and as indicated on the Drawings.
i. Expansion joint material and other similar materials: As specified in Sections 03150.

Repair of concrete: Where it is necessary to repair concrete by bonding mortar or new concrete to concrete which has reached its initial set, first coat surface of set concrete with epoxy bonding agent as specified in Section 03071.

D. Conveying and placing concrete:

Convey concrete from mixer to place of final deposit by methods that prevent separation or loss of materials.

Use equipment for chuting, pumping, and conveying concrete of such size and design as to ensure practically continuous flow of concrete at delivery end without segregation of materials.

Design and use chutes and devices for conveying and depositing concrete that direct concrete vertically downward when discharged from chute or conveying device.

Keep equipment for conveying concrete thoroughly clean by washing and scraping upon completion of day's placement.

E. Placing concrete:

Place no concrete without prior authorization of the Engineer.

Do not place concrete until:

- a. Reinforcement is secure and properly fastened in its correct position and loose form ties at construction joints have been retightened.
- b. Dowels, bucks, sleeves, hangers, pipes, conduits, anchor bolts, and any other fixtures required to be embedded in concrete have been placed and adequately anchored.
- c. Forms have been cleaned and oiled as specified.

Do not place concrete in which initial set has occurred, or that has been retempered

Do not place concrete during rainstorms or high velocity winds.

Protect concrete placed immediately before rain to prevent water from coming in contact with such concrete or winds causing excessive drying.

Keep sufficient protective covering on hand at all times for protection of concrete.

After acceptance, adhere to proposed sequence of placing concrete, except when specific changes are requested and accepted by the Engineer.

Notify the Engineer in writing of readiness, not just intention, to place concrete in any portion of the work:

- d. Provide this notification in such time in advance of operations, as the Engineer deems necessary to make final inspection of preparations at location of proposed concrete placing.
- e. Place forms, reinforcement, screeds, anchors, ties, and inserts in place before notification of readiness is given to the Engineer.
- f. Depositing concrete:
 - 1) Deposit concrete at or near its final position to avoid segregation caused by rehandling or flowing.
 - 2) Do not deposit concrete in large quantities in one place and work along forms with vibrator or by other methods.
 - 3) Do not drop concrete freely into place from height greater than 5 feet.
 - 4) Use tremies for placing concrete where drop is over 5 feet.
 - 5) Commence placement of concrete on slopes, starting at bottom of slope.

Place concrete in approximately horizontal layers not to exceed 24 inches in depth and bring up evenly in all parts of forms.

Continue concrete placement without avoidable interruption, in continuous operation, until end of placement is reached.

After concrete placement begins, continue concrete placement without significant interruption. Plan and implement precautions to prevent any delay, between layers being placed, from exceeding 20 minutes.

If concrete is to be placed over previously placed concrete and more than 20 minutes has elapsed, spread layer of cement grout not less than 1/2 inch in thickness nor more than 1 inch in thickness over surface before placing additional concrete.

Placement of concrete for slabs, beams, or walkways:

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

- g. If cast monolithically with walls or columns, do not commence until concrete in walls or columns has been allowed to set and shrink.
 - h. Allow set time of not less than 1 hour for shrinkage.
- F. Consolidating concrete:
Place concrete with aid of acceptable mechanical vibrators.
Thoroughly consolidate concrete around reinforcement, pipes, or other shapes built into the work.
Provide sufficiently intense vibration to cause concrete to flow and settle readily into place and to visibly affect concrete over radius of at least 18 inches.
Vibrators:
 - a. Keep sufficient vibrators on hand at all times to vibrate concrete as placed.
 - b. In addition to vibrators in actual use while concrete is being placed, have on hand minimum 1 spare vibrator in serviceable condition.
 - c. Do not place concrete until it has been ascertained that all vibrating equipment, including spares, are in serviceable condition.Take special care to place concrete solidly against forms to leave no voids.
Take every precaution to make concrete solid, compact, and smooth. If for any reason surfaces or interiors have voids or are in any way defective, repair such concrete in manner acceptable to the Engineer.
- G. Footings and slabs on grade:
Do not place concrete on ground or compacted fill until subgrade is in moist condition acceptable to the Engineer.
If necessary, sprinkle subgrade with water not less than 6 or more than 20 hours in advance of placing concrete.
If subgrade becomes dry prior to concrete placement, sprinkle again, without forming pools of water.
Do not place concrete if subgrade is muddy or soft.
- H. Loading concrete:
Green concrete: No heavy loading of green concrete will be permitted.
No backfill shall be placed against concrete walls, connecting slabs, or beams until the concrete has reached the specified strength.
Use construction methods, sequencing, and allow time for concrete to reach adequate strength to prevent overstress of the concrete structure during construction.
- I. Curing concrete:
General:
 - a. Cure concrete by methods specified in this Section.
 - b. Keep concrete continuously moist and at a temperature of at least 50 degrees Fahrenheit for minimum of 7 days after placement.
 - c. Cure concrete to be painted with water or sheet membrane.
 - d. Do not use sprayed membrane curing or sealing compounds on concrete surfaces that are to receive paint or upon which any material is to be bonded.
 - e. Water cure or sheet membrane cure concrete slabs that are specified to be sealed by concrete sealer.
 - f. Cure other concrete by water curing or sprayed membrane curing compound at the Contractor's option.
 - g. Floor slabs may be cured using sheet membrane curing.Water curing:
 - h. Keep surfaces of concrete being water cured constantly and visibly moist day and night for period of not less than 7 days.
 - i. Each day forms remain in place count as 1 day of water curing.
 - j. No further curing credit will be allowed for forms in place after contact has once been broken between concrete surface and forms.
 - k. Do not loosen form ties during period when concrete is being cured by leaving forms in place.
 - l. Flood top of walls with water at least 3 times per day, and keep concrete surfaces moist at all times during 7 day curing period.Sprayed membrane curing compound:
 - m. Apply curing compound to concrete surface after repairing and patching, and within 1 hour after forms are removed.
 - n. If more than 1 hour elapses after removal of forms, do not use curing compound, but use water curing for full curing period.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

- o. If surface requires repairing or painting, water cure such concrete surfaces.
- p. Do not remove curing compound from concrete in less than 7 days.
- q. Curing compound may be removed only upon written request by Contractor and acceptance by Engineer, stating what measures are to be performed to adequately cure concrete.
- r. Take care to apply curing compound to construction joints. Apply to all surfaces along full profile of joints.
- s. After curing period is complete, remove curing compound placed within construction joint profile by heavy sandblasting prior to placing any new concrete.
- t. Contractor's Option: Instead of using curing compound for curing of construction joints, such joints may be water cured.
- u. Apply curing compound by mechanical, power operated sprayer and mechanical agitator that will uniformly mix all pigment and compound.
- v. Apply curing compound in at least 2 coats.
- w. Apply each coat in direction 90 degrees to preceding coat.
- x. Apply curing compound in sufficient quantity so that concrete has uniform appearance and that natural color is effectively and completely concealed at time of spraying.
- y. Continue to coat and recoat surfaces until specified coverage is achieved and until coating film remains on concrete surfaces.
- z. Thickness and coverage of curing compound: Provide curing compound having film thickness that can be scraped from surfaces at any and all points after drying for at least 24 hours.
- aa. The Contractor is cautioned that method of applying curing compound specified in this Section may require more curing compound than normally suggested by manufacturer of curing compound and also more than is customary in the trade.
- bb. Apply amounts specified in this Section, regardless of manufacturer's recommendations or customary practice.
- cc. If the Contractor desires to use curing compound other than specified curing compound, coat sample areas of concrete wall with proposed curing compound and also similar adjacent area with specified compound in specified manner for comparison: If proposed sample is not equal or better, in opinion of the Engineer, in all features, proposed substitution will not be allowed.
- dd. Prior to final acceptance of the work, remove, by sandblasting or other acceptable method, any curing compound on surfaces exposed to view, so that only natural color of finished concrete is visible uniformly over entire surface.

Sheet membrane curing:

- ee. Install sheet membrane as soon as concrete is finished and can be walked on without damage.
- ff. Seal joints and edges with small sand berm.
- gg. Keep concrete moist under sheet membrane.

J. Cold weather concreting:

Preparation before concreting:

- a. Remove snow, ice, and frost from the surfaces, including reinforcement against which the concrete is to be placed.
- b. The subgrade shall be free of frost before concrete placing begins.
- c. Do not place concrete around any embedment that is at a temperature below freezing and is sufficiently massive as to cause the adjacent concrete to freeze.

Placement of concrete:

- d. Placement temperature:
 - 1) The minimum temperature of concrete immediately after placement shall be as specified in Table C.
 - 2) The temperature of concrete as placed shall not exceed the values shown in Table C by more than 20 degrees Fahrenheit.
- e. Protection temperature:
 - 1) Unless otherwise specified, the minimum temperature of concrete during the protection period shall be as shown Table C.
 - 2) Temperatures specified to be maintained during the protection period shall be those measured at the concrete surface, whether the surface is in contact with formwork, insulation, or air.
 - 3) Measure the temperature with a surface measuring device accurate to 2 degrees Fahrenheit.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CTA Contract No. XXX

- 4) Measure the temperature of concrete in each placement at regular time intervals as specified in the contract documents.
- f. Termination of protection:
 - 1) The maximum decrease in temperature measured at the surface of the concrete in a 24-hour period shall not exceed the values listed in Table C
 - 2) Do not exceed these limits until the surface temperature of the concrete is within 20 degrees Fahrenheit of the ambient temperature of surrounding temperatures.
 - 3) When the surface temperature of the concrete is within 20 degrees Fahrenheit of the ambient temperature, all protection may be removed.

Table C		
CONCRETE TEMPERATURE REQUIREMENTS		
Least dimension of section (inches)	Minimum temperature of concrete as placed and maintained during the protection period (degrees Fahrenheit)	Maximum for gradual decrease in surface temperature during any 24 hour period after end of protection period (degrees Fahrenheit)
Less than 12	55	50
12 to less than 36	50	40
36 to 72	45	30
Greater than 72	40	20

- 4) Curing of concrete: Prevent concrete from drying during the required curing period. If water curing is used, terminate use at least 24 hours before any anticipated exposure of the concrete to freezing temperatures.
- 5) Protection of concrete: Combustion heaters: Vent flue gases from combustion heating units to the outside of the enclosures.
- 6) Overheating and drying: Place and direct heaters and ducts to avoid areas of overheating or drying of the concrete surface.
- 7) Maximum air temperature:
 - a) During the protection period, do not expose the concrete surface to air having a temperature more than 20 degrees Fahrenheit above the values shown in Table C unless higher values are required by an accepted curing method.
- 8) Protection against freezing:
 - a) Cure and protect concrete against damage from freezing for a minimum of 3 days, unless otherwise specified.
 - b) Maintain the surface temperature of the concrete as specified in Table C.
 - c) During periods not defined as cold weather, but when freezing temperatures may occur, protect concrete surfaces against freezing for the first 24 hours after placing.

79-7.02B Concrete Finishes

Edges of joints: Provide joints having edges as indicated on the Drawings.

Protect wall and slab surfaces at edges against concrete spatter and thoroughly clean upon completion of each placement.

79-7.02C Field Quality Control

A. Testing of concrete:

During progress of construction, the Owner will have tests made to determine whether the concrete, as being produced, complies with requirements specified.

Tests will be performed in accordance with ASTM C 31, ASTM C 39, and ASTM C 172.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

The Engineer will make and deliver test cylinders to the laboratory and testing expense will be borne by the Owner.

Furnish test equipment.

Make provisions for and furnish concrete for test specimens, and provide manual assistance to the Engineer in preparing said specimens.

Assume responsibility for care of and providing of curing conditions for test specimens in accordance with ASTM C 31.

B. Compressive strength tests:

Test not less than 3 cylinder specimens, 6-inch diameter by 12 inch long, for each 150 cubic yards of each class of concrete with minimum of 3 specimens for each class of concrete placed and not less than 3 specimens for each half-day's placement.

- a. One cylinder will be tested at 7 days for information, and 2 cylinders will be tested at 28 days for acceptance.

C. Slump tests:

Test slump of concrete using slump cone in accordance with ASTM C 143.

Do not use concrete that does not meet specification requirements in regards to slump. Remove such concrete from project site.

Test slump at the beginning of each placement, as often as necessary to keep slump within the specified range, and when requested to do so by the Engineer.

D. Air entrainment tests:

Test percent of entrained air in concrete at beginning of each placement, as often as necessary to keep entrained air within specified range, and when requested to do so by the Engineer.

Do not use concrete that does not meet Specification requirements for air entrainment. Remove such concrete from project site.

Test air entrainment in concrete in accordance with ASTM C 173.

The Engineer may at any time test percent of entrained air in concrete received on project site.

E. Enforcement of strength requirement:

Concrete is expected to reach higher compressive strength than that which is indicated in Table A as specified compressive strength (f'c).

Strength level of concrete: Will be considered acceptable if following conditions are satisfied:

- a. Averages of all sets of 3 consecutive strength test results is greater or equal to specified compressive strength(f'c).
- b. No individual strength test (average of 2 cylinders) falls below specified compressive strength (f'c) by more than 500 pounds per square inch.

Non-compliant tests: Immediately forward copies of non-compliant test reports to all parties on the test report distribution list. Mark test reports to highlight that they represent non-complying results.

Whenever one, or both, of 2 conditions stated above is not satisfied, provide additional curing of affected portion followed by cores taken in accordance with ASTM C 42, ACI 318, and ACI 350 and comply with following requirements:

- c. If additional curing does not bring average of 3 cores taken in affected area to at least specified compressive strength (f'c), designate such concrete in affected area as defective.
- d. The Engineer may require the Contractor to strengthen defective concrete by means of additional concrete, additional reinforcement, or replacement of defective concrete, all of the Contractor's expense.

79-7.02D Defective Work

Remove and replace or repair defective work. Correct defective work as specified. Do not patch, repair, or cover defective work without inspection by the Engineer. Provide repairs having strength equal to or greater than specified concrete for areas involved.

A. Preparation of concrete for repair:

Make no repair until Engineer has accepted method for preparing surface for repair.

Chip out and key imperfections in the work and make them ready for repair.

Surfaces of set concrete to be repaired: First coat with epoxy bonding agent as specified in Section 03071.

B. Methods of repair:

Dry pack method:

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

- a. Use for holes having depth nearly equal to or greater than least surface dimension of hole, for cone-bolt holes, and for narrow slots cut for repair.
 - b. Smooth holes: Clean and roughen by heavy sandblasting before repair.
- Mortar replacement method:
- c. Use for holes too wide to dry pack and too shallow for concrete replacement.
 - d. Comparatively shallow depressions, large or small, which extend no deeper than nearest surface reinforcement.
- Concrete replacement method:
- e. Use when holes extend entirely through concrete section or when holes are more than 1 square foot in area and extend halfway or more through the section.

79-8 MASS CONCRETE

79-8.01 GENERAL

79-8.01A Summary

This section includes specifications for mass concrete.

Store coarse and fine aggregate in a covered area. Shade aggregates to prevent heating by direct sunlight. Store cementitious materials in covered, shaded silos to prevent heating by direct sunlight.

79-8.01BA References and Definitions

- A. American Concrete Institute (ACI):
 - 1. 207.1R - Guide to Mass Concrete.
- B. ASTM International (ASTM):
 - 1. C 494 - Standard Specification for Chemical Admixtures for Concrete.

Mass concrete: Concrete 3 feet or greater in thickness.

Cooling period: The time required for the interior temperature of the concrete placement to stabilize. Minimum of 14 days from the time of placement.

79-8.01C Submittals

- A. Product data.
- B. Thermal Control Plan:

General:

- 1) Submit a Thermal Control Plan signed by a licensed engineer, registered in the state where the project is located. Include the following as a minimum:
 - a) Calculations for maximum concrete temperature and maximum differential concrete temperature for each mass concrete element.
 - b) Concrete mix design.
 - c) Duration and method of curing.
 - d) Procedures to control concrete temperature at time of placement.
 - e) Methods of controlling temperature differentials.
 - f) Temperature sensor types and locations.
 - g) Temperature monitoring and recording system.
 - h) Field measures to ensure conformance with the maximum concrete temperature and maximum temperature differential requirements.
 - i) Corrective measure to take if it appears the specified maximum temperature and differential temperature will be exceeded.
- 2) Have temperature control measures in place during the placement of concrete to limit the maximum initial concrete temperature rise to 20 degrees Fahrenheit.
- 3) Difference in temperature between concrete interior and surface temperatures shall not exceed 35 degrees Fahrenheit.
- 4) Allow the interior of the concrete to cool down and stabilize.
- 5) The maximum allowable concrete temperature: 145 degrees Fahrenheit.
- 6) Do not place mass concrete until the Engineer has accepted in writing, the Thermal Control Plan.

Pre-cooling of concrete:

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

- 7) Cooling of the concrete mix, prior to placement, may be attained by following means:
 - a) Cool batch water. Ice may be substituted for a portion of the batch water.
 - b) Continuously spray coarse aggregate with water to cool the aggregate. Adjust the water content of the concrete mix to account for the cooling water.
 - c) Alternative means proposed by the Contractor and acceptable to the Engineer.

Post-cooling of concrete:

- 8) At Contractor's option, use embedded thin walled piping for circulating water to control temperature gain in the previously cast concrete:
 - a) Clearly indicate in the Thermal Control Plan if cooling piping will be embedded in the concrete.
 - b) Do not install embedded piping within the top 20 inches of the slab or wall.
 - c) Operate cooling pipe system for the duration of the cooling period.
 - d) After use of cooling pipes to cool the concrete is complete, fill pipes with grout.

Misting concrete:

- 9) Use fog sprayers to reduce the ambient air temperature and increase the humidity during concrete placement.

Curing concrete:

- 10) Water cure or plastic membrane cure as soon as possible following placement of concrete as specified in Section 79-703300.
 - a) If water curing is used, use methods that minimize differential concrete temperature.
 - b) Consider the type of curing in the Thermal Control Plan.

C. Temperature Monitoring Program.

Temperature monitoring and recording system:

- 1) Consist of temperature sensors connected to a data acquisition system capable of printing, storing, and downloading data to a computer.
- 2) Locate temperature sensors such that the maximum temperature difference within a mass concrete element can be monitored.
- 3) As a minimum, monitor concrete temperatures at the calculated hottest location, on at least 2 outer faces, 2 corners, and top surfaces.

Temperature readings:

- 4) Automatically recorded on an hourly or more frequent basis.
- 5) Hourly temperature recording may be discontinued when:
 - a) Maximum internal temperature is falling.
 - b) Difference between the interior concrete temperature and the average daily air temperature is less than the allowable temperature difference for 3 consecutive days.
 - c) There are no mass concrete elements to be cast adjacent.
- 6) Print and submit data to the Engineer daily.
- b. Methods of concrete consolidation: Prevent damage to the temperature monitoring and recording system.
 - 1) Protect wiring connected to temperature sensors cast into the concrete to prevent movement.
 - 2) Keep wire runs as short as possible.
 - 3) Do not allow ends of the temperature sensors to come into contact with either a support or concrete form, or reinforcing bar.
- c. When any equipment used in the temperature control and monitoring and recording system fails during the mass concrete construction operation, take immediate measures to correct the situation in accordance with Thermal Control Plan. Failure to conform to the temperature requirements will be cause for rejection of the concrete

D. Temperature monitoring data:

Tabular data of hourly temperature for each temperature sensor.

Tabular data for hourly temperature differential for each temperature sensor.

Plot of temperature and temperature differential for each temperature sensor.

E. Layout of cooling pipe system, if used, showing pipe sizes and material type, connections, location, spacing, method of support, and system for monitoring the temperature of the water in the cooling pipes.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

79-8.02 MATERIALS

79-8.02A General

- A. Concrete admixtures:
Air entraining admixture must be as specified in Section 79-703300.
Retarding admixture:
 a. At the Contractor's option, a set retarding admixture may be used to control set time and minimize premature setting of concrete and formation of cold joints.
 b. As specified in Section 03300.
 c. Dosage: In accordance with manufacturer's written requirements.
Water reducing admixture must be as specified in Section 79-703300.
- B. Coarse aggregate:
As specified in Section 79-703300.
Maximum coarse aggregate size: 1-1/2 inches.
Coarse aggregate grading: In accordance with of Table 2.5.8 of ACI 207.1R.
- C. Fine aggregate must be as specified in Section 79-703300.
- D. Portland cement:
Type II, except as modified in this Section.
Contain no more than 12 percent Tricalcium Aluminate.
Sum of Tricalcium Aluminate and Tricalcium Silicate: Less than 58 percent.
- E. Pozzolan must be as specified in Section 79-703300.
- F. Water and ice:
Mixing water: As specified in Section 79-703300.
Water for making ice: Meet the requirements of mixing water as specified in Section 79-703300.
Ice may be substitute for mixing water on a 1 to 1 ratio based on weight.

79-8.02B Mixes

- A. As specified in Section 79-703300 for Class A concrete, except as modified by this Section.
- B. Concrete mix for mass concrete:
Water-cementitious material ratio: Not to exceed 0.45.
Entrained air content range: 2 to 4 percent.
Slump range: 2 inches to 4 inches.
Pozzolan:
 a. Minimum of 15 percent pozzolan.
 b. Maximum of 25 percent pozzolan.

79-8.03 CONSTRUCTION

79-8.03A General

Concrete placement: As specified in to Section 79-703300 except as modified in this Section.

79-8.03B Field Quality Control

- A. Temperature Monitoring Program:
Install a temperature monitoring system to measure temperatures in the interior and near the surface of the concrete.
Continuously monitor the temperature of the interior of the concrete and surfaces of the concrete during the cooling period.
Temperature monitoring data not conforming to requirements of this Section:
 a. Stop placing mass concrete.
 b. Concrete not conforming to temperature requirements of this Section will be rejected.
 Remove rejected mass concrete at Contractor's expense.
 c. Modify Thermal Control Plan and calculations to correct problem and resubmit.
 d. Do not place mass concrete until revised Thermal Control Plan and calculations have been accepted by Engineer.

79-9 HIGH PERFORMANCE COATING

79-9.01 GENERAL

79-9.01A Summary

This section includes specifications for Field applied coatings.

Where SSPC surface preparation standards are specified or implied for ductile iron pipe or fittings, the equivalent NAPF surface preparation standard shall be substituted for the SSPC standard.

Deliver new unopened containers with labels identifying the manufacturer's name, brand name, product type, batch number, date of manufacturer, expiration date or shelf life, color, and mixing and reducing instructions.

Do not deliver materials aged more than 12 months from manufacturing date.

Store coatings in well-ventilated facility that provides protection from the sun weather, and fire hazards. Maintain ambient storage temperature between 45 and 90 degrees Fahrenheit, unless otherwise recommended by the manufacturer.

79-9.01B References and Definitions

- A. ASTM International (ASTM):
 - 1. D 16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications.
 - 2. D 4541 - Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
- B. NACE International (NACE):
 - 1. SP0178 - Design, Fabrication, and Surface Finish Practices for Tanks and Vessels to Be Lined for Immersion Service.
 - 2. SP0188 - Discontinuity (Holiday) Testing of Protective Coatings.
- C. National Association of Pipe Fabricators (NAPF):
 - 1. 500-03 - Surface Preparation Standard for Ductile Iron Pipe and Fittings Receiving Special External Coatings and/or Special Internal Linings.
- D. NSF International (NSF):
 - 1. 61 - Drinking Water System Components - Health Effects.
- E. Society for Protective Coatings (SSPC):
 - 1. SP COM - Surface Preparation Commentary for Steel and Concrete Substrates.
 - 2. SP-1 - Solvent Cleaning.
 - 3. SP-2 - Hand Tool Cleaning.
 - 4. SP-3 - Power Tool Cleaning.
 - 5. SP-5 - White Metal Blast Cleaning.
 - 6. SP-6 - Commercial Blast Cleaning.
 - 7. SP-7 - Brush-Off Blast Cleaning.
 - 8. SP-10 - Near-White Blast Cleaning.
- F. United States Environmental Protection Agency (EPA):
 - 1. Method 24 - Surface Coatings.

Submerged metal: Steel or iron surfaces below tops of channel or structure walls that will contain water even when above expected water level.

Submerged concrete and masonry surfaces: Surfaces that are or will be:

- 1. Underwater.
- 2. In structures that normally contain water.
- 3. Below tops of walls of water-containing structures.

Exposed surface: Any metal or concrete surface, indoors or outdoors, that is exposed to view.

Dry film thickness (DFT): Thickness of fully cured coating, measured in mils.

Volatile organic compound (VOC): Content of air polluting hydrocarbons in uncured coating product measured in units of grams per liter or pounds per gallon, as determined by EPA Method 24.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

Ferrous: Cast iron, ductile iron, wrought iron, and all steel alloys except stainless steel.

79-9.01C Submittals

- A. General: Submit as specified in Section 5-1.23 of the 2010 Caltrans Standard Specifications.
- B. Shop drawings:
 - 1. Schedule of proposed coating materials.
 - 2. Schedule of surfaces to be coated with each coating material.
- C. Product data: Include description of physical properties of coatings including solids content and ingredient analysis, VOC content, temperature resistance, typical exposures and limitations, and manufacturer's standard color chips:
 - 1. Regulatory requirements: Submit data concerning the following:
 - a. VOC limitations.
 - b. Coatings containing lead compounds and polychlorinated biphenyls .
 - c. Abrasives and abrasive blast cleaning techniques, and disposal.
 - d. NSF certification of coatings for use in potable water supply systems.
- D. Certificates: Submit in accordance with requirements for Product Data.
- E. Manufacturer's instructions: Include the following:
 - 1. Special requirements for transportation and storage.
 - 2. Mixing instructions.
 - 3. Shelf life.
 - 4. Pot life of material.
 - 5. Precautions for applications free of defects.
 - 6. Surface preparation.
 - 7. Method of application.
 - 8. Recommended number of coats.
 - 9. Recommended DFT of each coat.
 - 10. Recommended total DFT.
 - 11. Drying time of each coat, including prime coat.
 - 12. Required prime coat.
 - 13. Compatible and non-compatible prime coats.
 - 14. Recommended thinners, when recommended.
 - 15. Limits of ambient conditions during and after application.
 - 16. Time allowed between coats (minimum and maximum).
 - 17. Required protection from sun, wind, and other conditions.
 - 18. Touch-up requirements and limitations.
 - 19. Minimum adhesion of each system submitted in accordance with ASTM D 4541.
- F. Certifications:
 - 1. Submit notarized certificate that all paints and coatings to be used on this project comply with current federal, state, and local VOC regulations.
- G. California certifications:
 - 1. All paints and coatings to be used on this project comply with the current VOC regulations of the State of California Air Management District in which the coatings will be used.
 - 2. All paints and coatings to be used on this project comply with the South Coast Air Quality Management District Rule 1113 VOC Regulations

79-9.01D Quality Assurance

- A. Applicator qualifications:
 - 1. Minimum of 5 years of experience applying specified type or types of coatings under conditions similar to those of the Work: Provide qualifications of applicator and references listing 5 similar projects completed in the past 2 years.
 - 2. Manufacturer-approved applicator when manufacturer has approved applicator program.
 - 3. Approved and licensed by polymorphic polyester resin manufacturer to apply polymorphic polyester resin coating system.
 - 4. Approved and licensed by elastomeric polyurethane (100-percent solids) manufacturer to apply 100-percent solids elastomeric polyurethane system.
 - 5. Applicator of off-site application of coal-tar epoxy shall have successfully applied coal-tar epoxy on similar surfaces in material, size, and complexity as on the Project.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

- B. Regulatory requirements: Comply with governing agencies regulations by using coatings that do not exceed permissible VOC limits and do not contain lead:
 - 1. Do not use coal-tar epoxy in contact with drinking water or exposed to ultraviolet radiation.
- C. Compatibility of coatings: Use products by same manufacturer for prime coats, intermediate coats, and finish coats on same surface, unless specified otherwise.
- D. Services of coating manufacturer's representative: Arrange for coating manufacturer's representative to attend pre-installation conferences. Make periodic visits to the project site to provide consultation and inspection services during surface preparation and application of coatings, and to make visits to coating plants to observe and approve surface preparation procedures and coating application of items to be "shop-primed and coated."

79-9.02 MATERIALS

A. MANUFACTURERS

- 1. Special coatings: One of the following or equal:
 - a. Carboline: Carboline, St. Louis, MO.
 - b. Devoe: International Protective Coatings, Louisville, KY.
 - c. PPG Amercoat: PPG Protective & Marine Coatings, Brea, CA.
 - d. S-W: Sherwin-Williams Co., Cleveland, OH.
 - e. Tnemec: Tnemec Co., Kansas City, MO.
 - f. ZRC: ZRC Worldwide Innovative Zinc Technologies, Marshfield, MA.

B. PREPARATION AND PRETREATMENT MATERIALS

- 1. Metal pretreatment: As manufactured by one of the following or equal:
 - a. Henkel: Galvaprep 5.
 - b. International: AWLGrip Alumiprep 33.
- 2. Surface cleaner and degreaser: As manufactured by one of the following or equal:
 - a. Carboline Surface Cleaner No. 3.
 - b. Devoe: Devprep 88.
 - c. S-W: Clean and Etch.

C. COATING MATERIALS

- 1. High solids epoxy (self priming) not less than 72-percent solids by volume: As manufactured by one of the following or equal:
 - a. Carboline: Carboguard 891.
 - b. Devoe: Bar Rust 233H.
 - c. PPG Amercoat: Amerlock 2.
 - d. S-W: Macropoxy 646.
 - e. Tnemec: HS Epoxy Series 104.
- 2. Galvanizing zinc compound: As manufactured by one of the following or equal:
 - a. ZRC: Cold Galvanizing Compound.

D. COATING MATERIALS

- 1. High solids epoxy (self priming) not less than 72-percent solids by volume with a mixed applied flash point of 140 degrees Fahrenheit or less: As manufactured by one of the following or equal:
 - a. Carboline:
 - 1) Non-submerged: Carboguard 890 VOC.
 - 2) Submerged: Phenoline 341 (100-percent solids, 2-component epoxy).
 - b. Devoe:
 - 1) Bar Rust 233 Low VOC.
 - 2) Devran 133 (100-percent solids, 2-component epoxy).
 - c. Non-submerged: S-W Macropoxy 646-100.
 - d. PPG Amercoat: Amerlock 2 VOC.
- 2. Galvanizing zinc compound: As manufactured by the following or equal:
 - a. ZRC: Cold Galvanizing Compound.

79-9.03 CONSTRUCTION

79-9.03A Site Conditions

- A. Surface moisture contents: Do not coat surfaces that exceed manufacturer-specified moisture contents, or when not specified by the manufacturer, with the following moisture contents:
 - 1. Plaster and gypsum wallboard: 12 percent.
 - 2. Masonry, concrete, and concrete block: 12 percent.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

3. Interior located wood: 15 percent.
4. Concrete floors: 7 percent.
- B. Do not apply coatings:
 1. Under dusty conditions or adverse environmental conditions, unless tenting, covers, or other such protection is provided for structures to be coated.
 2. When light on surfaces measures less than 15 foot-candles.
 3. When ambient or surface temperature is less than 55 degrees Fahrenheit unless manufacturer allows a lower temperature.
 4. When relative humidity is higher than 85 percent.
 5. When surface temperature is less than 5 degrees Fahrenheit above dew point.
 6. When surface temperature exceeds the manufacturer's recommendation.
 7. When ambient temperature exceeds 90 degrees Fahrenheit, unless manufacturer allows a higher temperature.
 8. Apply clear finishes at minimum 65 degrees Fahrenheit.
- C. Provide fans, heating devices, dehumidifiers, or other means recommended by coating manufacturer to prevent formation of condensate or dew on surface of substrate, coating between coats and within curing time following application of last coat.
- D. Provide adequate continuous ventilation and sufficient heating facilities to maintain minimum 55 degrees Fahrenheit for 24 hours before, during, and 48 hours after application of finishes

79-9.03B General Protection

Protect adjacent surfaces from coatings and damage. Repair damage resulting from inadequate or unsuitable protection.

Protect adjacent surfaces not to be coated from spatter and droppings with drop cloths and other coverings:

Mask off surfaces of items not to be coated or remove items from area.

Furnish sufficient drop cloths, shields, and protective equipment to prevent spray or droppings from fouling surfaces not being coated and, in particular, surfaces within storage and preparation areas.

Place cotton waste, cloths, and material that may constitute a fire hazard in closed metal containers and remove daily from site.

Remove electrical plates, surface hardware, fittings, and fastenings prior to application of coating operations. Carefully store, clean, and replace on completion of coating in each area. Do not use solvent or degreasers to clean hardware that may remove permanent lacquer finish.

79-9.03B General Preparation

- A. Prepare surfaces in accordance with coating manufacturer's instructions, unless more stringent requirements are specified in this Section.
- B. Protect the following surfaces from abrasive blasting by masking or other means:
 1. Threaded portions of valve and gate stems, grease fittings, and identification plates.
 2. Machined surfaces for sliding contact.
 3. Surfaces to be assembled against gaskets.
 4. Surfaces of shafting on which sprockets are to fit.
 5. Surfaces of shafting on which bearings are to fit.
 6. Machined surfaces of bronze trim, including slide gates.
 7. Cadmium-plated items except cadmium-plated, zinc-plated, or sherardized fasteners used in assembly of equipment requiring abrasive blasting.
 8. Galvanized items, unless scheduled to be coated.
- C. Protect installed equipment, mechanical drives, and adjacent coated equipment from abrasive blasting to prevent damage caused by entering sand or dust.
- D. Ferrous metal surfaces:
 1. Remove grease and oil in accordance with SSPC SP-1.
 2. Remove rust, scale, and welding slag and spatter, and prepare surfaces in accordance with appropriate SSPC standard as specified.
 3. Abrasive blast surfaces prior to coating.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

- a. When abrasive blasted surfaces rust or discolor before coating, abrasive blast surfaces again to remove rust and discoloration.
- b. When metal surfaces are exposed because of coating damage, abrasive blast surfaces and feather in to a smooth transition before touching up.
- c. Ferrous metal surfaces not to be submerged: Abrasive blast in accordance with SSPC SP-10, unless blasting may damage adjacent surfaces, prohibited, or specified otherwise. Where not possible to abrasive blast, power tool clean surfaces in accordance with SSPC SP-3.
- d. Ferrous metal surfaces to be submerged: Unless specified otherwise, abrasive blast in accordance with SSPC SP-5 to clean and provide roughened surface profile of not less than 2 mils and not more than 4 mils in depth when measured with Elcometer 123, or as recommended by the coating manufacturer.
- 4. All abrasive blast cleaned surfaces shall be blown down with clean dry air and/or vacuumed.
- E. Ductile iron pipe and fittings to be lined or coated: Abrasive blast clean in accordance with NAPF 500-03.
- F. Sherardized, aluminum, copper, and bronze surfaces: Prepare in accordance with coating manufacturer's instructions.
- G. Galvanized surface:
 - 1. Degrease or solvent clean (SSPC SP-1) to remove oily residue.
 - 2. Power tool or hand tool clean or whip abrasive blast.
 - 3. Test surface for contaminants using copper sulfate solution.
 - 4. Apply metal pretreatment within 24 hours before coating galvanized surfaces that cannot be thoroughly abraded physically, such as bolts, nuts, or preformed channels.
- H. Shop-primed metal:
 - 1. Certify that primers applied to metal surfaces in the shop are compatible with coatings to be applied over such primers in the field.
 - 2. Remove shop primer from metal to be submerged by abrasive blasting in accordance with SSPC SP-10, unless greater degree of surface preparation is required by coating manufacturer's representative.
 - 3. Correct abraded, scratched, or otherwise damaged areas of prime coat by sanding or abrasive blasting to bare metal in accordance with SSPC SP-2, SP-3, or SP-6, as directed by the Engineer.
 - 4. When entire shop priming fails or has weathered excessively (more than 25 percent of the item), or when recommended by coating manufacturer's representative, abrasive blast shop-prime coat to remove entire coat and prepare surface in accordance with SSPC SP-10.
 - 5. When incorrect prime coat is applied, remove incorrect prime coat by abrasive blasting in accordance with SSPC SP-10.
 - 6. When prime coat not authorized by Engineer is applied, remove unauthorized prime coat by abrasive blasting in accordance with SSPC SP-10.
 - 7. Shop applied bituminous paint or asphalt varnish: Abrasive blast clean shop-applied bituminous paint or asphalt varnish from surfaces scheduled to receive non-bituminous coatings.
- I. Cadmium-plated, zinc-plated, or sherardized fasteners: Abrasive blast in the same manner as unprotected metal when used in assembly of equipment designated for abrasive blasting.
- J. Abrasive blast components that are to be attached to surfaces that cannot be abrasive blasted before components are attached.
- K. Grind sharp edges to approximately 1/16-inch radius before abrasive blast cleaning.
- L. Remove and grind smooth all excessive weld material and weld spatter before blast cleaning in accordance with NACE SP0178.
- M. Poly vinyl chloride (PVC) and FRP surfaces: Prepare surfaces to be coated by light sanding (de-gloss) and wipe-down with clean cloths, or by solvent cleaning in strict accordance with coating manufacturer's instructions.
- N. Cleaning of previously coated surfaces:
 - 1. Utilize cleaning agent to remove soluble salts such as chlorides and sulfates from concrete and metal surfaces:
 - a. Cleaning agent: Biodegradable non-flammable and containing no VOC.
 - b. Manufacturer: The following or equal: CHLOR*RID International, Inc.
 - 2. Cleaning of surfaces utilizing the decontamination cleaning agent may be accomplished in conjunction with abrasive blast cleaning, steam cleaning, high-pressure washing, or hand washing as approved by the coating manufacturer's representative and the Engineer.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

3. Test cleaned surfaces in accordance with the cleaning agent manufacturer's instructions to ensure all soluble salts have been removed. Additional cleaning shall be carried out as necessary.
4. Final surface preparation prior to application of new coating system shall be made in strict accordance with coating manufacturer's printed instructions.

79-9.03C General Application Requirements

- A. Apply coatings in accordance with manufacturer's instructions.
- B. Coat metal unless specified otherwise:
 1. Aboveground piping to be coated shall be empty of contents during application of coatings.
- C. Verify metal surface preparation immediately before applying coating in accordance with SSPC SP COM.
- D. Allow surfaces to dry, except where coating manufacturer requires surface wetting before coating.
- E. Wash coat and prime sherardized, aluminum, copper, and bronze surfaces, or prime with manufacturer's recommended special primer.
- F. Prime shop-primed metal surfaces. Spot prime exposed metal of shop-primed surfaces before applying primer over entire surface.
- G. Multiple coats:
 1. Apply minimum number of specified coats.
 2. Apply additional coats when necessary to achieve specified thicknesses.
 3. Apply coats to thicknesses specified, especially at edges and corners.
 4. When multiple coats of same material are specified, tint prime coat and intermediate coats with suitable pigment to distinguish each coat.
 5. Lightly sand and dust surfaces to receive high-gloss finishes, unless instructed otherwise by coating manufacturer.
 6. Dust coatings between coats.
- H. Coat surfaces without drops, overspray, dry spray, runs, ridges, waves, holidays, laps, or brush marks.
- I. Remove spatter and droppings after completion of coating.
- J. Apply coating by brush, roller, trowel, or spray, unless particular method of application is required by coating manufacturer's instructions or these Specifications.
- K. Plural component application: Drums shall be premixed each day. All gauges shall be in working order prior to the start of application. Ratio checks shall be completed prior to each application. A spray sample shall be sprayed on plastic sheeting to ensure set time is complete prior to each application. Hardness testing shall be performed after each application.
- L. Spray application:
 1. Stripe coat edges, welds, nuts, bolts, and difficult-to-reach areas by brush before beginning spray application, as necessary, to ensure specified coating thickness along edges.
 2. When using spray application, apply coating to thickness not greater than that recommended in coating manufacturer's instructions for spray application.
 3. Use airless spray method, unless air spray method is required by coating manufacturer's instruction or these Specifications.
 4. Conduct spray coating under controlled conditions. Protect adjacent construction and property from coating mist, fumes, or overspray.
- M. Drying and recoating:
 1. Provide fans, heating devices, or other means recommended by coating manufacturer to prevent formation of condensate or dew on surface of substrate, coating between coats and within curing time following application of last coat.
 2. Limit drying time to that required by these Specifications or coating manufacturer's instructions.
 3. Do not allow excessive drying time or exposure, which may impair bond between coats.
 4. Recoat epoxies within time limits recommended by coating manufacturer.
 5. When time limits are exceeded, abrasive blast clean and de-gloss clean prior to applying another coat.
 6. When limitation on time between abrasive blasting and coating cannot be met before attachment of components to surfaces that cannot be abrasive blasted, coat components before attachment.
 7. Ensure primer and intermediate coats of coating are unscarred and completely integral at time of application of each succeeding coat.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

8. Touch-up suction spots between coats and apply additional coats where required to produce finished surface of solid, even color, free of defects.
9. Leave no holidays.
10. Sand and feather in to a smooth transition and recoat scratched, contaminated, or otherwise damaged coating surfaces so damages are invisible to the naked eye.

79-9.03D High Solids Epoxy System

A. Preparation:

1. Prepare surfaces in accordance with general preparation requirements and as follows:
 - a. Abrasive blast ferrous metal surfaces to be submerged at jobsite in accordance with SSPC SP-5 prior to coating. When cleaned surfaces rust or discolor, abrasive blast surfaces in accordance with SSPC SP-10.
 - b. Abrasive blast non-submerged ferrous metal surfaces at jobsite in accordance with SSPC SP-10, prior to coating. When cleaned surfaces rust or discolor, abrasive blast surfaces in accordance with SSPC SP-6.
 - c. Abrasive blast clean ductile iron surfaces at jobsite in accordance with SSPC SP-7.

B. Application:

1. Apply coatings in accordance with general application requirements and as follows:
 - a. Apply minimum 2-coat system with minimum total DFT of 12 mils.
 - b. Recoat or apply succeeding epoxy coats within time limits recommended by manufacturer. Prepare surfaces for recoating in accordance with manufacturer's instructions.
 - c. Coat metal to be submerged before installation when necessary, to obtain acceptable finish, and to prevent damage to other surfaces.
 - d. Coat entire surface of support brackets, stem guides, pipe clips, fasteners, and other metal devices bolted to concrete.
 - e. Coat surface of items to be exposed and adjacent 1 inch to be concealed when embedded in concrete or masonry.

79-9.03E High Solids Epoxy and Polyurethane System

A. Preparation:

1. Prepare surfaces in accordance with general preparation requirements and as follows:
 - a. Prepare concrete surfaces in accordance with general preparation requirements.
 - b. Touch up shop-primed steel and miscellaneous iron.
 - c. Abrasive blast ferrous metal surfaces at jobsite prior to coating. Abrasive blast clean rust and discoloration from surfaces.
 - d. Degrease or solvent clean, whip abrasive blast, power tool, or hand tool clean galvanized metal surfaces.
 - e. Lightly sand (de-gloss) fiberglass and PVC pipe to be coated and wipe clean with dry cloths, or solvent clean in accordance with coating manufacturer's instructions.
 - f. Abrasive blast clean ductile iron surfaces.

B. Application:

1. Apply coatings in accordance with general application requirements and as follows:
 - a. Apply a 3-coat system consisting of:
 - 1) Primer: 4 to 5 mils DFT high solids epoxy.
 - 2) Intermediate coat: 4 to 5 mils DFT high solids epoxy.
 - 3) Topcoat: 2.5 to 3.5 mils DFT aliphatic or aliphatic-acrylic polyurethane topcoat.
2. Recoat or apply succeeding epoxy coats within 30 days or within time limits recommended by manufacturer, whichever is shorter. Prepare surfaces for recoating in accordance with manufacturer's instructions.

79-9.03F Schedule of Items Not Requiring Coating

A. General: Unless specified otherwise, the following items do not require coating:

1. Items that have received final coat at factory and are not listed to receive coating in field.
2. Aluminum, brass, bronze, copper, plastic (except PVC pipe), rubber, stainless steel, chrome, Everdur, or lead.
3. Buried or encased piping or conduit.
4. Exterior concrete.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

5. Galvanized steel wall framing, [galvanized roof decking,] galvanized electrical conduits, galvanized pipe trays, galvanized cable trays, and other galvanized items:
 - a. Areas on galvanized items or parts where galvanizing has been damaged during handling or construction shall be repaired as follows:
 - 1) Clean damaged areas by SSPC SP-1, SP-2, SP-3, or SP-7 as required.
 - 2) Apply 2 coats of a galvanizing zinc compound in strict accordance with manufacturer's instructions.
6. Grease fittings.
7. Fiberglass ducting or tanks in concealed locations.
8. Steel to be encased in concrete or masonry.

79-9.03G Schedule of Surfaces to be Coated in the Field

- A. In general, apply coatings to steel, iron, galvanized surfaces, and wood surfaces unless specified or otherwise indicated on the Drawings. Coat concrete surfaces and anodized aluminum only when specified or indicated on the Drawings.
- B. The following schedule is incomplete. Coat unlisted surfaces with same coating system as similar listed surfaces. Verify questionable surfaces.
- C. Metals:
 1. High solids epoxy and polyurethane system: [Interior and] exterior non-immersed ferrous metal surfaces including:
 - a. Pipe, valves, pipe hangers, supports and saddles, conduit, cable tray hangers, and supports.
 - b. Valve and gate operators and stands.
 - c. Structural steel including galvanized structural steel.
 - d. Mechanical equipment supports, drive units, and accessories.
 - e. Other miscellaneous metals.
 2. High solids epoxy system:
 - a. Field priming of ferrous metal surfaces with defective shop-prime coat where no other prime coat is specified; for non-submerged service.
 - b. Bell rings, underside of manhole covers and frames.
 - c. Stem guides.
 3. Asphalt varnish:
 - a. Underground valve boxes.
 4. Protective coal tar:
 - a. Underground pipe flanges, excluding pipe, corrugated metal pipe couplings, flexible pipe couplings and miscellaneous underground metals not otherwise specified to receive another protective coating.

79-10 COMMON WORK RESULTS FOR GENERAL PIPING

79-10.01 GENERAL

79-10.01A Summary

This section includes specifications for Basic piping materials and methods.

79-10.01B References and Definitions

- E. American Society of Mechanical Engineers (ASME):
 2. B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 Through 24.
 3. B16.47 - Large Diameter Steel Flanges: NPS 26 Through NPS 60 Metric/Inch Standard.
- F. American Water Works Association (AWWA):
 1. C105 – Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems.
 2. C207 - Standard for Steel Pipe Flanges for Waterworks Services-Size 4 In. Through 144 In.
- G. ASTM International (ASTM):
 1. A 193 - Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High Temperature or High Pressure Service and Other Special Purpose Applications.
 2. A 194 - Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
 3. A 307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 4. F 37 - Standard Test Methods for Sealability of Gasket Materials.
- H. California Health and Safety Code.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

Buried pipe: Pipe that is buried in the soil, or cast in a concrete pipe encasement that is buried in the soil.

Exposed pipe: Pipe that is located above ground, or pipe that is located inside a structure, supported by a structure, or cast into a concrete structure.

Underground piping: Piping actually buried in soil or cast in concrete that is buried in soil.

Underwater piping: Piping below tops of walls in basins or tanks containing water.

Wet wall: Wall with water on at least 1 side.

79-10.01C Submittals

- A. Product data:
- Escutcheons.
 - Flange bolts.
 - Gaskets.
 - Link -type seals.
 - Certifications of compliance with reference standard for lead limits.

79-10.02 MATERIALS

A. ESCUTCHEONS

Material: Chrome-plated steel plate.

Manufacturers: One of the following or equal:

- a. Dearborn Brass Company, Model Number 5358.
- b. Keeney Manufacturing Company, Model Number 102 or Number 105.

B. LINK TYPE SEALS

Characteristics:

- a. Modular mechanical type, consisting of interlocking neoprene or synthetic rubber links shaped to continuously fill the annular space between the pipe and wall opening.
- b. Assemble links solely with stainless steel bolts and nuts to form a continuous rubber belt around the pipe.
- c. Provide a nylon polymer pressure plate with Type 316 stainless steel hardware. Isolate pressure plate from contact with wall sleeve.

Manufacturers: One of the following or equal:

- d. Calpico, Incorporated.
- e. Pipeline Seal and Insulator, Inc., Link-Seal.

C. FLANGE BOLTS

Ductile iron pipe:

- a. Bolts and nuts for ductile iron pipe flanges located indoors, outdoors above ground, or in dry vaults and structures and where pressures do not exceed 150 pounds per square inch shall be hot-dip galvanized carbon steel, ASTM A 307, Grade B.
- b. Bolts and nuts for ductile iron pipe flanges located indoors, outdoors above ground, or in dry vaults and structures where the pressures exceed 150 pounds per square inch shall be alloy steel, ASTM A 193, Grade B7.
- c. Bolts and nuts for ductile iron pipe flanges submerged in water or wastewater, buried, in wet vaults or structures, adjacent to wet walls, or above open water-containing structures shall be Type 316 stainless steel in accordance with ASTM A 193, Grade B8M for bolts and in accordance with ASTM A 194, Grade 8M for nuts.
- d. [Bolts and nuts for buried ductile iron pipe flanges shall be Type 316 stainless steel in accordance with ASTM A 193, Grade B8M for bolts and in accordance with ASTM A 194, Grade 8M for nuts.
- e. Provide a washer for each nut. Washer shall be of the same material as the nut.
- f. Nuts shall be Heavy hex-head, Type 2H.
- g. Cut and finish flange bolts to project a maximum of 1/4 inch beyond outside face of nut after assembly.
- h. Tap holes for cap screws or stud bolts when used.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

D. GASKETS

Gaskets for non-steam cleaned ductile iron and steel piping:

- a. Suitable for pressures equal to and less than 150 pounds per square inch gauge, temperatures equal to or less than 250 degrees Fahrenheit, and raw sewage service.
- b. Gasket material:
 - 1) Neoprene elastomer with minimum Shore A hardness value of 70.
 - 2) Reinforcement: Inserted 13-ounce nylon fabric cloth for pipes 20 inch or larger.
 - 3) Thickness: Minimum 3/32-inch thick for less than 10-inch pipe; minimum 1/8 inch thick for 10-inch and larger pipe.
- c. Manufacturers: One of the following or equal:
 - 1) Pipe less than 20 inches in diameter: Garlock, Style 7797, John Crane, similar product.
 - 2) Pipe 20 inches in diameter and larger: Garlock, Style 8798, John Crane, similar product.

Gaskets for flanged joints in ductile iron or steel water piping:

- d. Suitable for hot or cold water, pressures equal to or less than 150 pounds per square inch gauge, and temperatures equal to or less than 160 degrees Fahrenheit.
- e. Material:
- f. Neoprene elastomer, compressed, with non-asbestos fiber reinforcement.
- g. Manufacturers: One of the following or equal:
 - 1) Garlock, Bluegard 3300.
 - 2) John Crane, similar product.

Provide gaskets suitable for the specific fluids and pressure and temperature conditions.

Lead limits must comply with NSF 61.

79-10.03 CONSTRUCTION

79-10.03A General

Locate and expose existing structures, piping, conduits, and other facilities and obstructions that may affect construction of underground piping before starting excavation for new underground piping and appurtenances.

Verify sizes, elevations, locations, and other relevant features of existing facilities and obstructions. Determine conflicts for the construction of the new underground piping and appurtenances.

Make piping location and grade adjustments to resolve conflicts between new piping and existing facilities and obstructions.

Perform piping cleaning upon completion of installation, clean piping interior of foreign matter and debris.

Perform special cleaning when required by the Contract Documents

A. General

Piping drawings:

- a. Except in details, piping is indicated diagrammatically. Not every offset and fitting, or structural difficulty that may be encountered has been indicated on the Drawings. Sizes and locations are indicated on the Drawings.
- b. Perform minor modifications to piping alignment where necessary to avoid structural, mechanical, or other type of obstructions that cannot be removed or changed. Modifications are intended to be of minor scope, not involving a change to the design concept or a change to the Contract Price or Contract Times.

Piping alternatives:

- c. Provide piping as specified in this Section, unless indicated on the Drawings or specified otherwise.
- d. Alternative pipe ratings:
 - 1) Piping with greater pressure rating than specified may be substituted in lieu of specified piping without changes to the Contract Price.
 - 2) Piping of different material may not be substituted in lieu of specified piping.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

- e. Valves in piping sections: Capable of withstanding specified test pressures for piping sections and fabricated with ends to fit piping.
 - f. For flanged joints, where 1 of the joining flanges is raised face type, provide a matching raised face type flange for the other joining flange.
 - 3) Unless otherwise indicated on the Drawings, piping at pipe joints, fittings, couplings, and equipment shall be installed without rotation, angular deflection, vertical offset, or horizontal offset.
- B. Wall and slab penetrations:
Provide sleeves for piping penetrations through aboveground masonry and concrete walls, floors, ceilings, roofs, unless specified or otherwise indicated on the Drawings.
Provide flexibility in piping connecting to structures to accommodate movement due to soil settlement and earthquakes. Provide flexibility using details indicated on the Drawings.
Core drilled openings:
- a. Do not damage or cut existing reinforcing bars, electrical conduits, or other items embedded in the existing concrete without acceptance by Engineer.
 - b. Determine location of reinforcing bars or other obstructions with a non-destructive indicator device.
 - c. Remove dust and debris from hole using compressed air.
- C. Exposed piping:
Install exposed piping in straight runs parallel to the axes of structures, unless otherwise indicated on the Drawings:
- a. Install piping runs plumb and level, unless otherwise indicated on the Drawings.
 - 1) Slope plumbing drain piping with a minimum of 1/4 inch per foot downward in the direction of flow.
 - 2) Slope digester gas piping to drip traps or low-point drains at a minimum of 1/2 inch per foot where condensate flows against the gas, or at a minimum of 1/4 inch per foot where condensate flows with gas.
- Install exposed piping after installing equipment and after piping and fitting locations have been determined.
In addition to the joints indicated on the Drawings, provide unions, flexible couplings, flanged joints, flanged coupling adapters, and other types of joints or means which are compatible with and suitable for the piping system, and necessary to allow ready assembly and disassembly of the piping.
Assemble piping without distortion or stresses caused by misalignment:
- b. Match and properly orient flanges, unions, flexible couplings, and other connections.
 - c. Do not subject piping to bending or other undue stresses when fitting piping.
 - d. Do not correct defective orientation or alignment by distorting flanged joints or subjecting flange bolts to bending or other undue stresses.
 - e. Flange bolts, union halves, flexible connectors, and other connection elements shall slip freely into place.
 - f. Alter piping assembly to fit, when proper fit is not obtained.
 - g. Install eccentric reducers or increasers with the top horizontal for pump suction piping.
- D. Buried piping:
Bury piping with minimum 3-foot cover without air traps, unless otherwise indicated on the Drawings.
- a. Where 2 similar services run parallel to each other, piping for such services may be laid in the same trench.
- Lay piping with sufficient room for assembly and disassembly of joints, for thrust blocks, for other structures, and to meet separation requirements of public health authorities having jurisdiction.
Laying piping:
- b. Lay piping in finished trenches free from water or debris. Begin at the lowest point with bell ends up slope.
 - c. Place piping with top or bottom markings with markings in proper position.
 - d. Lay piping on an unyielding foundation with uniform bearing under the full length of barrels.
 - e. Where joints require external grouting, banding, or pointing, provide space under and immediately in front of the bell end of each section laid with sufficient shape and size for grouting, banding, or pointing of joints.
 - f. At the end of each day's construction, plug open ends of piping temporarily to prevent entrance of debris or animals.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

- E. Venting piping under pressure:
Lay piping under pressure flat or at a continuous slope without air traps, unless otherwise indicated on the Drawings.
Install plug valves as air bleeder cocks at high points in piping. Provide 1-inch plug valves for water lines, and 2-inch plug valves for sewage and sludge lines, unless otherwise indicated on the Drawings.
Provide additional pipe taps with plug cocks and riser pipes along piping as required for venting during initial filling, disinfecting, and sampling.
Before piping is placed into service, close plug valves and install plugs. Protect plugs and plug valves from corrosion in as specified in Section 79-909960.
- F. Restraining piping:
Restrain piping at valves and at fittings where piping changes direction, changes sizes, and at ends:
a. When piping is underground, use concrete thrust blocks, mechanical restraints, or push-on restraints.
b. When piping is aboveground or underwater, use mechanical or structural restraints.
c. Determine thrust forces by multiplying the nominal cross sectional area of the piping by design test pressure of the piping.
Provide restraints with ample size to withstand thrust forces resulting from test pressures. During testing, provide suitable temporary restraints where piping does not require permanent restraints. Place concrete thrust blocks against undisturbed soil.
Place concrete so piping joints, fittings, and other appurtenances are accessible for assembly and disassembly.
Provide underground mechanical restraints where specified in the Piping Schedule.
- G. Connections to existing piping:
Expose existing piping to which connections are to be made with sufficient time to permit, where necessary, field adjustments in line, grade, or fittings:
a. Protect domestic water/potable water supplies from contamination:
1) Make connections between domestic water supply and other water systems in accordance with requirements of public health authorities.
2) Provide devices approved by Owner of domestic water supply system to prevent flow from other sources into the domestic supply system.
Make connections to existing piping and valves after sections of new piping to be connected have been tested and found satisfactory.
Provide sleeves, flanges, nipples, couplings, adapters, and other fittings needed to install or attach new fittings to existing piping and to make connections to existing piping.
For flanged connections, provide stainless steel bolts with isolation bushings and washers, and full-face flange gaskets.
- H. Connections to in-service piping must be as specified in section 10-1.02.
- I. Connections between ferrous and nonferrous metals:
Connect ferrous and nonferrous metal piping, tubing, and fittings with dielectric couplings especially designed for the prevention of chemical reactions between dissimilar metals.
Nonferrous metals include aluminum, copper, and copper alloys.
- J. Flanged connections between dissimilar metals such as ductile iron pipe and steel pipe:
Provide stainless steel bolts with isolation bushings and washers, and full-face flange gaskets.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

PIPING SCHEDULE											
Process Abbrev.	Service	Nominal Diameter (inches)	Material	Pressure Class Special Thickness Class Schedule Wall Thickness	Pipe Spec. Section	Joints/ Fittings	Test Pressure/ Method	Lining	Coating	Service Conditions	Comments
AW	Aeration Raw Water										
	Underground										
		4-12	DIP	150	15211	Mech Rest. MJ	100 psig/HH	CM	2 layers PEE		
	Aboveground										
		4-12	DIP	CL 53	15211	FL	100 psig /HH	CM	EPP		
Abbreviations:					<div><div><div>1. The following abbreviations used in the column of test method refer to the respective methods as specified in Section 79-1645956.</div><div>HH High head method</div></div><div><div>2. Abbreviations to designate piping include the following:</div><div>CL Class, followed by the designation</div><div>CM Cement mortar</div><div>DIP Ductile iron piping</div><div>EPP Epoxy polyurethane coating</div><div>FL Flange</div><div>GA Gauge, preceded by the designation</div></div></div> <div><div>MJ Mechanical joint</div><div>NPS Nominal pipe size, followed by the number in inches</div><div>psi pounds per square inch</div><div>psig pounds per square inch gauge</div><div>PE Polyethylene</div><div>PEE Polyethylene encasement</div><div>PTW Polyethylene tape wrap</div><div>PVC Polyvinyl Chloride</div><div>SCH Schedule, followed by the designation</div><div>SW Solvent welded</div><div>WLD Weld</div></div>						

79-11 COMMON WORK RESULTS FOR VALVES

79-11.01 GENERAL

79-11.01A Summary

This section includes specifications for Basic requirements for valves.

Valves must be manufactured by companies whose valves have had successful operational experience in comparable service.

79-11.01B References

- A. American Water Works Association (AWWA):
C111/A21.11 - Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe Fittings.
- B. ASTM International (ASTM):
A 126 - Standard Specification for Gray Iron Casting for Valves, Flanges, and Pipe Fittings.
A 167 - Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
A 536 - Standard Specification for Ductile Iron Castings.
- C. NSF International (NSF):
61 - Drinking Water System Components - Health Effects.
- D. Society for Protective Coatings (SSPC):
SP 7 - Brush-Off Blast Cleaning.
SP 10 - Near-White Blast Cleaning.

79-11.01C Submittals

- A. General: Submit as specified in Section 5-1.23 of the 2010 Caltrans Standard Specifications.
- B. Product data:
Submit the following information for each valve:
 - a. Valve type, size, pressure rating, Cv factor.
 - b. Coatings.
 - c. Manual valve actuators: Information on valve actuator including size, manufacturer, model number.
 - d. Certified drawings with description of component parts, dimensions, weights, and materials of construction.
 - e. Certifications of reference standard compliance: Submit certification that the valves and coatings are suitable in potable water applications in accordance with NSF 61.Clearly mark submittal information to show specific items, materials, and accessories or options being furnished.
- C. Operation and maintenance data: Furnish bound sets of installation, operation, and maintenance instructions for each type of manual valve 4 inch in nominal size and larger, and all non-manual valves. Include information on valve operators in operation and maintenance instruction manual.

79-11.02 MATERIALS

79-11.02A General

Stainless steel: In accordance with ASTM A 167, Type 316, or Type 304, UNS Alloy S31600 or S30400.

Valve and operator bolts and nuts:

- 1. Fabricated of stainless steel for the following installation conditions:
 - a) Submerged in sewage or water.
 - b) In an enclosed space above sewage or water.
 - c) In structures containing sewage or water, below top of walls.
 - d) At openings in concrete or metal decks.
- 2. Where dissimilar metals are being bolted, use stainless steel bolts with isolation bushings and washers.
- 3. Underground bolts: Low-alloy steel in accordance with AWWA C111/A21.11.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

Bronze and brass alloys: Use bronze and brass alloys with not more than 6 percent zinc and not more than 2 percent aluminum in the manufacture of valve parts; UNS Alloy C83600 or C92200 unless specified otherwise.

Valve bodies: Cast iron in accordance with ASTM A 126, Class 30 minimum or ductile iron in accordance with ASTM A 536, Grade 65-45-12 minimum unless specified otherwise.

A. INTERIOR PROTECTIVE LINING

1. When specified in the particular valve specification, provide valves with type of protective lining specified in the particular valve Specification.
2. Apply protective lining to interior, non-working surfaces, except stainless steel surfaces.
3. Lining types:
 - a. Fusion bonded epoxy:
 - 1) Manufacturers: One of the following or equal: 3-M Company, ScotchKote 134; certified to NSF 61 for drinking water use.
 - 2) Clean surfaces in accordance with SSPC SP 7 or SP 10, as recommended by epoxy manufacturer.
 - 3) Apply in accordance with manufacturer's published instructions.
 - 4) Lining thickness: 0.010 to 0.012 inches except that:
 - a) Lining thickness in grooves for gaskets: 0.005 inches.
 - b) Do not coat seat grooves in valves with bonded seat.
 - 5) Quality control:
 - a) Lining thickness: Measured with a non-destructive magnetic type thickness gauge.
 - b) Verify lining integrity with a wet sponge-testing unit operating at approximately 60 volts, or as recommended by the lining manufacturer.
 - c) Consider tests successful when lining thickness meets specified requirements and when no pinholes are found.
 - d) Correct defective lining disclosed by unsuccessful tests, and repeat test.
 - e) Repair pinholes with liquid epoxy recommended by manufacturer of the epoxy used for lining.
 - b. High solids epoxy:
 - 1) Product equivalent to high solids epoxy specified in Section 79-909960.
 - a) Certified in accordance with NSF 61 for drinking water use.
 - b) Interior: Coat valve interior with manufacturer's equivalent high performance high solids epoxy coating system with a certifiable performance history for the service conditions and as approved by the Engineer. Manufacturer shall provide for approval, coating information sufficient to allow Engineer to assess equivalence to the specified high solids epoxy coating specified in Section 79-909960.
 - 2) Clean surfaces to meet SP-7 or SP-10, or as recommended by coating manufacturer.
 - 3) Quality control: After coating is cured, check coated surface for porosity with a holiday detector set at 1,800 volts, or as recommended by coating manufacturer.
 - c) Repair holidays and other irregularities and retest coating.
 - d) Repeat procedure until holidays and other irregularities are corrected.

B. UNDERGROUND VALVES

1. Provide underground valves with flanged, mechanical, or other type of joint required for the type of pipe to which the valve is to be connected.
2. Coating and wrapping:
 - a. After installation, encase valves in 2 layers of polyethylene wrap as specified for ductile iron piping in Section 79-154524. Ascertain that polyethylene wrapping does not affect operation of valve.

C. VALVE BOXES

1. Provide cast-iron valve boxes at each buried valve to access valve and valve operators.
2. Do not support boxes on valve, valve operator, or pipe.
3. Boxes:
 - a. 2-piece, fabricated of cast iron; provide cover, with asphalt varnish or enamel protective coating.
 - b. Adjustable to grade, install centered around the upper portions of the valve and valve operator.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

4. Manufacturers: One of the following or equal: Tyler Pipe Industries, Inc., Neenah Foundry Company.
- D. VALVE OPERATORS
1. Valve operator "Open" direction: Open counterclockwise.
 2. Provide valves located below operating level or deck with extensions for key operation or floor stands and handwheels.
 3. Provide manually operated valves located not more than 6 feet above the operating level with tee handles, wrenches, or handwheels.
 - a. Make the valve operator more conveniently accessible by rolling valves, located more than 5 feet but less than 6 feet above the operating level, toward the operating side.
 - b. Secure tee handles and wrenches to the valve head or stem, except where a handle or wrench so secured constitutes a hazard to personnel; in which case, stow handle or wrench immediately adjacent to the valve on or in a suitable hanger, bracket, or receptacle.
 4. Fit valves located more than 6 feet above operating level with chain operated handles or valve wheels.
 - a. Chains: Sufficient length to reach approximately 4 feet above the operating level.
 - b. Where chains constitute a nuisance or hazard to operating personnel, provide holdbacks or other means for keeping the chains out of the way.
 5. Provide an operator shaft extension from valve or valve operator to finished grade or deck level when buried valves, and other valves located below the operating deck or level, are specified or indicated on the Drawings to be key operated; provide 2 inch square AWWA operating nut, and box and cover as specified, or a cover where a box is not required.

79-11.03 CONSTRUCTION

Install valves after the required submittal on installation has been accepted.

Determine after flanged valves and flanged check valves are selected, the face-to-face dimensions of flanged valves and flanged check valves.

Fabricate piping to lengths taking into account the dimensions of flanged valves and flanged check valves.

Provide incidental work and materials necessary for installation of valves including flange gaskets, flange bolts and nuts, valve boxes and covers, concrete bases, blocking, and protective coating.

Where needed, furnish and install additional valves for proper operation and maintenance of equipment and plant facilities under the following circumstances:

Where such additional valves are required for operation and maintenance of the particular equipment furnished by Contractor.

Where such additional valves are required as a result of a substitution or change initiated by Contractor.

Install valves with their stems in vertical position above the pipe, except as follows:

- A. Butterfly valves, gate valves aboveground, globe valves, ball valves, and angle valves may be installed with their stems in the horizontal position.
- B. Install buried plug valves with geared operators with their stems in a horizontal position.

Install valves so that handles clear obstructions when the valves are operated from fully open to fully closed.

Place top of valve boxes flush with finished grade or as otherwise indicated on the Drawings.

Valves with threaded connections:

- A. Install valves by applying wrench on end of valve nearest the joint to prevent distortion of the valve body.
- B. Apply pipe joint compound or Teflon tape on external (male) threads to prevent forcing compound into valve seat area.

Valves with flanged connections:

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

- A. Align flanges and gasket carefully before tightening flange bolts.
- B. When flanges are aligned, install bolts and hand tighten.
- C. Tighten nuts opposite each other with equal tension before moving to next pair of nuts.

Valves with soldered connections:

- A. Do not overheat connection to prevent damage to resilient seats and metal seat rings.
- B. Position valves in full open position before starting soldering procedure.
- C. Apply heat to piping rather than to valve body.

79-12 GATE VALVES

79-12.01 GENERAL

79-12.02A Summary

Not Used

79-12.02B References

- A. American Society of Mechanical Engineers (AMSE).
- B. American Water Works Association (AWWA):
 - C 509 - Resilient-Seated Gate Valves for Water Supply Service (Includes Addendum C509a-95).
 - C515 - Standard for Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Services.
 - C 550 - Protective Interior Coatings for Valves and Hydrants.
- C. ASTM International (ASTM):
 - B 98 - Standard Specification for Copper-Silicon Alloy Rod, Bar, and Shapes.

79-12.02C Submittals

Shop drawings: Submit the following information as specified in Section 5-1.23 of the 2010 Caltrans Standard Specifications and 79-1145440:

- A. Product Data.
- B. Certificates:
 - 1. General purpose AWWA gate valves:
 - a. Proof-of-Design Tests: Certified statement that proof-of-design tests were performed and all requirements were successfully met.
 - b. Affidavit of compliance attesting valves provided in accordance with all provisions of AWWA C515.
 - 2. Interior epoxy coatings: Affidavit of compliance attesting that epoxy coatings applied to interior surfaces of valves and hydrants comply in accordance with all provisions of AWWA C550.
- C. Operation and Maintenance Data.

79-12.02D Quality Assurance

Not Used

79-12.02 MATERIALS

Gate valves aboveground and 3 inches in size and larger:

- A. Manufacturers: One of the following or equal:
 - 1. M&H/Kennedy Valve Company.
 - 2. Mueller.
 - 3. American Flow Control, Series 2500.
- B. Design:
 - 1. Size, material, configuration: Indicated on the Drawings.
 - 2. Resilient wedge type in accordance with AWWA C515.
 - 3. Flange, iron body, and bonnet rated for 200 pound working pressure. Provide O-ring seal between valve body and bonnet.
 - 4. Ductile or cast iron wedge encapsulated in nitrile rubber and capable of sealing in either flow direction.
 - 5. Bronze stem with double or triple O-ring or braided packing stem seals.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

6. Rising stem configuration with handwheel diameter sized to allow opening of valve with no more than a 40-pound pull.
7. Coat interior and exterior surfaces of valve body and bonnet with fusion-bonded epoxy in accordance with AWWA C550.

79-12.03 CONSTRUCTION

Install valves as specified in Section 79-1145440 and manufacturer's instructions.

79-13 AIR AND VACUUM RELIEF VALVES

79-13.01 GENERAL

79-13.01A Summary

The section includes specifications for Air release valves, air and vacuum valves, and air vents.

79-13.01B References

- A. American Society of Mechanical Engineers (ASME).
 1. B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.
 2. B16.5 Pipe Flanges and Flanged Fittings: NPS 1/2 through 24.
- B. American Water Works Association (AWWA).
- C. ASTM International (ASTM):
 1. A 126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
 2. A 240 - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 3. A 270 - Standard Specification for Seamless and Welded Austenitic Stainless Steel Sanitary Tubing.
 4. B 584 - Standard Specification for Copper Alloy Sand Castings for General Applications

79-13.01C Submittals

Shop drawings: Submit the following information as specified in Section 5-1.23 of the 2010 Caltrans Standard Specifications and 79-1145440:

- A. Product data.
- B. Operation and maintenance data.

79-13.02 MATERIALS

- A. Combination Air Valves, water service
 1. Manufacturers: One of the following or equal:
 - a. Valve and Primer Corporation, DeZurik/APCO, Series 140C.
 - b. Multiplex Manufacturing Company, Crispin UL Series.
 2. Design:
 - a. Operation: Automatic exhaust of large quantities of air from pipelines during filling and draining and release of accumulated air while pipeline is under pressure.
 - b. Utilize compound lever system in conjunction with large and small orifices.
 - c. Internal parts removable through top cover without removing valve from pipeline.
 - d. Pressure rating: 125 pounds per square inch.
 - e. Inlet: Flanged 6-inch size.
 3. Materials:
 - a. Body: Cast iron.
 - b. Float: Type 316 stainless steel.
 - c. Needle: Buna-N.
 - d. Lever frame: Cast iron or Delrin.

79-13.03 CONSTRUCTION

Install as specified according to manufacturer's instructions.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

Install air release valves and air and vacuum valves with suitable discharge lines to nearest drainage system.

79-14 PIPE COUPLINGS

79-14.01 GENERAL

79-14.01A Summary

The section includes specifications for Restrained flange coupling adapters.

79-14.01B References

- A. American National Standards Institute (ANSI).
- B. American Society of Mechanical Engineers (ASME):
 - 1. B31.1 - Power Piping.
 - 2. B31.9 - Building Services Piping.
- C. American Water Works Association (AWWA):
 - 1. C111 - Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 - 2. C207 - Standard for Steel Pipe Flanges for Waterworks Service - Sizes 4 In. Through 144 In.
 - 3. C606 - Standard for Grooved and Shouldered Joints.
- D. ASTM International (ASTM):
 - 1. A 36 - Standard Specification for Carbon Structural Steel.
 - 2. A 53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - 3. A 193 - Standard Specification for Alloy Steel and Stainless Steel Bolting Materials for High Temperature or High Pressure Service and Other Special Purpose Applications.
 - 4. A 351 - Standard Specification for Castings, Austenitic, for Pressure-Containing Parts.
 - 5. A 449 - Standard Specification for Hex Cap Screws, Bolts and Studs, Steel, Heat Treated, 120/105/9 ksi Minimum Tensile Strength, General Use.
 - 6. A 536 - Standard Specification for Ductile Iron Castings.
 - 7. A 576 - Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality.
 - 8. F 593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
- E. NSF International (NSF): 61 - Drinking Water System Components - Health Effects.

79-14.01C Submittals

- A. Shop drawings, detailing dimensions, and materials.
- B. Piping layout drawings: Coordinate preparation of required piping layout drawings such that coupling center sleeve sizes are clearly indicated on the Drawings.
- C. Manufacturer's published installation instructions.

79-14.02 MATERIALS

A. PIPE COUPLINGS FOR DUCTILE IRON PIPING

- 1. Restrained flange coupling adapter:
 - a. Manufacturers: One of the following or equal: Romac Industries, Inc., Style RFCA. or Star Pipe Products, 3200 StarFlange.
 - b. Materials:
 - 1) Flange and flanged body: Ductile iron in accordance with ASTM A 536.
 - 2) Follower ring: Lug type restraint system.
 - a) Follower ring: Ductile iron in accordance with ASTM A 536.
 - b) Restraining lugs: Ductile iron in accordance with ASTM A 536. Designed to contact the pipe and apply forces evenly.
 - 3) Restraining bolts:
 - a) Ductile iron in accordance with ASTM A 536.
 - b) Bolt heads shall be designed to twist off when the proper torque has been applied.
 - 4) Bolts and hex nuts:
 - a) Aboveground: High strength, low alloy steel in accordance with AWWA C111.
 - b) Buried and underwater: Type 316 stainless steel bolts in accordance with ASTM F 593.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

- c. Flange design: Class D steel ring flange in accordance with AWWA C207 compatible with ANSI Class 125 and 150 bolt circles.
- d. Coating and lining: Manufacturer's standard fusion bonded epoxy, NSF 61 certified.
- e. Angular deflection: Restrained flange coupling adapter must allow angular deflection after assembly.
- B. PIPE COUPLINGS FOR STEEL PIPING
 - 1. Restrained flange coupling adapters:
 - a. Manufacturers: One of the following or equal: Romac Industries, Inc., Style RFCA or Star Pipe Products, 3200 StarFlange.
 - 2. Materials:
 - a. Flange and flanged body: Ductile iron in accordance with ASTM A 536.
 - b. Follower ring: Lug type restraint system.
 - 1) Follower ring: Ductile iron in accordance with ASTM A 536.
 - 2) Restraining lugs: Ductile iron in accordance with ASTM A 536. Designed to contact the pipe and apply forces evenly.
 - 3) Restraining bolts: Ductile iron in accordance with ASTM A 536. Bolt heads shall be designed to twist off when the proper torque has been applied.
 - c. Bolts and hex nuts:
 - 1) Aboveground: High-strength, low-alloy steel in accordance with AWWA C111.
 - 2) Buried and underwater: Type 316 stainless steel bolts in accordance with ASTM F 593.
 - 3. Flange design: Class D steel ring flange in accordance with AWWA C207 compatible with ANSI Class 125 and 150 bolt circles.
 - 4. Coating and lining: Manufacturer's standard fusion bonded epoxy certified in accordance with NSF 61.
- C. GASKETS FOR FLEXIBLE COUPLINGS AND FLANGED COUPLING ADAPTERS
 - 1. Provide gasket materials for piping applications as follows:
 - Low-pressure and high-pressure air, steam, hot water: EPDM.
 - All other piping applications: EPDM.
- D. EXTERIOR COATINGS FOR UNDERGROUND AND SUBMERGED APPLICATIONS
 - 1. Manufacturers: One of the following or equal:
 - a. Tapecoat Company, Inc., T.C. Mastic.
 - b. Kop-Coat Company, Inc., Bitumastic Number 50.
 - 2. Thickness: Minimum 0.040 inch.

79-14.03 CONSTRUCTION

In underground and underwater installations, coat the exterior of coupling with a protective coating after installation.

Joints and flexible connections shall be installed centered with no angular deflection unless otherwise indicated on the Drawings.

Flexible couplings and flange coupling adapters: Install with gap between pipe ends in accordance with the following table unless a greater gap is indicated on the Drawings. Maximum gap tolerance shall be within 1/8 inch.

- A. Install flexible coupling with pipe gap located in middle of center sleeve.
- B. Install flanged coupling adapter with end of plain end pipe in middle of flanged coupling body.

Center Ring Length	Gap Dimension and Tolerance
4 inch through 6 inch	3/8 inch
7 inch	5/8 inch
10 inch and greater	7/8 inch

Provide harnesses (tie-downs) for flexible couplings unless otherwise indicated on the Drawings with a written note. Design harnesses (tie-downs) for the test pressures as specified in the Piping Schedule in Section 79-1045062.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

Bolted, split-sleeve coupling: Manufacturer's representative shall be on site for training of installation of couplings and to supervise installation of first few couplings.

79-15 DUCTILE IRON PIPE: AWWA C151

79-15.01 GENERAL

79-15.01A Summary

The section includes specifications for Ductile iron pipe, joints, fittings, gaskets, and pipe linings and coatings.

79-15.01B References

- A. American Society of Mechanical Engineers (ASME):
 - 1. B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.
- B. American Water Works Association (AWWA):
 - 1. C104 - Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.
 - 2. C105 - Polyethylene Encasement for Ductile-Iron Pipe Systems.
 - 3. C110 - Standard for Ductile-Iron and Gray-Iron Fittings.
 - 4. C111 - Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 - 5. C115 - Flanged Ductile Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges.
 - 6. C150 - Standard for Thickness Design of Ductile-Iron Pipe.
 - 7. C151 - Standard for Ductile-Iron Pipe, Centrifugally Cast.
 - 8. C600 - Installation of Ductile Iron Water Mains and Their Appurtenances.
 - 9. C606 - Standard for Grooved and Shouldered Joints.
- C. American Welding Society (AWS):
 - 1. D11.2 - Guide for Welding Iron Castings.
- D. ASTM International (ASTM):
 - 1. A 47 - Standard Specifications for Ferritic Malleable Iron Castings.
 - 2. A 183 - Standard Specifications for Carbon Steel Track Bolts and Nuts.
 - 3. A 536 - Standard Specifications for Ductile Iron Castings.
 - 4. C 283 - Standard Test Methods for Resistance of Porcelain Enameled Utensils to Boiling Acid.
 - 5. D 792 - Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
- E. Ductile Iron Pipe Research Association (DIPRA):
 - 1. Thrust Restraint Design Manual.
- F. NACE International (NACE):
 - 1. SP0188 - Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates.
- G. National Association of Pipe Fabricators, Inc. (NAPF):
 - 1. 500-03 - Surface Preparation Standard for Ductile Iron Pipe and Fittings in Exposed Locations Receiving Special External Coatings and/or Special Internal Linings.
- H. Society for Protective Coatings (SSPC):
 - 1. PA-2 - Measurement of Dry Coating Thickness With Magnetic Gages.

79-15.01C Submittals

- A. Product data: Photographs, drawings, and descriptions of fittings, gaskets, couplings, grooving of pipe and fittings, pipe linings, and coatings.
- B. Shop drawings:
 - 1. Detailed layout drawings showing alignment of pipes, location of valves, fittings, and appurtenances, types of joints, connections to structures, and thrust restraint system layouts.
 - 2. Thrust restraint systems: Calculations and layout for restrained joint thrust restraint systems.
- C. Design calculations: Calculations for thrust restraint system design.
- D. Test reports: Submit Coating Manufacturer's Technical Representative's reports.

79-15.02 MATERIALS

- A. Ductile iron piping:
 - 1. Typical type:
 - a. In accordance with AWWA C150 and AWWA C151.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

- b. Pressure class or special thickness class as indicated in the Piping Schedule provided in Section 79-1045052.
- B. Joints:
 - 1. Flanged joints:
 - a. Bolt holes on flanges: 2-holed and aligned at both ends of pipe.
 - b. Cap screw or stud bolt holes: Tapped.
 - c. Bolts and nuts: As specified in Section 79-1045052.
 - d. Gaskets: Standard styrene butadiene copolymer (SBR) unless specified otherwise in Section 79-1045052.
 - 2. Mechanical joints: In accordance with AWWA C111.
 - 3. Push-on rubber gasket joints: In accordance with AWWA C111.
 - 4. Integrally restrained mechanical joints:
 - a. Application: Where designation Mech Rest.
 - 1) MJ is specified in the Piping Schedule provided in Section 79-1045052, supply a restrained mechanical joint piping system, which includes restrained mechanical joints where necessary based upon thrust calculations.
 - 2) Standard mechanical joints as specified above can be used where thrust calculations demonstrate restraint is not required.
 - b. Design:
 - 1) Integral retainer weldment type or lugged type joint with Type 304 stainless steel rods and nuts.
 - 2) Restrained mechanical joints of the configuration which utilizes a gripping or friction force for restraint will not be acceptable.
 - c. Manufacturers: Where restrained mechanical joints are required, use one of the following or equal:
 - 1) American Cast Iron Pipe Company, MJ Coupled Joint.
 - 2) Pacific States Cast Iron Pipe Company, Lock Mechanical Joint.
 - 3) Griffin Pipe Products Co., Bolt-Lok.
 - 4) Griffin Pipe Products Co., Mech-Lok.]
 - 5. Mechanical wedge action joint restraints:
 - a. Manufacturers: One of the following or equal:
 - 1) EBAA Iron, Inc., Megalug Series 1100.
 - 2) Star Pipe Products, Split Stargrip Series 3000.
 - b. Materials:
 - 1) Gland body: Ductile iron in accordance with ASTM A 536.
 - 2) Wedges and wedge actuating components: Ductile iron in accordance with ASTM A 536.
 - 3) Wedges shall be heat treated to a minimum of 370 BHN.
 - 4) Actuating bolts and nuts: Ductile iron in accordance with ASTM A 536.
 - 5) Provide torque-limiting twist off components to ensure proper installation.
 - c. Coatings:
 - 1) Provide manufacturer applied coating system.
 - 2) Manufacturers: One of the following or equal:
 - 3) EBAA Iron Inc., Mega-Bond.
 - 4) Star Pipe Products, Star-Bond.
 - d. Working pressure:
 - 1) Shall include a minimum safety factor of 2:1.
 - 2) For sizes 3- through 16-inch: 350 pounds per square inch.
 - 3) For sizes 18- through 48-inch: 250 pounds per square inch.
 - e. Restraint shall consist of multiple gripping wedges incorporated into a follower gland meeting the requirements of AWWA C111.
 - f. Restraint shall allow post assembly angular deflection that is a minimum of 50 percent of the angular deflection allowed by the mechanical joint.
 - g. Restraint must be in accordance with applicable requirements of AWWA C110 and AWWA C111 for mechanical joints.
- C. Fittings:
 - 1. Ductile iron in accordance with AWWA C110.
 - 2. Joint type: Same as that of the associated piping as specified in Section 79-1045052.
 - 3. Plain end-to-flanged joint connectors using setscrews are not acceptable.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

- D. Pipe linings:
1. Cement-mortar lining:
 - a. In accordance with AWWA C104, apply cement-mortar on clean bare metal surfaces. Extend to faces of flanges, ends of spigots, and shoulders of hubs.
 - b. Minimum lining thickness: Standard in accordance with AWWA C104.
 - c. Type of cement: Type II.
 2. Asphaltic seal coat: Apply over cement mortar linings and to outside surface of pipes that will not receive another coating. Apply in accordance with AWWA C151.
- E. Coatings:
1. Asphalt varnish: Factory applied.
 2. Primer:
 - a. Factory applied for field coating.
 - b. Compatible with materials as specified in 79-909960.
- F. Polyethylene Encasement:
1. 2 layers of linear low-density polyethylene (LLDPE) film, minimum thickness of 8 mils in accordance with AWWA C105; or
 2. Single layer of high-density, cross-laminated polyethylene (HDCLPE) film, minimum thickness of 4 mils in accordance with AWWA C105.

79-15.03 CONSTRUCTION

- A. General:
1. Install ductile iron piping in accordance with AWWA C600, modified as specified in Section 79-1045052.
 2. For underground piping, the trenching, backfill, and compaction: As specified in Section 79-1302318.
- B. Polyethylene encasement:
1. Wrap all buried ductile iron pipe and fittings in 2 layers of loose polyethylene wrap in accordance with AWWA C105.
 2. Polyethylene encasement shall be continuous and terminated neatly at connections to below grade equipment or structures.
 3. At wall penetrations, extend encasement to the wall and neatly terminate.
 4. At slab penetrations, extend encasement to 2 inches below the top of slab and neatly terminate.
 5. When rising vertically in unimproved areas, extend encasement 6 inches above existing grade and neatly terminate.
 6. Repair tears and make joints with 2 layers of plastic tape.
 7. All work shall be inspected prior to backfilling of pipe and associated items.
- C. Joints:
1. Install types of joints as specified in the piping schedule provided in Section 79-1045052.
 2. Mechanical joints are not acceptable in above ground applications.
 3. Field closure for restrained push-on pipe: Locate field closures in areas where thrust calculations demonstrate restraint is not required.
- D. Tapping ductile iron pipe:
1. Direct tapping of ductile iron pipe may be performed but is limited to the following conditions:
 - a. Maximum allowable tap diameter by pipe diameter and pressure class:

Pipe Size (inches)	Pressure Class				
	150	200	250	300	350
	Maximum Allowable Direct Tap Size (inches)				
3	-	-	-	-	3/4
4	-	-	-	-	3/4
6	-	-	-	-	1
8	-	-	-	-	1
10	-	-	-	-	1

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Pipe Size (inches)	Pressure Class				
	150	200	250	300	350
	Maximum Allowable Direct Tap Size (inches)				
12	-	-	-	-	1-1/4
14	-	-	1-1/4	1-1/2	1-1/2
16	-	-	1-1/2	2	2
18	-	-	2	2	2
20	-	-	2	2	2
24	-	2	2	2	2

- b. The maximum allowable tap diameter for pipelines greater than 24 inches is 2 inches.
- c. Two layers of 3-mil thread sealant are required to minimize the torque required to effect a watertight connection.
2. Direct tapping of glass lined ductile iron pipe may be performed only when approved in writing by the Engineer. Direct tapping of glass lined pipe shall be performed in accordance with the above conditions for tapping ductile iron pipe in addition to the following conditions:
 - a. Drilling and tapping shall be performed using a hole saw. Use of a large drill bit is not acceptable.
 - b. As the hole saw approaches the glass lining, lessen the inward pressure to avoid excess chipping or cracking of the lining.
 - c. Minor chipping or spalling of the glass lining shall be repaired using an epoxy resin "glass repair kit" provided by the fabricator.
 - 1) Manufacturers: One of the following or equal:
 - a) Devoe - Devran 224 HS.
 - b) Sherwin-Williams Co. – Sher-Tile High Solids Epoxy.
 - 2) Repair kit use is only allowed for areas of damage less than 1/2 inch in diameter. Larger areas of damage will require replacement.
 - 3) Surface shall be prepared and repair kit shall be applied in accordance with manufacturer and/or fabricator's instructions.

Testing ductile iron piping as specified in Section 79-104.5052. Do not test sections longer than 1/2 mile in total pipe length.

Repair damaged cement mortar lining to match quality, thickness, and bonding of original lining in accordance with AWWA C104.

When lining cannot be repaired or repairs are defective, replace defective piping with undamaged piping.

79-16 PIPING SYSTEMS TESTING

79-16.01 GENERAL

79-16.01A Summary

The section includes specifications for test requirements for piping systems.

General requirements:

Testing requirements are stipulated in Laws and Regulations; are included in the Piping Schedule in Section 79-104.5052; are specified in the specifications covering the various types of piping; and are specified in this Section.

Requirements in Laws and Regulations supersede other requirements of Contract Documents, except where requirements of Contract Documents are more stringent, including higher test pressures, longer test times, and lower leakage allowances.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CTA Contract No. XXX

Test plumbing piping in accordance with Laws and Regulations, the plumbing code and UL requirements.

When testing with water, the specified test pressure is considered to be the pressure at the lowest point of the piping section under test. Lower test pressure as necessary (based on elevation) if testing is performed at higher point of the pipe section.

Furnish necessary personnel, materials, and equipment, including bulkheads, restraints, anchors, temporary connections, pumps, water, pressure gauges, and other means and facilities required to perform tests.

Water for testing, cleaning, and disinfecting will be provided as specified in **Section 01500**.

Pipes to be tested: Test only those portions of pipes that have been installed as part of this Contract. Test new pipe sections prior to making final connections to existing piping. Furnish and install test plugs, bulkheads, and restraints required to isolate new pipe sections. Do not use existing valves as test plug or bulkhead.

Unsuccessful tests:

- A. Where tests are not successful, correct defects or remove defective piping and appurtenances and install piping and appurtenances that comply with the specified requirements.
- B. Repeat testing until tests are successful.

Test completion: Drain and leave piping clean after successful testing.

Test water disposal: Dispose of testing water at sanitary sewer in accordance with requirements of federal, state, county, and city regulations governing disposal of wastes in the location of the Project and disposal site.

79-16.01B References

- A. National Fuel Gas Code (NFGC).
- B. American Society of Mechanical Engineers (ASME):
 1. B31.1 - Power Piping.
 2. B31.3 - Process Piping.
 3. B31.8 - Gas Transmission and Distribution Piping Systems.
- C. Underwriters Laboratories Inc. (UL).

79-16.01C Submittals

- A. Submit the following information as specified in Section 5-1.23 of the 2010 Caltrans Standard Specifications
- B. Schedule and notification of tests:
 1. Submit a list of scheduled piping tests by noon of the working day preceding the date of the scheduled tests.
 2. Notification of readiness to test: Immediately before testing, notify Engineer in writing of readiness, not just intention, to test piping.
 3. Have personnel, materials, and equipment specified in place before submitting notification of readiness.

79-16.02 MATERIALS

Not Used.

79-16.03 CONSTRUCTION

79-16.03A Sequence

- A. Clean piping before pressure or leak tests.
- A. Test gravity piping underground, including sanitary sewers, for visible leaks before backfilling and compacting.
- B. Underground pressure piping may be tested before or after backfilling when not indicated or specified otherwise.
- C. Backfill and compact trench, or provide blocking that prevents pipe movement before testing underground piping with a maximum leakage allowance.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

- D. Test underground piping before encasing piping in concrete or covering piping with slab, structure, or permanent improvement.

79-16.03B Testing High Pressure Piping

- A. Test piping for which the specified test pressure in the Piping Schedule is 20 pounds per square inch gauge or greater, by the high head pressure test method, indicated "HH" in the Piping Schedule.
- B. General:
1. Test connections, hydrants, valves, blowoffs, and closure pieces with the piping.
 2. Do not use installed valves for shutoff when the specified test pressure exceeds the valve's maximum allowable seat differential pressure. Provide blinds or other means to isolate test sections.
 3. Do not include valves, equipment, or piping specialties in test sections if test pressure exceeds the valve, equipment, or piping specialty safe test pressure allowed by the item's manufacturer.
 4. During the performance of the tests, test pressure shall not vary more than plus or minus 5 pounds per square inch gauge with respect to the specified test pressure.
 5. Select the limits of testing to sections of piping. Select sections that have the same piping material and test pressure.
 6. When test results indicate failure of selected sections, limit tests to piping:
 - a. Between valves.
 - b. Between a valve and the end of the piping.
 - c. Less than 500 feet long.
 7. Test piping for minimum 2 hours for visible leaks test and minimum 2 hours for the pressure test with maximum leakage allowance.
- C. Testing procedures:
1. Fill piping section under test slowly with water while venting air: Use potable water for all potable waterlines and where noted on the Piping Schedule.
 2. Before pressurizing for the tests, retain water in piping under slight pressure for a water absorption period of minimum 24 hours.
 3. Raise pressure to the specified test pressure and inspect piping visually for leaks: Consider visible leakage testing complete when no visible leaks are observed.
- D. Pressure test with maximum leakage allowance:
1. Leakage allowance is zero for piping systems using flanged, National Pipe Thread threaded and welded joints.
 2. Pressure test piping after completion of visible leaks test.
 3. For piping systems using joint designs other than flanged, threaded, or welded joints, accurately measure the makeup water necessary to maintain the pressure in the piping section under test during the pressure test period:
 - a. Consider the pressure test to be complete when makeup water added is less than the allowable leakage and no damage to piping and appurtenances has occurred.
 - b. Successful completion of the pressure test with maximum leakage allowance shall have been achieved when the observed leakage during the test period is equal or less than the allowable leakage and no damage to piping and appurtenances has occurred.
 - c. When leakage is allowed, calculate the allowable leakage by the following formula:

$$L = S \times D \times P^{1/2} \times 133,200^{-1}$$

wherein the terms shall mean: L = Allowable leakage in gallons per hour.

S = Length of the test section in feet.

D = Nominal diameter of the piping in inches.

P = Average observed test pressure in pounds per square inches gauge, at the lowest point of the test section, corrected for elevation of the pressure gauge.

x = The multiplication symbol.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

79-17 COMMON WORK RESULTS FOR ELECTRICAL

79-17.01 GENERAL

79-17.01A Summary

The section includes specifications for all Electrical Work and electrical submittals related to the Contra Costa Water District waterline work. Provide a complete electrical system: Install all extra conduits, cables, and interfaces as may be necessary to provide a complete and operating electrical system.

The Work includes everything necessary for and incidental to executing and completing the Electrical Work indicated on the Drawings and specified in the Specifications and reasonably inferable there from: The Electrical Drawings are schematic in nature; use the Structural, Architectural, Mechanical, and Civil Drawings for all dimensions and scaling purposes.

It is the intent of these Specifications that the entire electrical power, instrumentation, and control system be complete and operable. Provide all necessary material and labor for the complete system from source of power to final utilization equipment, including all connections, testing, calibration of equipment furnished by others as well as equipment furnished by the Contractor, whether or not specifically mentioned but which are necessary for successful operation.

Provide all Electrical Work, including conduit, field wiring, and connections by the electrical subcontractor under the provisions of the Electrical Specifications for all aspects of the Work.

Coordinate all aspects of the Work with the electrical subcontractor and other subcontractors before bidding in order to ensure that all costs associated with a complete installation are included. The Owner is not responsible for any change orders due to lack of coordination of the Work between the Contractor, the electrical subcontractor, the other subcontractors or suppliers.

Demolition:

1. Where demolition is specified or indicated on the Drawings, disconnect all associated electrical equipment and render the equipment safe.
2. Remove and dispose of all conduit, wire, electrical equipment, controls, etc. associated with the items and/or areas to be demolished as indicated on the Drawings unless otherwise indicated.
3. Salvage electrical equipment as shown on the drawings.
4. For each piece of equipment to be removed, remove all ancillary components (e.g. instruments, solenoid valves, disconnect switches, etc.).
5. Remove all wire back to the source for all conduits to be removed or abandoned in place.

Provide all trenching, forming, rebar, concrete, back filling, hard surface removal and replacement, for all items associated with the Electrical Work and installation.

Furnish all equipment listed by and bearing the label of UL or of an independent testing laboratory acceptable to the Engineer and the Authority Having Jurisdiction.

Provide enclosures for electrical, instrumentation and control equipment, regardless of supplier or subcontractor furnishing the equipment, that meet the requirements outlined in NEMA Standard 250 for the following types of enclosures:

1. NEMA Type 1: Intended for indoor use, primarily to provide a degree of protection from accidental contact with energized parts or equipment.
2. NEMA Type 4: Intended for indoor or outdoor use, primarily to protect equipment from exposure to windblown dust and rain, splashing or hose directed water, ice formation and freezing.
3. NEMA Type 4X: Made from corrosion resistant materials (fiberglass reinforced plastic, 316 stainless steel or equal) and are intended for indoor or outdoor use, primarily to protect equipment from exposure to windblown dust and rain, splashing or hose directed water, ice formation and freezing, and corrosion.
4. NEMA Type 12: Intended for indoor use, primarily to provide a degree of protection from dust, falling dirt and dripping non-corrosive liquids.
5. NEMA Type 6: Rated for submergence.
6. NEMA Type 6P: Rated for prolonged submergence.
7. Modify exposed conduit runs as show in the Drawings.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

79-17.01B References and Definitions

- A. Code compliance:
1. The publications are referred to in the text by the basic designation only. The latest edition accepted by the Authority Having Jurisdiction of referenced publications in effect at the time of the bid governs.
 2. The standards listed are hereby incorporated into this Section.
 - a. American National Standards Institute (ANSI).
 - b. American Society of Civil Engineers (ASCE):
 - 1) ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
 - c. ASTM International (ASTM).
 - d. Illuminating Engineering Society (IES). Institute of Electrical and Electronics Engineers (IEEE).
 - e. Insulated Cable Engineers Association (ICEA).
 - f. International Code Council (ICC).
 - 1) International Code Council Evaluation Service (ICC-ES).
 - a) AC 156 – Acceptance Criteria for Seismic Certification by Shake Table Testing of Non-Structural Components (ICC-ES AC 156).
 - g. International Society of Automation (ISA).
 - h. National Electrical Manufacturers Association (NEMA): 250 - Enclosures for Electrical Equipment (1000 V Maximum).
 - i. National Fire Protection Association (NFPA): 70 - National Electrical Code (NEC).
 - j. National Institute of Standards and Technology (NIST).
 - k. Underwriters' Laboratories, Inc. (UL).
- B. Compliance with laws and regulations:

FAT: Factory acceptance test.

ICSC: Instrumentation and controls subcontractor.

PCM: Process control module: An enclosure containing any of the following devices: PLC, RTU, or RIO.

Space: That portion of the switchgear, motor control center, panelboard, switchboard or control panel that does not physically contain a device but is capable of accepting a device with no modifications to the equipment, i.e., provide all standoffs, bus, and hardware, as part of the space.

Spare: That portion of the switchgear, motor control center, panelboard, switchboard or control panel that physically contains a device with no load connections to be made.

Unequipped space: That portion of the switchgear, motor control center, panelboard, switchboard or control panel that does not physically contain a device, standoff, bus, hardware, or other equipment.

79-17.01C Submittals

- A. Submit the following information as specified in Section 5-1.23 of the 2010 Caltrans Standard Specifications.
- B. General:
1. Instruct all equipment suppliers of submittals and operation and maintenance manuals of the requirements in this Section.
 2. Furnish the submittals required by each section in the Electrical Specifications.
 3. Adhere to the wiring numbering scheme specified in Drawings throughout the Project: Uniquely number each wire.
- C. Material and equipment schedules:
1. Furnish a complete schedule and/or matrix of all materials, equipment, apparatus, that are proposed for use:
 - a. Include sizes, names of manufacturers, catalog numbers, and such other information required to identify the items.
- D. Test reports: As specified in Section 01330.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

79-17.01D Quality Assurance

Furnish all equipment listed by and bearing the label of UL or of an independent testing laboratory acceptable to the Engineer and the Authority Having Jurisdiction.

79-17.02 MATERIALS

Provide similar items of same manufacturer throughout the electrical and instrumentation portion of the Project.

Allowable manufacturers are specified in individual Electrical Specifications.

Provide all equipment that is new, free from defects, and standard products produced by manufacturers regularly engaged in the production of these products.

Furnish all spare parts as required by other sections of the Specifications

Warrant the Electrical Work as specified in the Caltrans 2010 Standard Specifications and provide additional warranty as specified in the individual Electrical Specifications.

79-17.03 CONSTRUCTION

- A. Equipment locations shown on Drawings may change due to variations in equipment size or minor changes made by others during construction:
 - 1. Verify all dimensions indicated on the Drawings: Actual field conditions govern all final installed locations, distances, and levels.
 - 2. Review all Contract Documents and approved equipment shop drawings and coordinate Work as necessary to adjust to all conditions that arise due to such changes.
 - 3. Make minor changes in location of equipment before rough in, as directed by the Owner or Engineer.
- B. Install the equipment in accordance with the accepted installation instructions and anchorage details to meet the seismic and wind load requirements at the Project site.
- C. Install all conduits and equipment in such a manner as to avoid all obstructions:
 - 1. Install all conduits and equipment in accordance with working space requirements in accordance with the NEC. This includes any panel, disconnect switch or other equipment that can be energized while open exposing live parts regardless of whether it is likely to require examination or has serviceable parts.
 - 2. Where the Drawings do not show dimensions for locating equipment, install equipment in the approximate locations indicated on the Drawings. Adjust equipment locations as necessary to avoid any obstruction or interferences.
 - 3. Where an obstruction interferes with equipment operation or safe access, relocate the equipment.
 - 4. Where the Drawings do not indicate the exact mounting and/or supporting method to be used, use materials and methods similar to the mounting details indicated on the Drawings.
- D. Labeling: Provide all nameplates and labels as specified in the Drawings

Inspection:

- A. Allow for inspection of electrical system installation.
- B. Provide any assistance necessary to support inspection activities.
- C. Engineer inspections may include, but are not limited to, the following:
 - 1. Inspect equipment and materials for physical damage.
 - 2. Inspect installation for compliance with the Drawings and Specifications.
 - 3. Inspect installation for obstructions and adequate clearances around equipment.
 - 4. Inspect equipment installation for proper leveling, alignment, anchorage, and assembly.
 - 5. Inspect equipment nameplate data to verify compliance with design requirements.
 - 6. Inspect raceway installation for quality workmanship and adequate support.
 - 7. Inspect cable terminations.

Field acceptance testing (Functional Testing):

- A. Notify the Engineer when the Electrical Work is ready for field acceptance testing.
- B. Record results of the required tests along with the date of test: Use conduit identification numbers to indicate portion of circuit tested.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

Workmanship:

- A. Leave wiring in panels, manholes, boxes, and other locations neat, clean, and organized:
 - 1. Neatly coil and label spare wiring lengths.
 - 2. Shorten, re-terminate, and re-label excessive used as well as spare wire and cable lengths, as determined by the Engineer.

Remove all foreign material and restore all damaged finishes to the satisfaction of the Engineer and Owner.

Protect all Work from damage or degradation until Substantial Completion.

Maintain all surfaces to be painted in a clean and smooth condition.

79-18 LOW VOLTAGE WIRE CONNECTIONS

79-18.01 GENERAL

79-18.01A Summary

The section includes specifications for Wire connecting devices, Terminations, and Splices.

79-18.01B References

- A. As specified in Section 79-1746050.
- B. ASTM International (ASTM): D 3005 – Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape.
- C. CSA International (CSA): C22.2 - No.197-M1983 (R2208) - PVC Insulating Tape.
- D. Underwriters Laboratories, Inc. (UL): 510 - Standard for Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape.

79-18.01C Submittals

- A. Submit the following information as specified in Section 5-1.23 of the 2010 Caltrans Standard Specifications and 79-1746050.
- B. Product data:
 - 1. Catalog cut sheets.
 - 2. Installation instructions.

79-18.01D Quality Assurance

Quality assurance must be as specified in Section 79-1746050. All materials shall be UL listed

79-18.02 MATERIALS

Manufacturers for each type of technology are specified with the equipment in this Section.

- A. Control connections:
 - 1. Use insulated ring type wire terminators for connections to all screw terminals:
 - a. With chamfered/funneled terminal barrel entry.
 - b. Deep internal serrations.
 - c. Long barrel design to reduce electrical resistance and increased insulator-barrel surface area to ensure that the insulator remains in contact with the barrel.
 - d. Electroplated-tin copper conductor.
 - e. Manufacturer: One of the following or equal: Thomas and Betts, or Stakon.
 - 2. For process equipment connections work from manufacturer's drawings.
- B. Joints, splices, taps, and connections:
 - 1. 600-volt conductors:
 - a. Use solderless connectors.
 - b. Use only plated copper alloy connectors or lugs: Aluminum connectors or lugs are not acceptable for copper conductors.
 - c. Under those specific conditions where aluminum conductors have been allowed or are specified then the connectors for aluminum conductors shall be specifically designed for that purpose.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

- d. For wire Number 10 AWG and smaller use compression splice caps, with insulating caps:
 - 1) Manufacturer: One of the following or equal: Buchanan 2006S or 2011S, with 2007 or 2014 insulating caps.
- e. For wire Number 8 AWG and larger, use heavy duty copper compression connectors:
 - 1) Manufacturer: One of the following or equal: Burndy or Thomas and Betts.
- f. Heat shrink tubing:
 - 1) Suitable for indoors, outdoors, overhead, direct burial or submerged applications.
 - 2) Minimum shrink ratio: 4 to 1.
 - 3) Continuous operating temperature: -55 degrees Celsius to 110 degrees Celsius.
 - 4) Internally applied adhesive sealant.
 - 5) Cross-linked polyolefin:
 - a) Manufacturers, one of the following or equal: 3M ITCSN or Thomas & Betts Shrink-Kon.
- 2. Instrumentation class cable splices:
 - a. Suitable for indoor, outdoors, weather exposed, direct buried, or submersed applications.
 - b. Utilizing an epoxy, polyurethane, and re-enterable compounds.
 - c. For use with shielded or unshielded plastic- and rubber-jacketed, signal, control, and power cables rated up to 1 kilovolt.
 - d. Two-part mold body with tongue and groove seams and built in spacer webbing.
 - 1) Manufacturer: One of the following or equal: 3M - Scotchcast 72-N.
- C. Insulating tape:
 - General purpose insulating tape:
 - e. Minimum 7 mil vinyl tape.
 - f. Suitable for application in an ambient of -18 degrees Celsius (0 degrees Fahrenheit).
 - g. Operating range up to 105 degrees Celsius (220 degrees Fahrenheit).
 - h. Flame retardant, hot- and cold- weather resistant, UV resistant.
 - i. For use as a primary insulation for wire cable splices up to 600 VAC.
 - j. Meeting and complying with:
 - 1) ASTM D 3005 Type I.
 - 2) UL 510.
 - 3) CSA C22.2.
 - k. Manufacturer: One of the following or equal:
 - 1) 3M - Scotch Number Super 33+.
 - General-purpose color-coding tape:
 - l. Minimum 7 mil vinyl tape.
 - m. Suitable for application on PVC and polyethylene jacketed cables.
 - n. For use indoors and outdoors in weather protected enclosures.
 - o. Available with the following colors:
 - 1) Red.
 - 2) Yellow.
 - 3) Blue.
 - 4) Brown.
 - 5) Gray.
 - 6) White.
 - 7) Green.
 - 8) Orange.
 - 9) Violet.
 - p. For use as phase identification, marking, insulating, and harnessing.
 - q. Meeting and complying with:
 - 1) UL 510.
 - 2) CSA C22.2.
 - r. Manufacturer: One of the following or equal: 3M - Scotch Number 35

79-18.03 CONSTRUCTION

- A. As specified in Section 79-1746050.
- B. Zero to 600-volt systems:
 - 1. Make all connections with the proper tool and die as specified by the device manufacturer.
Use only tooling and dies manufactured by the device manufacturer.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

Insulate all connections and splices with Scotch 33+ tape and Scotchfill, or pre-molded plastic covers, or heat shrink tubing and caps.

Number all power and control wires before termination.

C. Motor connections (600 volts and below):

1. Terminate wires with compression type ring lugs at motors.

Connection at both the motor leads and the machine wires shall have ring type compression lugs.

Cover bolted connectors with a heat shrinkable, cross-linked polyolefin material formed as a single opening boot:

a. In damp and wet locations, use a complete kit containing mastic that shall seal out moisture and contamination.

b. Shrink cap with low heat as recommended by manufacturer.

Wire markers shall be readable after boot installation.

Manufacturer: One of the following or equal: Raychem MCK.

79-19 EPOXIES

79-19.01 GENERAL

79-19.01A Summary

The section includes specifications for epoxy, epoxy gel and epoxy bonding agent. Epoxy materials must be new and stored and used within the shelf life limitations under the manufacturer's recommendations.

79-19.01B References

A. ASTM International (ASTM):

1. C 881 – Standard Specification for Epoxy-Resin-Base Systems for Concrete.
2. C 882 – Standard Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear.
3. D 638 - Standard Test Method for Tensile Properties of Plastics.
4. D 695 - Standard Test Method for Compressive Properties of Rigid Plastics.

79-19.01C Submittals

A. Product Data: Submit manufacturer's data completely describing epoxy materials.

1. Submit evidence of conformance to ASTM C 881. Include manufacturer's designations of Type Grade, Class, and Color.
2. Submit evidence that materials meet or exceed the specified physical characteristics.

79-19.01D Quality Assurance

Not Used

79-19.02 MATERIALS

A. General: Moisture tolerant, water-insensitive, two-component epoxy resin adhesive material containing 100 percent solids, and meeting or exceeding the performance properties specified when tested in accordance with the standards specified.

B. Epoxy: Low viscosity product in accordance with ASTM C 881; Types I, II and V; Grade 1; Class C.

1. Manufacturers: One of the following or equal:

- a. BASF, Concrese Standard LVI.
- b. Sika Corporation, Sikadur 35 Hi-Mod LV.

2. Required properties:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Table 1: Material Properties – Epoxy.		
Property	Test Method	Required Results (“neat”)
Tensile Strength (7-day)	ASTM D 638	7,500 pounds per square inch, minimum.
Compressive Strength, (7-day)	ASTM D 695	11,000 pounds per square inch, minimum .
Bond Strength (2-day)	ASTM C 882	Concrete shall fail before failure of epoxy.
Notes:	Testing results are for materials installed and cured at a temperature between 72 and 78 degrees Fahrenheit for 7 days, unless otherwise noted.	

- C. Epoxy gel: Non-sagging product in accordance with ASTM C 881, Types I and IV, Grade 3, Class C.
1. Manufacturers: One of the following or equal:
 - a. BASF, Concreive Paste LPL.
 - b. Sika Corporation, Sikadur 31, Hi-Mod Gel.
 2. Required properties:

Table 2 – Material Properties – Epoxy Gel.		
Property	Test Method	Required Results (“neat”)
Tensile Strength (7-day)	ASTM D 638	2,000 pounds per square inch, minimum.
Compressive Yield Strength (7-day)	ASTM D 695	8,000 pounds per square inch, minimum.
Bond Strength (14-day)	ASTM C 882	1,500 pounds per square inch, minimum.
Notes:	Testing results are for materials installed and cured at a temperature between 72 and 78 degrees Fahrenheit for 7 days, unless otherwise noted.	

- D. Epoxy bonding agent: Non-sagging product in accordance with ASTM C 881, Type II, Grade 1, Class C.
1. Manufacturers: One of the following or equal:
 - a. BASF, Concreive Liquid LPL.
 - b. Sika Chemical Corp., Sikadur 32 Hi-Mod LPL.
 2. Required properties.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Table 3 – Material Properties – Epoxy Bonding Agent		
Property	Test Method	Required Results
Tensile Strength (7-day)	ASTM D 638	4,400 pounds per square inch, minimum.
Compressive Yield Strength (7-day)	ASTM D 695	8,300 pounds per square inch, minimum.
Bond Strength (14-days)	ASTM C 882	1,800 pounds per square inch, minimum. Concrete shall fail before failure of epoxy bonding agent.
Notes:	Testing results are for materials installed and cured at a temperature between 72 and 78 degrees Fahrenheit for 7 days, unless otherwise noted.	

79-19.03 CONSTRUCTION

- A. Install and cure epoxy materials under manufacturer's installation instructions.
- B. Epoxy:
 - 1. Apply under manufacturer's installation instructions.
- C. Epoxy gel:
 - 1. Apply under manufacturer's installation instructions.
 - 2. Use for vertical or overhead work, or where high viscosity epoxy is required.
 - 3. Epoxy gel used for vertical or overhead work may be used for horizontal work.
- D. Epoxy bonding agent:
 - 1. Apply under manufacturer's installation instructions.
 - 2. Bonding agent will not be required for filling form tie holes or for normal finishing and patching of similar sized small defects.

79-20 EPOXIES

79-20.01 GENERAL

79-20.01A Summary

The section includes specifications for joint fillers.

79-20.01B References

- 1. ASTM International (ASTM):
 - 1. C 203 - Standard Test Methods for Breaking Load and Flexural Properties of Block-Type Thermal Insulation.
 - 2. D 570 - Standard Test Method for Water Absorption of Plastics.
 - 3. D 624 - Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.
 - 4. D 638 - Standard Test Method for Tensile Properties of Plastics.
 - 5. D 746 - Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.
 - 6. D 747 - Standard Test Method for Apparent Bending Modulus of Plastics by Means of a Cantilever Beam.
 - 7. D 792 - Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
 - 8. D 2240 - Standard Test Method for Rubber Property – Durometer Hardness.
- B. American National Standards Institute (ANSI):
 - 1. A135.4 - Basic Hardboard.

79-20.01C Submittals

- A. Product Data:

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

1. Preformed expansion joint material: Sufficient information on each type of material for review to determine conformance of material to requirements specified.
- B. Quality control submittals:
2. Manufacturer's instructions: For materials specified in this Section that are specified to be installed with such instructions.

79-20.01D Quality Assurance

Not Used

79-20.02 MATERIALS

- A. General:
1. Use specific type in applications as **indicated on the Drawings**.
 2. No scrap or recycled materials shall be used.
- B. Expanded polystyrene joint filler:
1. Properties:
 2. Commercially available polystyrene board:
 3. Minimum flexural strength: 35 pounds per square inch in accordance with ASTM C 203.
 4. Compressive yield strength: Between 16 and 40 pounds per square inch at 5-percent compression.
- C. Hardboard:
1. Properties:
 - a. 1/8-inch minimum thickness.
 - b. Complies with ANSI A135.4 Class 2.
- D. Preformed expansion joint materials:
1. Bituminous fiber expansion joint material:
 - a. Properties:
 - 1) Thickness: To match joint width **indicated on the Drawings**.
 - 2) Asphalt-impregnated fiber conforming to ASTM D 1751.
 - b. Manufacturers: One of the following or equal:
 - 3) Durajoint.
 - 4) W.R. Meadows: SealTight Fibre Expansion Joint.
 2. Synthetic sponge rubber expansion joint material:
 - a. Properties:
 - 1) Thickness: As recommended for width indicated on the Drawings.
 - 2) Material conforming to ASTM D 1752, Type I.
 - b. Manufacturers: One of the following or equal:
 - 1) Durajoint.
 - 2) W.R. Meadows: SealTight Sponge Rubber.
- E. Synthetic sponge rubber tube:
1. Seamless extruded tube profile with 3/4-inch inside diameter and a minimum of 3/8-inch wall thickness.
 2. Fit tubes to hold-down bars snugly.
 3. Make tubes of closed-cell sponge rubber, with medium to low mass change, in accordance with ASTM D 1056, Type 2, Class B or C, Grades 4 or 5.
 4. Manufacturers: One of the following or equal: Armacell LLC, Esoline 2400 Grip.

79-20.03 CONSTRUCTION

- A. Joints:
1. Construct construction and expansion joints as **indicated on the Drawings**.
 2. Preformed expansion joint material: Fasten expansion joint strips to concrete, masonry, or forms with adhesive. No nailing will be permitted, nor shall expansion joint strips be placed without fastening.
- B. Expanded polystyrene joint filler:
1. When filler is indicated on the Drawings or specified, place filler in correct position before concrete is placed against filler.
 2. Fill holes and joints in filler with caulking to prevent entry of mortar into joint or passage of mortar or concrete from one side of joint to other.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

- C. Hardboard:
 - 1. When indicated on the Drawings, face surface of joint filler with hardboard.
 - 2. Other facing materials may be used provided they furnish equivalent protection and the material is acceptable to Engineer.
 - 3. Hold boards in place with nails, waterproof adhesive, or other means acceptable to the Engineer.
- D. Synthetic sponge rubber tube:
 - 1. Bond synthetic sponge rubber tubes to the hold-down bars using epoxy adhesive.

79-21 GROUTING

79-21.01 GENERAL

79-21.01A Summary

The section includes specifications for cement grout, cement mortar, dry-pack mortar, epoxy grout, grout and non-shrinking grout.

79-21.01B References

- A. ASTM International (ASTM):
 - 1. C 109 - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (using 2-inch or [50-millimeter] cube specimens).
 - 2. C 230 - Standard Specification for Flow Table for Use In Tests of Hydraulic Cement.
 - 3. C 531 - Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.
 - 4. C 579 - Standard Test Method for Compressive Strength of Chemical-Resistant Mortars, Grouts, and Monolithic Surfacing and Polymer Concretes.
 - 5. C 939 - Standard Test Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method).
 - 6. C 942 - Standard Test Method for Compressive Strength of Grouts for Preplaced-Aggregate Concrete in the Laboratory.
 - 7. C 1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-shrink).
 - 8. C 1181 - Standard Test Methods for Compressive Creep of Chemical-Resistant Polymer Machinery Grouts.

79-21.01C Submittals

- A. Cement grout:
 - 1. Mix design.
 - 2. Material submittals.
- B. Cement mortar:
 - 1. Mix design.
 - 2. Material submittals.
- C. Non-shrink grout: Submit manufacturer's literature.

79-21.01D Quality Assurance

Not Used

79-21.02 MATERIALS

- A. Non-shrink grout must comply with ASTM C 1107 and:
 - 1. Manufacturers: One of the following or equal:
 - a. Five Star Products, Inc., Fairfield, CT, Five Star Grout.
 - b. BASF Construction Chemicals, Shakopee, MN, Masterflow 928.
 - c. L&M Construction Chemicals, Inc., Omaha, NE, CRYSTEX.
 - 2. Preportioned and prepackaged cement-based mixture:
 - a. It shall contain no metallic particles such as aluminum powder and no metallic aggregate such as iron filings.
 - b. It shall require only the addition of potable water.
 - 3. Water for pre-soaking, mixing, and curing: Potable water.
 - 4. Free from the emergence of mixing water from within or the presence of water on its surface.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

5. Remain at a minimum flowable consistency for at least 45 minutes after mixing at 45 degrees Fahrenheit to 90 degrees Fahrenheit when tested in accordance with ASTM C 230.
 - a. If at a fluid consistency, it shall be verified in accordance with ASTM C 939.
 6. Dimensional stability (height change):
 - a. In accordance with ASTM C 1107, volume-adjusting Grade B or C at 45 degrees Fahrenheit to 90 degrees Fahrenheit.
 - b. Have 90 percent or greater bearing area under bases.
 7. Have minimum compressive strengths at 45 degrees Fahrenheit to 90 degrees Fahrenheit in accordance with ASTM C 1107 for various periods from the time of placement, including 5,000 pounds per square inch at 28 days when tested in accordance with ASTM C 109 as modified by ASTM C 1107.
- B. Cement grout:
1. Consist of concrete mix with coarse aggregate removed and water quantity adjusted as required.
 2. Use the same materials for cement grout that are used for concrete.
 3. Use water-to-cementitious materials ratio that is no more than that specified for concrete being repaired.
 4. For spreading over the surfaces of construction or cold joints. Mix with no more water used than allowed by water-to-cementitious materials ratio specified for concrete.
- C. Cement mortar:
1. Consist of concrete mix with coarse aggregate removed and water quantity adjusted as required.
 2. Use the same materials for cement mortar that are used for concrete.
 3. Use water-to-cementitious materials ratio that is no more than that specified for concrete being repaired.
 4. At exposed concrete surfaces not to be painted or submerged in water: Use sufficient white cement to make color of finished patch match that of surrounding concrete.
- D. Dry-pack mortar:
1. Mix in proportions by weight of 1 part portland cement to 2 parts of concrete sand.
 - a. Portland cement: As specified in Section 03300.
 - b. Concrete sand: As specified in Section 03300.
 2. Use only enough water so that resulting mortar will crumble to touch after being formed into ball by hand.
- E. Epoxy grout:
1. Consist of mixture of epoxy or epoxy gel and concrete sand.
 - a. Epoxy: As specified in Section 03071.
 - b. Epoxy gel: As specified in Section 03071.
 - c. Sand: Clean, bagged, graded, and kiln dried silica sand.
 2. Proportioning:
 - a. For horizontal work: Consist of mixture of 1 part epoxy with not more than 2 parts sand.
 - b. For vertical or overhead work: Consist of 1 part concrete epoxy gel with not more than 2 parts sand.
- F. Grout:
1. Mix in proportions by weight of 1 part portland cement to 4 parts of concrete sand.
 - a. Portland cement: As specified in Section ~~79-703300~~.
 - b. Concrete sand: As specified in Section ~~79-703300~~.
- G. Non-shrink grout: Mix in accordance with manufacturer's installation instructions such that resulting mix has flowable consistency and is suitable for placing by pouring.

79-21.03 CONSTRUCTION

Inspect concrete surfaces to receive grout or mortar and verify that they are free of ice, frost, dirt, grease, oil, curing compounds, paints, impregnations, and all loose material or foreign matter likely to reduce the bond or performance of grout or mortar.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

Remove grease, oil, dirt, curing compounds, laitance, and other deleterious materials that may affect bond from concrete and bottoms of baseplates.

Roughen concrete surfaces by heavy sandblasting, waterblasting, chipping, or other mechanical means then remove loose or broken concrete.

For metal surfaces sandblast to a 2 to 3 mil peak-to-valley profile.

Use mortar mixer with moving paddles for mixing grouts. For cement grouts, pre-wet the mixer and empty out excess water before beginning mixing.

- A. Cement grout:
 - 1. Exercise particular care in placing cement grout since it is required to furnish structural strength, impermeable water seal, or both.
 - 2. Do not use cement grout that has not been placed within 30 minutes after mixing.
- B. Epoxy grouts:
 - 1. Use where **indicated on the Drawings**.
 - 2. Wet surfaces with epoxy for horizontal work or epoxy gel for vertical or overhead work prior to placing epoxy grout.
- C. Non-shrink grout:
 - 1. Add non-shrink cement grout to a premeasured amount of water that does not exceed the manufacturer's maximum recommended water content.
 - 2. Mix in accordance with manufacturer's instructions to uniform consistency.
 - 3. May be drypacked, flowed, or pumped into place. Do not overwork grouts.
 - 4. Do not retemper grout by adding more water after stiffening.
- D. Curing:
 - 1. Cement based grouts:
 - a. Non-shrink grout: Cure in accordance with manufacturer's recommendations. Keep grout wet for a minimum of 7 days. Use wet burlap, a soaker hose, sun shading, ponding, and in extreme conditions, a combination of methods.
 - b. Maintain grout above 40 degrees Fahrenheit until it has attained a compressive strength of 3,000 pounds per square inch, or above 70 degrees Fahrenheit for a minimum of 24 hours to avoid damage from subsequent freezing.
- E. Epoxy based grouts:
 - 1. Cure grouts in accordance with manufacturers' recommendations.
 - a. Do not wet cure epoxy grouts.
 - 2. Do not allow any surface in contact with epoxy grout to fall below 50 degrees Fahrenheit for a minimum of 48 hours after placement.
- F. Grouting other baseplates:
 - 1. General:
 - a. All baseplate grouting shall take place from one side of a baseplate to the other in a continuous flow to avoid trapping air.
 - b. Hydrostatic head pressure shall be maintained by keeping the level of the grout in the headbox above the bottom of the baseplate. The headbox should be filled to the maximum level and the grout worked down.
 - 2. Forms and headboxes:
 - a. Build forms for grouts of material with adequate strength to withstand the placement of grouts.
 - b. Forms shall be rigid and liquidtight. Caulk cracks and joints with an elastomeric sealant. Line forms with polyethylene for easy grout release. Forms carefully wax with 2 coats of heavy-duty paste wax will also be acceptable.
 - c. Forms shall be 4 to 6 inches higher than the baseplate on one side of the baseplate configuration when using head pressure for placement.
 - 3. Non-shrink epoxy grout: Cut back epoxy grout after setting. Install epoxy grout with chamfer edges built into the formwork.

Non-shrink grout: Test for 24-hour compressive strength in accordance with ASTM C 942.

~~80 FENCES~~

~~81 MONUMENTS~~

DIVISION IX TRAFFIC CONTROL FACILITIES

~~82 MARKERS AND DELINEATORS~~

83 RAILINGS AND BARRIERS

Add to section 83-1.01:

Some locations require the "narrow roadway installation" of Midwest guardrail system.

{ XE "83-1.02B(1)_A02-21-14" }
Page 1 of 4

Section 83-1.02B(1). Use for vegetation control using minor concrete.

Replace "Reserved" in section 83-1.02B(1) with:

83-1.02B(1)(a) General

83-1.02B(1)(a)(i) Summary

1

Section 83-1.02B(1) includes specifications for constructing vegetation control areas around midwest guardrail system, metal beam guardrail to be reconstructed, and thrie beam barrier posts using minor concrete.

83-1.02B(1)(a)(ii) Definitions

2

Not Used

83-1.02B(1)(a)(iii) Submittals

3

Submit a mix design for the minor concrete to be used. The mix design must show proportions of:

1. Coarse aggregate
2. Fine aggregate
3. Cementitious material
4. Reinforcing fiber

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

5 Water

4

Include compressive strength test results with your mix design.

5

Submit the quantity in pounds of crumb rubber aggregate with your certificate of compliance for crumb rubber aggregate if used.

83-1.02B(1)(a)(iv) Quality Control and Assurance

6

Not Used

83-1.02B(1)(b) Materials

83-1.02B(1)(b)(i) General

7. Delete if par. 8 is used.

Not Used

8. Use if colored concrete is required. Insert the color. Delete par. 7.

**** KG 6/23/14**

~~The concrete color must match color no. _____ of FED-STD-595.~~

83-1.02B(1)(b)(ii) Minor Concrete

9

Minor concrete must include reinforcing fibers and may include crumb rubber aggregate.

10. Delete if crumb rubber aggregate is required.

Section 90-2.02B does not apply. Minor concrete must contain at least:

1. 505 pounds of cementitious material per cubic yard if crumb rubber aggregate is used
2. 400 pounds of cementitious material per cubic yard if crumb rubber aggregate is not used

11

The 3rd paragraph of section 90-2.02C does not apply. Minor concrete must have a maximum aggregate size of 3/8 inch.

12

All ingredients must be added at the concrete plant before delivery to the job site.

13

You may use volumetric proportioning under ASTM C 685/C 685M or section 90-3.02B.

14

Minor concrete must have a 28-day compressive strength from 1,400 to 1,800 psi.

83-1.02B(1)(b)(iii) Crumb Rubber Aggregate

15

Crumb rubber aggregate must consist of ground or granulated scrap tire rubber from automobile and truck tires. Tire buffings are not allowed. Crumb rubber aggregate must be ground and granulated at ambient temperature.

16

The gradation of the crumb rubber aggregate must comply with the requirements shown in the following table:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Gradation Requirements	
Sieve size	Percentage passing
1/2"	100
3/8"	90–100
1/4"	35–45
No. 4	5–15
No. 8	0–5
No. 16	0

17

Crumb rubber aggregate must not contain more than 0.01 percent of wire by mass of crumb rubber and must be free of oils and volatile organic compounds.

18

Commingling of crumb rubber from different sources is not allowed.

19

The crumb rubber aggregate must be 3.5 ± 0.5 percent by weight of the concrete.

83-1.02B(1)(b)(iv) Reinforcing Fibers

20

Reinforcing fibers for minor concrete must be:

1. Manufactured specifically for use as concrete reinforcement from one of the following:
 - 1.1. Polypropylene, polyethylene, or a combination of both.
 - 1.2. Copolymer of polypropylene and polyethylene.
2. Blended ratio from 4 to 5.67 parts by weight of macro synthetic fibers to 1 part by weight of micro synthetic fibers. Synthetic fibers must be:
 - 2.1. Nonfibrillated macro fibers with individual fiber lengths less than $2 \pm 1/2$ inch.
 - 2.2. Fibrillated or monofilament micro fibers of various lengths and thicknesses.
3. Supplied in sealed, degradable bags of appropriate size for adding whole bags to concrete batches.
4. From a commercial source.

21

The reinforcing fiber content of minor concrete must be from 5 to 6 lb/cu yd.

83-1.02B(1)(b)(v) Coloring Agent

22

If a color for concrete is specified in section 83-1.02B(1)(b)(i), the coloring agent must be integral to the concrete mix and added at the concrete plant.

83-1.02B(1)(b)(vi) Block-Out Material

23

Use a commercially available expanded polystyrene foam for the block-out material. The expanded polystyrene foam must have a compressive strength of 13 ± 5 psi at 10 percent deformation when tested under ASTM D1621.

24

You may substitute an alternative material that meets the compressive strength requirements of the expanded polystyrene foam if authorized.

83-1.02B(1)(c) Construction

83-1.02B(1)(c)(i) General

25

Areas to receive vegetation control must be cleared of vegetation, trash, and debris. Dispose of removed material.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

83-1.02B(1)(c)(ii) Earthwork

26

Excavate areas to receive vegetation control. Where vegetation control abuts the existing surfacing, the edge of the existing surfacing must be on a neat line or must be cut on a neat line to a minimum depth of 2 inches before removing the surfacing. The finished elevation of the excavated area to receive vegetation control must maintain planned flow lines, slope gradients, and contours of the job site.

27

Grade areas to receive vegetation control to a smooth, uniform surface and compact to a relative compaction of not less than 95 percent.

28

Dispose of surplus excavated material uniformly along the adjacent roadway except as specified in section 14-11.

83-1.02B(1)(c)(iii) Block Out

29

If block-out material is supplied in more than 1 piece, tape the pieces together to make a smooth surface on the top and sides.

30

Ensure block-out material does not move during concrete placement.

83-1.02B(1)(c)(iv) Placing Minor Concrete

31

Place minor concrete for vegetation control by hand.

32

Strike off and compact minor concrete with a mechanical or vibratory screed device. Apply a broom finish. Match the finished grade to the adjacent section of vegetation control, pavement, shoulder, or existing grade.

33

If the curing compound method is used for colored concrete, use curing compound no. 6.

83-1.02B(1)(d) Payment

34

Not Used

{ XE "83-1.02B(2)_A07-18-14" }
Page 1 of 1

Section 83-1.02B(2). Use for Type WB-31 transition railings.

Add to section 83-1.02B(2):

The offset from the face of the Type WB-31 transition railing to the hinge point must be at least 3'-6".

The offset from the face of the adjacent midwest guardrail system to the hinge point must be transitioned from the offset at the Type WB-31 transition railing to 4'-0" using a ratio of 6:1.

Section 83-1.02C(2). Use if alternative in-line terminal system is included.

Replace section 83-1.02C(2) with:

83-1.02C(2) Alternative In-Line Terminal System

Alternative in-line terminal system must be furnished and installed as shown on the plans and under these special provisions.

2

The allowable alternatives for an in-line terminal system must consist of one of the following or a Department-authorized equal.

1. TYPE SKT TERMINAL SYSTEM - Type SKT terminal system must be a SKT 350 sequential kinking terminal manufactured by Road Systems, Inc., located in Big Spring, Texas, and must include items detailed for Type SKT terminal system shown on the plans. The SKT 350 sequential kinking terminal can be obtained from the distributor, Universal Industrial Sales, P.O. Box 699, Pleasant Grove, UT 84062, telephone (801) 785-0505 or from the distributor, Gregory Highway Products, 4100 13th Street, S.W., Canton, OH 44708, telephone (330) 477-4800.
2. TYPE ET TERMINAL SYSTEM - Type ET terminal system must be an ET-2000 PLUS (4-tube system) extruder terminal as manufactured by Trinity Highway Products, LLC, and must include items detailed for Type ET terminal system shown on the plans. The ET-2000 PLUS (4-tube system) extruder terminal can be obtained from the manufacturer, Trinity Highway Products, LLC, P.O. Box 99, Centerville, UT 84012, telephone (800) 772-7976.

3

Submit a certificate of compliance for terminal systems.

4

Terminal systems must be installed under the manufacturer's installation instructions and these specifications. Each terminal system installed must be identified by painting the type of terminal system in neat black letters and figures 2 inches high on the backside of the rail element between system posts numbers 4 and 5.

5

For Type ET terminal system, the steel foundation tubes with soil plates attached must be, at the Contractor's option, either driven, with or without pilot holes, or placed in drilled holes. Space around the steel foundation tubes must be backfilled with selected earth, free of rock, placed in layers approximately 4 inches thick and each layer must be moistened and thoroughly compacted. The wood terminal posts must be inserted into the steel foundation tubes by hand and must not be driven. Before the wood terminal posts are inserted, the inside surfaces of the steel foundation tubes to receive the wood posts must be coated with a grease that will not melt or run at a temperature of 149 degrees F or less. The edges of the wood terminal posts may be slightly rounded to facilitate insertion of the post into the steel foundation tubes.

6

For Type SKT terminal system, the soil tubes must be, at the Contractor's option, driven with or without pilot holes, or placed in drilled holes. Space around the steel foundation tubes must be backfilled with selected earth, free of rock, placed in layers approximately 4 inches thick and each layer must be moistened and thoroughly compacted. Wood posts must be inserted into the steel foundation tubes by hand. Before the wood terminal posts are inserted, the inside surfaces of the steel foundation tubes to receive the wood posts must be coated with a grease that will not melt or run at a temperature of 149 degrees F or less. The edges of the wood posts may be slightly rounded to facilitate insertion of the post into the steel foundation tubes.

After installing the terminal system, dispose of surplus excavated material in a uniform manner along the adjacent roadway where designated by the Engineer.

{ XE "83-1.02C(3)_A09-16-11" }
Page 1 of 2

Section 83-1.02C(3). Use if alternative flared terminal system is included.

Replace section 83-1.02C(3) with:

83-1.02C(3) Alternative Flared Terminal System

Alternative flared terminal system must be furnished and installed as shown on the plans and under these special provisions.

2

The allowable alternatives for a flared terminal system must consist of one of the following or a Department-authorized equal.

1. TYPE FLEAT TERMINAL SYSTEM - Type FLEAT terminal system must be a Flared Energy Absorbing Terminal 350 manufactured by Road Systems, Inc., located in Big Spring, Texas, and must include items detailed for Type FLEAT terminal system shown on the plans. The Flared Energy Absorbing Terminal 350 can be obtained from the distributor, Universal Industrial Sales, P.O. Box 699, Pleasant Grove, UT 84062, telephone (801) 785-0505 or from the distributor, Gregory Industries, Inc., 4100 13th Street, S.W., Canton, OH 44708, telephone (330) 477-4800.
2. TYPE SRT TERMINAL SYSTEM - Type SRT terminal system must be an SRT-350 Slotted Rail Terminal (8-post system) as manufactured by Trinity Highway Products, LLC, and must include items detailed for Type SRT terminal system shown on the plans. The SRT-350 Slotted Rail Terminal (8-post system) can be obtained from the manufacturer, Trinity Highway Products, LLC, P.O. Box 99, Centerville, UT 84012, telephone (800) 772-7976.

3

Submit a certificate of compliance for terminal systems.

4

Terminal systems must be installed under the manufacturer's installation instructions and these specifications. Each terminal system installed must be identified by painting the type of terminal system in neat black letters and figures 2 inches high on the backside of the rail element between system posts numbers 4 and 5.

5

For Type SRT terminal system, the steel foundation tubes with soil plates attached must be, at the Contractor's option, either driven, with or without pilot holes, or placed in drilled holes. Space around the steel foundation tubes must be backfilled with selected earth, free of rock, placed in layers approximately 4 inches thick and each layer must be moistened and thoroughly compacted. The wood terminal posts must be inserted into the steel foundation tubes by hand and must not be driven. Before the wood terminal posts are inserted, the inside surfaces of the steel foundation tubes to receive the wood posts must be coated with a grease that will not melt or run at a temperature of 149 degrees F or less. The edges of the wood terminal posts may be slightly rounded to facilitate insertion of the post into the steel foundation tubes.

6

For Type FLEAT terminal system, the soil tubes must be, at the Contractor's option, driven with or without pilot holes, or placed in drilled holes. Space around the steel foundation tubes must be backfilled with selected earth, free of rock, placed in layers approximately 4 inches thick and each layer must be

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

moistened and thoroughly compacted. Wood posts must be inserted into the steel foundation tubes by hand. Before the wood terminal posts are inserted, the inside surfaces of the steel foundation tubes to receive the wood posts must be coated with a grease that will not melt or run at a temperature of 149 degrees F or less. The edges of the wood posts may be slightly rounded to facilitate insertion of the post into the steel foundation tubes.

7

After installing the terminal system, dispose of surplus excavated material in a uniform manner along the adjacent roadway where designated by the Engineer.

{ XE "83-2.02D(3)(b)_A07-19-13" }
Page 1 of 1

Section 83-2.02D(3)(b). Use for concrete barrier Type 50 or Type 60 series.

Replace the 1st paragraph of section 83-2.02D(3)(b) with:

Concrete barriers constructed using an extrusion or slip form machine or other similar type of equipment must be made of well-compacted, dense concrete, and the exposed surfaces must comply with section 51. You may be required to submit evidence of successful operation of the extrusion or slip form machine or other equipment.

Submit a QC plan for use of the extrusion or slip form construction method if reinforcement is not fixed in place before placing concrete.

The QC plan must include:

1. Contingency plan for correcting problems in production, transportation, or placement
2. Procedure for splicing concrete barrier reinforcement
3. Procedure for positioning reinforcement during extrusion or slip form operations
4. Test procedure for verifying final positions of horizontal reinforcement at 100-foot intervals, evaluated a minimum of 20 feet behind the trailing extrusion or slip form edge
5. Test report forms to be used that shows (1) positions of reinforcement relative to the top of the barrier, (2) clearance cover from the faces of the barrier to the reinforcement, and (3) station of the tests

If a QC plan is submitted, submit the test report forms within 48 hours of constructing the concrete barrier.

The Department rejects concrete barrier with any reinforcement deviating more than 1 inch from the positions shown.

{ XE "83-2.02E(3)_A05-20-11" }
Page 1 of 1

Section 83-2.02E(3). Use if Type ADIEM crash cushion is included.

Replace section 83-2.02E(3) with:

83-2.02E(3) Type ADIEM Crash Cushion

Type ADIEM crash cushion must be installed where shown.

2

Type ADIEM crash cushion must be an ADIEM-350 as manufactured by Trinity Highway Products, LLC, and must include the items shown for the crash cushion.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

3

The successful bidder can obtain the crash cushion from the manufacturer, Trinity Highway Products, LLC, P.O. Box 99, Centerville, UT 84012, telephone (800) 772-7976.

**Pars. 4 and 5. For price quotation and price expiration date, go to:
<http://oe.dot.ca.gov>.**

4

Will complete prior to PS&E ** KG 6/24/14

The price quoted by the manufacturer for the crash cushion, FOB Centerville, Utah is \$_____, not including sales tax.

5

Will complete prior to PS&E ** KG 6/24/14

The above price will be firm for orders placed on or before _____, provided delivery is accepted within 90 days after the order is placed.

6

Submit a copy of the manufacturer's plan and parts list as an informational submittal.

7

Submit a certificate of compliance for Type ADIEM crash cushion.

8

Install the crash cushion under the manufacturer's installation instructions.

9

After installing the Type ADIEM crash cushion and backup, dispose of surplus excavated material in a uniform manner along the adjacent roadway where designated by the Engineer.

{ XE "83-2.03_A07-20-12" }
Page 1 of 1

Section 83-2.03. Use to pay for one type of concrete barrier as another type.

Add to section 83-2.03:

1. Edit for appropriate barrier types. Add additional clauses for other barrier types as appropriate.

**** KG 7/02/14**

Concrete barrier (Type 736A, mod) and concrete barrier (Type 736B, mod) is are paid for as concrete barrier (Type 736, modified).

The trench footing, including reinforcing steel, excavation and backfill, is included in the payment for concrete barrier (Type 736, modified).

Concrete barrier (Type 732A, mod) is paid for as concrete barrier (Type 732, modified).

^

84 TRAFFIC STRIPES AND PAVEMENT MARKINGS

Section 84-6. Use thermoplastic traffic stripes and pavement markings with enhanced wet-night visibility in areas where improved nighttime visibility is needed. Wet-night visibility is maximized when stripes and markings are applied on porous pavements.

Replace "Reserved" in the RSS for section 84-6 with:

84-6.01 GENERAL

84-6.01A Summary

1

Section 84-6 includes specifications for applying thermoplastic traffic stripes and pavement markings with enhanced wet-night visibility.

2

Thermoplastic must comply with section 84-2.

84-6.01B Submittals

3

Submit a certificate of compliance for the glass beads.

84-6.01C Quality Control and Assurance

4

Within 14 days of applying a thermoplastic traffic stripe or pavement marking with enhanced wet-night visibility, the retroreflectivity must be a minimum of 700 mcd/sq m/lx for white stripes and markings and 500 mcd/sq m/lx for yellow stripes and markings. Test the retroreflectivity using a reflectometer under ASTM E 1710.

84-6.02 MATERIALS

5

Thermoplastic traffic stripes and pavement markings with enhanced wet-night visibility must consist of a single uniform layer of thermoplastic and 2 layers of glass beads as follows:

1. The 1st layer of glass beads must be on the Authorized Material List under high-performance retroreflective glass beads for use in thermoplastic traffic stripes and pavement markings. The color of the glass beads must match the color of the stripe or marking to which they are being applied.
2. The 2nd layer of glass beads must comply with AASHTO M 247, Type 2.

6

Both types of glass beads must be surface treated for use with thermoplastic under the bead manufacturer's instructions.

84-6.03 CONSTRUCTION

7

Use a ribbon-extrusion or screed-type applicator to apply thermoplastic traffic stripe.

8

Operate the striping machine at a speed of 8 mph or slower during the application of thermoplastic traffic stripe and glass beads.

9

Apply thermoplastic traffic stripe at a rate of at least 0.38 lb/ft of 4-inch-wide solid stripe. The applied thermoplastic traffic stripe must be at least 0.090 inch thick.

11

12

13

14

AA

AA

Special Provisions

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

2. Use if electrical work is shown on plans other than electrical plans. Edit for installation types and locations.

JS

Locations of _____ installations are shown on the _____ plans.

Pars. 3–5. Identify structures by name and number. Delete the paragraph if not needed.

3

JS

**** MS 7/15/14**

Lighting equipment is included in the following structures:

1. Deer Creek Bridge at EB SR 4 Onramp.
2. Balfour Road UC (Right).

4

JS

Communication conduit is included in the following structures:

1. _____
2. _____

5

JS

Sprinkler control conduit is included in the following structures:

1. _____
2. _____

6. Use if electrical work is performed at more than 1 location. Edit for other application types.

JS

Traffic signal work must be performed at the following locations:

1. Balfour Rd / Route 4 Bypass (Location 1)
2. Balfour Rd / SB Route 4 Off Ramp (Location 2)
3. Balfour Rd / NB Route 4 Off Ramp (Location 3)
4. Balfour Rd / Eagle Rock Wy / Cartona Wy (Location 4)

{ XE "86-1.03_A07-19-13" }
Page 1 of 1

Section 86-1.03. Use for a lump sum bid item for electrical system work.

1. Use if the number of days after Contract approval for submitting a schedule of values is not 15 days.

JS

Replace "15" in the 1st paragraph of the RSS for section 86-1.03 with:

2. Insert additional items as necessary.

JS

Add to the list in the 5th paragraph of the RSS for section 86-1.03:

14. Materials shown in the quantity tables on sheets labeled *Electrical Quantities*
15. _____
16. _____

{ XE "86-1.06A_A05-20-11" }

Page 1 of 1

Section 86-1.06A. Use if signal system shutdowns are only allowed during specific hours and lane closures are not specified under section 12-4.

Replace the 3rd paragraph of section 86-1.06A with:

JS

Traffic signal system shutdowns are limited to periods between the hours of 9:00 a.m. and 3:00 p.m.

{ XE "86-1.06B_A05-20-11" }

Page 1 of 3

Section 86-1.06B. Use in all projects unless the District's Traffic Operations Electrical Representative provides an exception based on zero existing TMS elements within the project limits.

Do not use for building projects.

Use BEES item 860090 Maintaining Existing Traffic Management System Elements During Construction.

Replace "Reserved" in section 86-1.06B with:

Traffic Management System (TMS) elements include, but are not limited to ramp metering (RM) system, communication system, traffic monitoring stations, video image vehicle detection system (VIVDS), microwave vehicle detection system (MVDS), loop detection system, changeable message sign (CMS) system, extinguishable message sign (EMS) system, highway advisory radio (HAR) system, closed circuit television (CCTV) camera system, roadway weather information system (RWIS), visibility sensor, and fiber optic system.

2

Existing TMS elements, including detection systems, shown and located within the project limits must remain in place and be protected from damage. If the construction activities require existing TMS elements to be nonoperational or off line, and if temporary or portable TMS elements are not shown, the Contractor must provide for temporary or portable TMS elements. The Contractor must receive authorization on the type of temporary or portable TMS elements and installation method.

3. Designer to generate a notice to Construction (in RE pending file) to coordinate with the Department's Traffic Operations Electrical Representatives for operational status check/meeting.

Before work is performed, the Engineer, the Contractor, and the Department's Traffic Operations Electrical representatives must jointly conduct a pre-construction operational status check of all existing TMS elements and each element's communication status with the Traffic Management Center (TMC),

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

including existing TMS elements not shown and elements that may not be impacted by the Contractor's activities. The Department's Traffic Operations Electrical representatives will certify the TMS elements' location and status, and provide a copy of the certified list of the existing TMS elements within the project limits to the Contractor. The status list will include the operational, defined as having full functionality, and the nonoperational components.

4

The Contractor must obtain authorization at least 72 hours before interrupting existing TMS elements' communication with the TMC that will result in the elements being nonoperational or off line. The Contractor must notify the Engineer at least 72 hours before starting excavation activities.

5

Traffic monitoring stations and their associated communication systems, which were verified to be operational during the pre-construction operational status check, must remain operational on freeway/highway mainline at all times, except:

1. For a duration of up to 15 days on any continuous segment of the freeway/highway longer than 3 miles
2. For a duration of up to 60 days on any continuous segment of the freeway/highway shorter than 3 miles

6

If the construction activities require existing detection systems to be nonoperational or off line for a longer time period or the spacing between traffic monitoring stations is more than the specified criteria above, and temporary or portable detection operations are not shown, the Contractor must provide provisions for temporary or portable detection operations. The Contractor must receive authorization on the type of detection and installation before installing the temporary or portable detection.

7. Designer to modify the maximum acceptable number of "hours or working days" for every TMS element after verification with its operating division/owner when different from "24 hours."

If existing TMS elements shown or identified during the pre-construction operational status check, except traffic monitoring stations, are damaged or fail due to the Contractor's activity, where the elements are not fully functional, the Engineer must be notified immediately. If the Contractor is notified by the Engineer that existing TMS elements have been damaged, have failed or are not fully functional due to the Contractor's activity, the damaged or failed TMS elements, excluding structure-related elements, must be repaired or replaced, at the Contractor's expense, within 24 hours. For a structure-related elements, the Contractor must install temporary or portable TMS elements within 24 hours. For nonstructure-related TMS elements, the Engineer may authorize temporary or portable TMS elements for use during the construction activities.

8. Use if project includes fiber optic specifications.

JS

If fiber optic cables are damaged due to the Contractor's activities, the Contractor must install new fiber optic cables from an original splice point or termination to an original splice point or termination, unless otherwise authorized. Fiber optic cable must be spliced at the splice vaults if available. The amount of new fiber optic cable slack in splice vaults and the number of new fiber optic cable splices must be equivalent to the amount of slack and number of splices existing before the damage or as directed by the Engineer. Fusion splicing will be required.

9

The Contractor must demonstrate that repaired or replaced elements operate in a manner equal to or better than the replaced equipment. If the Contractor fails to perform required repairs or replacement work, the Department may perform the repair or replacement work and the cost will be deducted from monies due to the Contractor.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

10

A TMS element must be considered nonoperational or off line for the duration of time that active communications with the TMC is disrupted, resulting in messages and commands not transmitted from or to the TMS element.

11

The Contractor must provide provisions for replacing existing TMS elements within the project limits, including detection systems, that were not identified on the plans or during the pre-construction operational status check that became damaged due to the Contractor's activities.

12

If the pre-construction operational status check identified existing TMS elements, then the Contractor, the Engineer, and the Department's Traffic Operations Electrical representatives must jointly conduct a post construction operational status check of all existing TMS elements and each element's communication status with the TMC. The Department's Traffic Operations Electrical representatives will certify the TMS elements' status and provide a copy of the certified list of the existing TMS elements within the project limits to the Contractor. The status list will include the operational, defined as having full functionality, and the nonoperational components. TMS elements that cease to be functional between pre and post construction status checks must be repaired at the Contractor's expense.

13

The Engineer will authorize the schedule for final replacement, the replacement methods and the replacement elements, including element types and installation methods before repair or replacement work is performed. The final TMS elements must be new and of equal or better quality than the existing TMS elements.

14

If no electrical work exists on the project and no TMS elements are identified within the project limits, the pre-construction operational status check is change order work.

15

Furnishing and installing temporary or portable TMS elements that are not shown, but are required when an existing TMS element becomes nonoperational or off line due to construction activities, is change order work.

16

Furnishing and installing temporary or portable TMS elements and replacing TMS elements that are not shown nor identified during the pre-construction operational status check and were damaged by construction activities is change order work.

17

If the Contractor is required to submit provisions for the replacement of TMS elements that were not identified, submitting the provisions is change order work.

{ XE "86-2.03B_A05-20-11" }
Page 1 of 1

Section 86-2.03B. Use for Type 1 foundation.

1. Use if sleeve nuts are required. Edit for type of standard.

JS

Add to section 86-2.03B:

Use sleeve nuts on Type ~~1-A~~ 1-B standards. The bottom of the base plate must be flush with finished grade.

JS

Section 86-2.04A. Use for section 86 work requiring standards, steel pedestals, or posts.

Add to section 86-2.04A:

1. Use if signal mast arms are included and tip tenon substitution is allowed.

~~Where the side tenon detail at the end of the signal mast arm is shown, you may substitute the applicable tip tenon detail.~~

2. Use if mast arm mounted signs are included.

The sign mounting hardware must be installed at the locations shown.

JS

3. Use if mast arm mounted signs are Department furnished.

~~The sign panels will be Department furnished.~~

4. Use if non-illuminated street name signs are included.

JS

~~Install non-illuminated street name signs on signal mast arms using a minimum 3/4 by 0.020-inch round edge stainless steel strap and saddle bracket. Wrap the strap at least twice around the mast arm, tighten, and secure with a 3/4-inch stainless strap seal. Level the sign panel and tighten the hardware securely.~~

5. Use if Type 1 signal standards are included.

Set the Type 1 standards with the handhole on the downstream side of the pole in relation to traffic or as shown.

Section 86-2.05. Use if conduit is included.

1. Edit for type of conduit allowed.

Add to section 86-2.05A:

Conduit installed underground must be Type 1 or Type 3.

2. Edit for type of conduit allowed.

JS

Add to section 86-2.05B:

The conduit in a foundation and between a foundation and the nearest pull box must be Type 1 ~~or Type 3.~~

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

3. Use if applicable. Edit for type of metal conduit if not Type 1.

Add to section 86-2.05C:

If a standard coupling cannot be used for joining Type 1 conduit, use a UL-listed threaded union coupling under section 86-2.05C, a concrete-tight split coupling, or a concrete-tight set screw coupling.

4. Delete if concrete backfill is not required.

If Type 3 conduit is placed in a trench, not in the pavement or under concrete sidewalk, after the bedding material is placed and the conduit is installed, backfill the trench to not less than 4 inches above the conduit with minor concrete under section 90-2, except the concrete must contain not less than 421 pounds of cementitious material per cubic yard. Backfill the remaining trench to finished grade with backfill material.

5. Edit as required.

After conductors have been installed, the ends of the conduits terminating in pull boxes, service equipment enclosures, and controller cabinets must be sealed with an authorized type of sealing compound.

6. Use if, at conduit locations, the vertical location of existing high priority subsurface installations have not been determined by field survey. Delete this par. and "other" from par. 7 if no high priority subsurface installations exist.

At those locations where conduit is required to be installed under pavement and underground facilities designated as high priority subsurface installation under Govt Code § 4216 et seq. exist, conduit must be placed by the trenching in pavement method under section 86-2.05C.

7. The 5-minute delay to vehicles may be edited as required. For delays greater than 15 minutes, provide written authorization from District Traffic Manager. Delete if not needed.

At other locations where conduit is required to be installed under pavement and if a delay to vehicles will not exceed 5 minutes, conduit may be installed by the trenching in pavement method.

8. May be used if structure pull boxes are included.

The final 2 feet of conduit entering a pull box in a reinforced concrete structure may be Type 4.

{ XE "86-2.06_A07-19-13" }
Page 1 of 3

Section 86-2.06. Use for pull boxes.

1. Use if the bottom of the pull box is not to be grouted.

Replace the 3rd paragraph in section 86-2.06A(2) of the RSS for section 86-2.06 with:

In a ground or sidewalk area, embed the bottom of a pull box in crushed rock.

Replace "Reserved" in section 86-2.06B of the RSS for section 86-2.06 with:

86-2.06B(1) General

86-2.06B(1)(a) Summary

2

Section 86-2.06B includes specifications for installing non-traffic-rated pull boxes.

86-2.06B(1)(b) Submittals

3

Before shipping pull boxes to the job site, submit a list of materials used to fabricate the pull boxes to METS. Include:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

1. Contract number
2. Manufacturer's name
3. Manufacturer's installation instructions
4. Your contact information

4

Submit reports for pull boxes from an NRTL-accredited laboratory.

5

Before installing a pull box and cover, submit the manufacturer's replacement warranty for them.

86-2.06B(1)(c) Quality Control and Assurance

86-2.06B(1)(c)(i) Functional Testing

6

The pull box and cover must be tested under ANSI/SCTE 77, "Specification for Underground Enclosure Integrity."

86-2.06B(1)(c)(ii) Warranty

7

Provide a 2-year manufacturer's replacement warranty for the pull box and cover. The warranty period starts on the date of Contract acceptance.

8. Insert the District maintenance address.

JS

Deliver replacement parts within 5 business days after you receive notification of a failed pull box, cover, or both to the Department's Maintenance Electrical Shop at:

30 Rickard Street, San Francisco, CA 94134, (415) 330-6500

86-2.06B(2) Materials

9

The pull box and cover must comply with ANSI/SCTE 77, "Specification for Underground Enclosure Integrity," for tier 22 load rating and must be gray or brown.

10. Use for a new pull box.

Each pull box cover must have an electronic marker cast inside.

11

A pull box extension must be made of the same material as the pull box and attached to the box to maintain the minimum combined depths.

12

Include recesses for a hanger if a transformer or other device must be placed in a pull box.

13

The bolts, nuts, and washers must be a captive design.

14

The captive bolt must be capable of withstanding a torque from 55 to 60 ft-lb and a minimum pull-out strength of 750 lb. Perform the test with the cover in place and the bolts torqued. The pull box and cover must not be damaged while performing the test.

15

Hardware must be stainless steel with 18 percent chromium and 8 percent nickel content.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

16

Galvanize ferrous metal parts under section 75-1.05.

17

The manufacturer's instructions must include:

1. Quantity and size of entries that can be made without degrading the strength of the pull box below the tier 22 load rating
2. Locations where side entries cannot be made
3. Acceptable method for creating the entry

18

The tier 22 load rating must be labeled or stenciled by the manufacturer on the inside and outside of the pull box and on the underside of the cover.

86-2.06B(3) Construction

19

Do not install a pull box in curb ramps or driveways.

20

A pull box for a post or a pole standard must be located within 5 feet of the standard. Place the pull box adjacent to the back of the curb or edge of the shoulder. If this is impractical, place the pull box in a suitable, protected, and accessible location.

Pars. 21–22. Delete if no pull box is to be buried.

21

Cover the pull box with a plastic sheet and then bury it in soil from 6 to 8 inches below grade.

22

Plastic sheets must be 20 mil thick and made of HDPE or PVC virgin compounds.

23. Delete if no damaged pull boxes or pull box covers are to be replaced.

JS

~~If only the cover is to be replaced, anchor the cover to the pull box.~~

{ XE "86-2.08_A05-20-11" }
Page 1 of 1

Section 86-2.08. Use for all Electrical projects.

1. Edit as applicable.

Add to section 86-2.08A:

JS

~~Wrap conductors around the projecting end of conduit in pull boxes as shown.~~ Secure conductors and cables to the projecting end of the conduit in pull boxes.

2. Edit for cable type. If both types are allowed, delete the par.

Replace the 1st sentence of the 1st paragraph of section 86-2.08E with:

JS

Signal interconnect cable must be the ~~3-pair~~ 6-pair type with stranded tinned copper no. 20 conductors.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Add section 86-2.08F:

86-2.08F Telephone Cable (TC)

Telephone cable (TC) must consist of 6 pairs of No. 19 solid copper conductors. Conductors must be twisted in pairs. Each conductor must be insulated with a high molecular weight, heat stabilized, color-coded polyethylene material. The insulation must be 440 µm nominal.

Color coded for TC must be as follows:

1. White/Blue
2. White/Orange
3. White/Green
4. White/Brown
5. White/Grey
6. Red/Blue

The core must be protected by a non-hygroscopic polyester film with a single longitudinally applied 120 µm thick corrugated copper shield or 190 µm thick plastic coated aluminum shield. A moisture barrier of petrolatum-polyethylene compound must be applied over the core tape and over and under the cable shield to fill all cable interstices.

The cable must be provided with an outer jacket of extruded, black, high molecular weight, heat stabilized polyethylene material. The outer jacket must have a thickness of 3/50 inch nominal. The outer diameter of the cable must be 3/5 inch maximum.

Splices are not allowed.

All conductors must be terminated inside the telephone demarcation cabinet and the controller cabinet. All connections from the TBO terminal block to the 8-position connecting block must be via a cable consisting of 2 pairs of No. 22 solid conductors and must meet the same specifications as the TC cable.

{ XE "86-2.09E_A10-19-12" }
Page 1 of 1

Section 86-2.09E. Use for conductors that allow only 1 type of splice insulation.

Pars. 1–2. Use if only "Method B" insulation is allowed. Delete pars. 3 and 4.

Replace the 1st paragraph of section 86-2.09E with:

Splices must be insulated by "Method B."

2

Delete the 6th and 7th paragraphs of section 86-2.09E.

Pars. 3–4. Use if "Method B" insulation is not allowed. Delete pars. 1 and 2.

3

Replace the 1st paragraph of section 86-2.09E with:

~~Splices must be insulated by "Heat-shrink tubing."~~

JS

4

JS

~~**Delete the 8th paragraph of section 86-2.09E.**~~

Section 86-2.11A. Use for projects with new service equipment enclosures.

Add to section 86-2.11A:

1. Delete if continuous welding of exterior seams in service equipment enclosures is required.

Continuous welding of exterior seams in service equipment enclosures is not required.

2. Edit to specify required circuit-breaker mounting. Delete if not needed.

Circuit breakers must be the cable-in/cable-out type mounted on non-energized clips. All circuit breakers must be mounted vertically with the up position of the handle being the "ON" position.

3. Use for Model 500 changeable message signs.

JS

~~Circuits with Model 500 changeable message signs must have service equipment enclosures that have main busses and terminal lugs rated for 100 A, minimum, and a no. 2 bare copper ground wire.~~

4. Edit the circuit breaker rating as required by the service utility.

Each service must be provided with up to 2 main circuit breakers that will disconnect ungrounded service entrance conductors. Where the "Main" circuit breaker consists of 2 circuit breakers as described, each of the circuit breakers must have a minimum interrupting capacity of 10,000 A, rms.

5. Use for District 11 projects or if required by the service utility.

~~Replace item 9 in the list in the 5th paragraph of section 86-2.11A with:~~

JS

~~Circuit breakers used as service disconnect equipment must have a minimum interrupting capacity of 42,000 A, rms, for 120/240 V(ac) services and 30,000 A, rms, for 480 V(ac) services.~~

6. Use if corrosion is expected to be a problem.

Replace 7th and 8th paragraphs of section 86-2.11A with:

Service equipment enclosures must be the aluminum type.

Section 86-2.11B. Use for projects with electric service for irrigation.

1. Edit as required.

JS

~~Replace "Reserved" in section 86-2.11B with:~~

~~Electric service (irrigation) must be from the service points to the irrigation controllers (IC) and to the spaces provided in the irrigation controller enclosure cabinets (CEC) for irrigation controllers as shown.~~

2. Edit or delete as applicable.

JS

~~Irrigation Controller (IC) _____ : Electric service (irrigation) must be a metered 120/240 V (ac), single-phase service with service disconnects in a NEMA Type 3R enclosure and surface mounted on the _____ pole. Service disconnects and metering equipment may be in a common enclosure if approved by the serving utility.~~

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

3. Edit or delete as applicable.

JS

Irrigation Controller (IC) _____ : Electric service (irrigation) must be an unmetered 120/240 V (ac), single phase service with service disconnects in a NEMA Type 3R enclosure and surface mounted on the _____ pole.

4. Edit or delete as applicable.

JS

Irrigation Controller (IC) _____ : A single pole, 1520 A circuit breaker must be installed in the existing Type III service equipment enclosure as shown on plans. The circuit breaker must be of the same manufacturer and model and interrupting capacity as the existing circuit breakers.

5. Edit or delete as applicable.

JS

Irrigation Controller (IC) _____ : Electric service (irrigation) must be _____ V (ac) obtained from the existing pull box.

6. Edit or delete as applicable.

JS

Irrigation Controller (IC) _____ : Electric service (irrigation) must be a metered 120/240 V(ac), single phase service in a Type III service equipment enclosure.

7. Edit or delete as applicable.

JS

Irrigation Controller (IC) _____ : Electric service (irrigation) must be an unmetered 120/240 V(ac), single phase service in a Type III service equipment enclosure.

8

JS

Service disconnects in service equipment enclosures must be _____ pole, _____ A circuit breaker.

9.

JS

Nameplate inscriptions must be as follows:

Item	Inscription
Metering equipment enclosure	IC _____
Service disconnect	IC _____

10

JS

The inscription on the other nameplates must be the letter designation used on the plans and in the special provisions.

11. Use if electric service (irrigation) is paid for as a separate item. Edit as required.

JS

Conductors, conduit, and pull boxes to the pull box adjacent to irrigation controller enclosure cabinets and irrigation controllers are included in the payment for electric service (irrigation).

Section 86-2.18. Use in all projects with electrical work.

1. Use if inventory/identification numbers are shown but are to be placed by State forces. Delete pars. 2 and 3.

Replace section 86-2.18 with:

86-2.18 NUMBERING ELECTRICAL EQUIPMENT

The placement of numbers on electrical equipment will be done by others.

Pars. 2 and 3. Use if edge sealer is not used.

2

~~Replace 1st paragraph of section 86-2.18 with:~~

~~Place numbers on the equipment as ordered.~~

JS

3

JS

~~Delete 2nd sentence of 3rd paragraph of section 86-2.18.~~

Section 86-3.04. Use if Contractor-furnished Model 334L or 336L cabinets without 170/2070 assemblies are required.

Use if Contractor-furnished cabinets for CCTV, RWIS, HAR, EMS, TMS, WIM, AVC, or similar applications are required.

Add to section 86-3.04:

1. Use for Model 334L Contractor-furnished cabinets. Edit for required equipment. Add "Model 208 watch dog monitor" to the list if a Department-furnished Model 170/2070 cabinet is needed for the application.

Cabinet must be Model 334L and consist of a housing (B), a mounting cage 1, and the following listed equipment. The equipment must comply with chapter 6 of TEES.

1. Service panel no. 1
2. Power distribution assembly no. 3
3. Input file (I file)
4. C1 harness
5. Controller and equipment shelves
6. Dual fan assembly with thermostatic control
7. Mechanical armature-type relays
8. Input panel
9. Model 208 watch dog monitor
10. 170E controller assembly

2. Use if cabinets contain Contractor-furnished electrical or electronic equipment and testing at METS is required. Edit for cabinet type.

JS

Before shipping to the job site, submit each Model 334L cabinet to METS for acceptance testing.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

3. Use if applicable and edit for cabinet type.

JS

Notify the Engineer when each Model 334L cabinet is ready for functional testing. Functional testing will be conducted by the Department.

4. Suggested circuit breakers are listed. Edit as required for the work.

Each power distribution assembly must include the following equipment:

1. Two duplex NEMA 5-15R controller receptacle (rear mount)
2. One 30 A, 1-pole, 120 V(ac) main circuit breaker
3. Three 15 A, 1-pole, 120 V(ac) circuit breaker
4. One duplex GFCI NEMA 15 A, receptacle (front mount)

5

Furnish 3 shelves as shown. Each shelf must be attached to the tops of 2 supporting angles with 4 screws. Supporting angles must extend from the front to the back rails. The front of the shelf must abut the front member of the mounting cage. Arrange shelves as shown. The angles must be designed to support a minimum of 50 pounds each. The horizontal side of each angle must be a minimum of 3 inches. The angles must be vertically adjustable.

6

Furnish 3 terminal blocks as shown. Terminal blocks must comply with Chapter 6 of TEES, except the screw size must be 8-32.

7

Furnish a maintenance manual or a combined maintenance and operation manual for all controller units, auxiliary equipment, vehicle detector sensor units, control units, and amplifiers. Submit manual when the controllers are delivered for testing or, if ordered by the Engineer, before purchasing. The manual must include the following:

1. Specifications
2. Design characteristics
3. General operation theory
4. Function of all controls
5. Troubleshooting procedure (diagnostic routine)
6. Block circuit diagram
7. Geographical layout of components
8. Schematic diagrams
9. List of replaceable component parts with stock numbers

{ XE "86-4.01D_A05-20-11" }
Page 1 of 1

Section 86-4.01D. Use if installing signal face with circular, arrows, U turn, bicycle, programmable visibility, or lane control sections.

1. Edit for shop location.

Replace section 86-4.01D(1)(c)(ii) with:

86-4.01D(1)(c)(ii) Warranty

JS

The manufacturer must provide a written warranty against defects in materials and workmanship for LED signal modules for a minimum period of 48 months after installation of LED signal modules. Replacement LED signal modules must be provided within 15 days after receipt of failed LED modules at your expense. The Department pays for shipping the failed modules to you. All warranty documentation must be

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

submitted to the Engineer before installation. Replacement LED signal modules must be delivered to State Maintenance Electrical Shop at 30 Rickard Street, San Francisco, CA 94134, (415) 330-6500.

2. Edit size and types of LED used.

Add to section 86-4.01D(2)(a):

JS

LED signal module must be manufactured for 12-inch circular 8-inch circular, and arrow, ~~U-turn, bicycle,~~
~~and lane control~~ sections.

{ XE "86-4.03H_A07-19-13" }

Page 1 of 5

Section 86-4.03H. Use for LED countdown PSF modules.

Under Traffic Operations Policy Directive TR-0011, pedestrian countdown timers must be installed (1) at all new signalized intersections and signalized pedestrian crossings and (2) at modified signalized intersections or pedestrian crossings if more than 50 percent of the existing pedestrian signals or pedestrian push buttons are being replaced.

Replace section 86-4.03H with:

86-4.03H LED Countdown Pedestrian Signal Face Modules

86-4.03H(1) General

86-4.03H(1)(a) Summary

1

Section 86-4.03H includes specifications for installing a LED countdown PSF module into a standard Type A pedestrian signal housing. Comply with TEES.

86-4.03H(1)(b) Definitions

2

Not Used

86-4.03H(1)(c) Submittals

3

Before shipping LED countdown PSF modules to the job site, submit all modules and the following items to METS:

1. Delivery form with Contract number and contact information
2. Installation manual and schematic wiring diagram
3. Product information, including manufacturer's name and month and year of manufacture
4. List of model, lot, and serial numbers

4

Submit documentation of the manufacturer's production QA, including test data showing the modules comply with the following requirements:

1. Luminous intensity as shown in the table titled "Luminance Values."
2. Power factor after burn-in.
3. Test current flow measurements in amperes after burn-in. The measured values must comply with the design qualification figures. Record the measured ampere values with rated voltage on the product labels.

5

Submit the manufacturer's warranty before installing LED countdown PSF modules.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

86-4.03H(1)(d) Quality Control and Assurance

86-4.03H(1)(d)(i) General

6

The Engineer rejects a module if a visual inspection reveals any of the following defects:

1. Exterior physical damage
2. Assembly anomalies
3. Scratches
4. Abrasions
5. Cracks
6. Chips
7. Discoloration
8. Other surface defects

7

The Department tests LED countdown PSF modules under ANSI/ASQ Z1.4 and California Test 606. The module submitted for testing must be representative of typical production units.

8

Comply with testing requirements for electrical material and equipment under section 86-2.14.

86-4.03H(1)(d)(ii) Warranty

9

JS

Provide a 5-year manufacturer's replacement warranty against defects or failures. The warranty period starts on the date of Contract acceptance. Furnish replacement parts within 15 days after notification of a failed module. The Department does not pay for replacement modules. Deliver replacement modules to the Department's Maintenance Electrical Shop at:

30 Rickard Street, San Francisco, CA 94134, (415) 330-6500.

86-4.03H(2) Materials

10

A LED countdown PSF module must:

1. Use LED as the light source.
2. Be made of material complying with ASTM D 3935.
3. Be designed to mount behind or to replace face plates of a standard Type A housing as specified in the ITE publication *Equipment and Material Standards*, chapter 3, "Pedestrian Traffic Control Signal Indications," and the *California MUTCD*.
4. Have a minimum power consumption of 10 W for the "Upraised Hand."
5. Have internal components supported such that they withstand mechanical shock and vibration from high winds and other sources.
6. Use the required color and be the ultra-bright type rated for 100,000 hours of continuous operation for a temperature range from -40 to +74 degrees C.
7. Have replaceable signal lamp optical units.
8. Fit into the housing of a pedestrian signal section without modification.
9. Be a single, self-contained device that does not require on-site assembly for installation.
10. Have the following information permanently marked on the back of the module:
 - 10.1. Manufacturer's name
 - 10.2. Trademark
 - 10.3. Model number
 - 10.4. Serial number
 - 10.5. Lot number
 - 10.6. Month and year of manufacture

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

- 10.7. Required operating characteristics, including:
 - 10.7.1. Rated voltage
 - 10.7.2. Power consumption
 - 10.7.3. Volt-ampere
 - 10.7.4. Power factor
- 11. Have prominent and permanent vertical markings for accurate indexing and orientation within the signal housing if a specific mounting orientation is required. Markings must be a minimum of 1 inch in height and include an up arrow and the word "up" or "top."

11

The circuit board and the power supply must be contained inside of the LED countdown PSF module. The circuit board must comply with TEES, chapter 1, section 6.

12

The enclosure containing the power supply or the electronic components of the module, except the lens, must be made of UL 94 V-0 flame-retardant material.

13

Each symbol must be at least 9 inches high and 5-1/4 inches wide. The lens' signal output for the "Walking Person" and "Upraised Hand" symbols and the countdown display must not exceed a ratio of 5 to 1 for the highest and lowest luminance values. The symbols must comply with ITE publication *Equipment and Material Standards*, chapter 3, "Pedestrian Traffic Control Signal Indications," and the *California MUTCD*. The 2-digit countdown timer, "Upraised Hand," and "Walking Person" indications must be electronically isolated from each other. The 3 indications must not share a power supply or interconnect circuitry.

14

The module must maintain an average luminance value for at least 5 years of continuous signal operation for a temperature range from -40 to +74 degrees C.

15

The module must operate over the specified ambient temperature and voltage range and be readable both day and night at distances up to the full width of the area to be crossed. Upon initial testing at 25 degrees C, the module must have at least the luminance values shown in the following table:

Luminance Values

PSF module symbol	Luminance
"Upraised Hand" and 2-digit countdown timer	1,094 fL
"Walking Person"	1,547 fL

16

The color output of the module must comply with chromaticity requirements in section 5.3 of ITE publication *Equipment and Material Standards* chapter 3, "Pedestrian Traffic Control Signal Indications."

17

When operating over a temperature range from -40 to +74 degrees C, the measured chromaticity coordinates of the module must comply with the following requirements for 5 years after Contract acceptance:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Chromaticity Standards (CIE Chart)

"Upraised Hand" and 2-digit countdown timer (portland orange)	$0.600 \leq X \leq 0.659$ Y: Not greater than 0.390 or less than 0.331 or less than $0.990 - X$
"Walking Person" (lunar white)	X: Not less than 0.280 or greater than 0.400 Y: Not less than $0.0483 + 0.7917 \cdot X$ or greater than $0.0983 + 0.7917 \cdot X$

18

The module must not exceed the power consumption requirements shown in the following table:

Maximum Power Consumption Requirements

PSF module display	At 24 °C	At 74 °C
"Upraised Hand"	10.0 W	12.0 W
"Walking Person"	9.0 W	12.0 W
2-digit countdown timer	6.0 W	8.0 W

19

The wiring and terminal block must comply with section 13.02 of ITE publication *Equipment and Material Standards*, chapter 2, "Vehicle Traffic Control Signal Heads." The PSF module must have spade lugs and 3 secured, jacketed copper wires that comply with NEC and are:

1. Color coded
2. 3 feet long
3. 600 V(ac)
4. 20 AWG minimum stranded
5. Rated for service at +105 degrees C

20

The module must operate:

1. At a frequency of 60 ± 3 Hz over a voltage range from 95 to 135 V(ac) without flicker perceptible to the unaided eye. Fluctuations of the line voltage must have no visible effect on the luminous intensity of the indications. The rated voltage for measurements must be 120 V(ac).
2. With currently-used Department controller assemblies, including solid-state load switches, flashers, and conflict monitors. Comply with TEES, chapters 3 and 6. If an alternating current of 20 mA or less is applied to the unit, the voltage read across the 2 leads must not exceed 15 V(ac).
3. With a smart control and regulation mode that exhibits countdown displays automatically adjusted to the traffic controller's programmed intervals.

21

The countdown PSF module must operate during the pedestrian change interval. The module must begin counting down when the flashing "Upraised Hand" interval turns on, counting down to 0 and turning off when the steady "Upraised Hand" interval turns on.

22

The module's on-board circuitry must:

1. Include voltage surge protection to withstand high-repetition noise transients. The voltage surge protection must comply with NEMA Standard TS, section 2.1.6.
2. Comply with Class A emission limits for electronic noise under 47 CFR 15, subpart B.

23

The module must provide a power factor of 0.90 or greater.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

24

The total harmonic distortion from a current and voltage induced in an alternating-current power line by a PSF module must not exceed 20 percent at an operating temperature of 25 degrees C.

25

The module's circuitry must prevent light emission perceptible to the unaided eye when a voltage of 50 V(ac) or less is applied to the unit.

26

When power is applied to the module, light emission must occur within 90 ms.

86-4.03H(3) Construction

27

Use LED countdown PSF modules from the same manufacturer.

28

Install the module in a standard Type A pedestrian signal housing. Special tools must not be required for installing the modules.

29

The installation of the module into the pedestrian signal face must require only the removal of the lens, reflector, and existing LED module.

86-4.03H(4) Payment

30

Not Used

{ XE "86-4.03I_A07-19-13" }
Page 1 of 1

Section 86-4.03I. Use if installing Type A pedestrian signal face modules.

1

Add to section 86-4.03I(1)(b):

Submit warranty documentation as an informational submittal before installing LED PSF modules.

2. Insert the address for the District's maintenance electrical shop.

JS

Replace section 86-4.03I(1)(c)(ii) with:

86-4.03I(1)(c)(ii) Warranty

Submit a 5-year manufacturer's warranty against defects in materials and workmanship for LED PSF modules. The 5-year warranty period starts on the date of Contract acceptance. Furnish replacement modules within 15 days after receiving the failed modules. The Department does not pay for replacement modules. Deliver replacement modules to the Department's Maintenance Electrical Shop at:

30 Rickard Street, San Francisco, CA 94134, (415) 330-6500.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Add to the 6th paragraph in section 86-4.03I(2):

3. Specify items to be removed.

JS

Installation of the LED PSF module into the pedestrian signal face only requires the removal of lenses, reflectors, and existing LED modules.

{ XE "86-4.03J_A07-19-13" }

Page 1 of 1

Section 86-4.03J. Use for ramp metering signs.

Add to section 86-4.03J:

The "Meter On" sign must be a Type A pedestrian signal modified such that the reflector is a single chamber.

{ XE "86-5.01A(1)_A05-20-11" }

Page 1 of 1

Section 86-5.01A(1). Use if detectors are included.

Add to section 86-5.01A(1):

Pars 1–2. Use if applicable and edit as required. If all types are acceptable, delete pars.

1

JS

Loop wire must be ~~Type 1~~ Type 2.

2

JS

Loop detector lead-in cable must be ~~Type B~~ Type C.

3. Edit for sealant type. Delete if Type E loops are the only type allowed.

JS

Slots must be filled with elastomeric sealant ~~or asphaltic emulsion sealant~~ hot-melt rubberized asphalt sealant.

Pars 4–5. Use if circular loops are allowed. Delete loop types not applicable.

JS

4

You may use a Type E loop where a Type A ~~or a Type B~~ loop is shown.

5

For Type E detector loops, sides of the slot must be vertical and the minimum radius of the slot entering and leaving the circular part of the loop must be 1-1/2 inches. Slot width must be a maximum of 5/8 inch. Loop wire for circular loops must be Type 2. Slots of circular loops must be filled with elastomeric sealant or hot-melt rubberized asphalt sealant.

6. Use if deeper sawed slots are required and the pavement depth is adequate.

The depth of the loop sealant above the top of the uppermost loop wire in the sawed slots must be 2 inches, minimum.

7. Use if epoxy slot sealant is optional on PCC pavement.

Fill slots in concrete with elastomeric, hot-melt rubberized asphalt or epoxy sealant for loop detectors.

{ XE "86-5.01D_A07-19-13" }
Page 1 of 7

Section 86-5.01D. Use for emergency vehicle detector system.

Do not pay for this equipment with State/Federal gas tax funds. If required, add a bid item and a pay clause to cover this equipment in order to bill the local agency.

Replace "Reserved" in section 86-5.01D with:

86-5.01D(1) General

1

Each traffic signal must have an emergency vehicle detector system that must comply with the details shown and the special provisions.

2

Each emergency vehicle detector system must consist of an optical emitter assembly or assemblies located on the appropriate vehicle and an optical detector/discriminator assembly or assemblies located at the traffic signal.

3

Emitter assemblies are not required for this project except units for testing purposes to demonstrate that the systems perform as specified. Tests must be conducted in the presence of the Engineer as described in section 86-5.01D(4) during the signal test period. The Engineer must be provided a minimum of 2 business days notice before performing the tests.

4

Each system must allow detection of 2 classes of authorized vehicles. Class I (mass transit) vehicles must be detected at ranges of up to 1,000 feet from the optical detector. Class II (emergency) vehicles must be detected at ranges up to 1,800 feet from the optical detector.

5

Class I signals (those emitted by Class I vehicles) must be distinguished from Class II signals (those emitted by Class II vehicles) on the basis of the modulation frequency of the light from the respective emitter. The modulation frequency for Class I signal emitters must be 9.639 Hz \pm 0.110 Hz. The modulation frequency for Class II signal emitters must be 14.035 Hz \pm 0.250 Hz.

6

A system must establish a priority of Class II vehicle signals over Class I vehicle signals and must comply with the requirements in section 25352 of the California Vehicle Code.

Pars. 7–18. Use if emitter assemblies are required. If not required, delete paragraphs but maintain the section title for 86-5.01D(2) and add "Not Used" below it.

7

86-5.01D(2) Emitter Assembly

86-5.01D(2)(a) General

Each emitter assembly provided for testing purposes must consist of an emitter unit, an emitter control unit, and connecting cables.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

8

Each emitter assembly, including lamp, must operate over an ambient temperature range of -34 to +60 degrees C at both modulation frequencies and operate continuously at the higher frequency for a minimum of 3,000 hours at 25 degrees C ambient temperature before failure of the lamp or other components.

9

Each emitter unit must be controlled by a single, maintained-contact switch on the respective emitter control unit. The switch must be located to be readily accessible to the vehicle driver. The control unit must contain a pilot light to indicate that the emitter power circuit is energized and must generate only 1 modulating code, either that for Class I vehicles or that for Class II vehicles.

10

86-5.01D(2)(b) Functional

Each emitter unit must transmit optical energy in 1 direction only.

11

The signal from each Class I signal emitter unit must be detectable at a distance of 1,000 feet when used with a standard optical detection/discriminator assembly and filter to eliminate visible light. Visible light must be considered eliminated when the output of the emitter unit with the filter is less than an average of 0.0003 candela per energy pulse in the wavelength range of 380 nm to 750 nm when measured at a distance of 10 feet. Submit a certificate of compliance for each Class I emitter unit.

12

The signal from each Class II signal emitter unit must be detectable at a distance of 1,800 feet when used with a standard optical detection/discriminator assembly.

13

The standard optical detection/discriminator assembly to be used in making the range tests must be available from the manufacturer of the system. A certified performance report must be furnished with each assembly.

14

86-5.01D(2)(c) Electrical

Each emitter assembly must provide full light output with input voltages of between 12.5 V (dc) and 17.5 V (dc). An emitter assembly must not be damaged by input voltages up to 7.5 V (dc) above supply voltage. The emitter assembly must not generate voltage transients, on the input supply, that exceed the supply voltage by more than 4 volts.

15

Each emitter assembly must consume not more than 100 W at 17.5 V (dc) and must have a power input circuit breaker rated at 10 A to 12 A, 12 V (dc).

16

The design and circuitry of each emitter must allow its use on vehicles with either negative or positive ground without disassembling or rewiring of the unit.

17

86-5.01D(2)(d) Mechanical

Each emitter unit must be housed in a weatherproof corrosion-resistant housing. The housing must be provided with facilities to allow mounting on various types of vehicles and must have provision for aligning the emitter unit properly and for locking the emitter unit into this alignment.

18

Each emitter control unit must be provided with hardware to allow the unit to be mounted in or on an emergency vehicle or mass transit vehicle. Where required for certain emergency vehicles, the emitter control unit and exposed controls must be weatherproof.

19

86-5.01D(3) Optical Detection/Discriminator Assembly

86-5.01D(3)(a) General

Each optical detection/discriminator assembly must consist of 1 or more optical detectors, connecting cable and a discriminator module.

20

Each assembly, when used with standard emitters, must have a range of at least 1,000 feet for Class I signals and 1,800 feet for Class II signals. Standard emitters for both classes of signals must be available from the manufacturer of the system. Range measurements must be taken with all range adjustments on the discriminator module set to "maximum".

21

86-5.01D(3)(b) Optical Detector

Each optical detector must be a waterproof unit capable of receiving optical energy from 2 horizontal directions.

22

The reception angle for each photocell assembly must be a maximum of 8 degrees in all directions about the aiming axis of the assembly. Measurements of reception angle will be taken at a range of 1,000 feet for a Type I emitter and at a range of 1,800 feet for a Type II emitter.

23

Internal circuitry must be solid state and electrical power must be provided by the associated discriminator module.

24

Each optical detector must be contained in a housing, which must include 2 photocell assemblies, an electronic assembly and a base. The base must have an opening to allow mounting on a mast arm or a vertical pipe nipple, or suspension from a span wire. The mounting opening must have female threads for 3/4 inch conduit. A cable entrance must be provided which must have male threads and gasketing to allow a waterproof cable connection. Each detector must have weight of less than 2.5 pounds and must present a maximum wind load area of 36 square inches. The housing must be provided with weep holes to allow drainage of condensed moisture.

25

Each optical detector must be installed, wired and aimed as specified by the manufacturer.

26

86-5.01D(3)(c) Cable

Optical detector cable (EV-C) must comply with the requirements of IPCEA-S-61-402/NEMA WC 5, section 7.4, 600-V (ac) control cable, 75 degrees C, Type B, and the following:

1. The cable must contain 3 conductors, each of which must be No. 20 (7 x 28) stranded, tinned copper with low-density polyethylene insulation. Minimum average insulation thickness must be 25 mils. Insulation of individual conductors must be color coded: 1-yellow, 1-blue, 1-orange.
2. The shield must be either tinned copper braid or aluminized polyester film with a nominal 20 percent overlap. Where film is used, a No. 20 (7 x 28) stranded, tinned, bare drain wire must be placed between the insulated conductors and the shield and in contact with the conductive surface of the shield.
3. The jacket must be black polyvinyl chloride with minimum ratings of 600 V (ac) and 80 degrees C and a minimum average thickness of 43 mils. The jacket must be marked as required by IPCEA/NEMA.
4. The finished outside diameter of the cable must not exceed 0.35-inch.
5. The capacitance, as measured between any conductor and the other conductors and the shield, must not exceed 48 pf per foot at 1000 Hz.
6. The cable run between each detector and the controller cabinet must be continuous without splices or must be spliced only as directed by the detector manufacturer.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

27

86-5.01D(3)(d) Discriminator Module

Each discriminator module must be designed to be compatible and usable with a Model 170E/2070E controller unit and to be mounted in the input file of a Model 332L or Model 336L controller cabinet, and must comply with the requirements in chapter 1 of TEES.

28

Each discriminator module must be capable of operating 2 channels, each of which must provide an independent output for each separate input.

29

Each discriminator module, when used with its associated detectors, must perform the following:

1. Receive Class I signals at a range of up to 1,000 feet and Class II signals at a range of up to 1,800 feet.
2. Decode the signals, on the basis of frequency, at $9.639 \text{ Hz} \pm 0.119 \text{ Hz}$ for Class I signals and $14.035 \text{ Hz} \pm 0.255 \text{ Hz}$ for Class II signals.
3. Establish the validity of received signals on the basis of frequency and length of time received. A signal must be considered valid only when received for more than 0.50-second. No combination of Class I signals must be recognized as a Class II signal regardless of the number of signals being received, up to a maximum of 10 signals. Once a valid signal has been recognized, the effect must be held by the module in the event of temporary loss of the signal for a period adjustable from 4.5 seconds to 11 seconds in at least 2 steps at $5 \text{ seconds} \pm 0.5 \text{ second}$ and $10 \text{ seconds} \pm 0.5 \text{ second}$.
4. Provide an output for each channel that will result in a "low" or grounded condition of the appropriate input of a Model 170E controller unit. For Class I signals the output must be a $6.25 \text{ Hz} \pm 0.1 \text{ percent}$, rectangular waveform with a 50 percent duty cycle. For Class II signals the output must be steady.

30

Each discriminator module must receive electric power from the controller cabinet at either 24 V (dc) or 120 V (ac).

31

Each channel together with the channel's associated detectors must draw not more than 100 mA at 24 V (dc) or more than 100 mA at 120 V (ac). Electric power, 1 detector input for each channel and 1 output for each channel must terminate at the printed circuit board edge connector pins shown in the following table:

Board Edge Connector Pin Assignment

A	DC ground		
B	+24 V (dc)	P	(NC)
C	(NC)		
D	Detector input, Channel A	R	(NC)
E	+24V (dc) to detectors	S	(NC)
F	Channel A output (C)	T	(NC)
		U	(NC)
H	Channel A output (E)	V	(NC)
J	Detector input, Channel B	W	Channel B output (C)
K	DC ground to detectors	X	Channel B output (E)
L	Chassis ground	Y	(NC)
M	AC-	Z	(NC)
N	AC+		

(C) Collector, slotted for keying

(E) Emitter, slotted for keying

(NC) Not connected, cannot be used by manufacturer for any purpose.

32

Two auxiliary inputs for each channel must enter each module through the front panel connector. Pin assignment for the connector must be as follows:

1. Auxiliary detector 1 input, Channel A
2. Auxiliary detector 2 input, Channel A
3. Auxiliary detector 1 input, Channel B
4. Auxiliary detector 2 input, Channel B

33

Each channel output must be an optically isolated NPN open collector transistor capable of sinking 50 mA at 30 V (ac) and must be compatible with the Model 170E controller unit inputs.

34

Each discriminator module must be provided with means of preventing transients received by the detector from affecting the Model 170E/2070E controller assembly.

35

Each discriminator module must have a single connector board and must occupy 1 slot width of the input file. The front panel of each module must have a handle to facilitate withdrawal and the following controls and indicators for each channel:

1. Three separate range adjustments each for both Class I and Class II signals.
2. A 3-position, center-off, momentary contact switch, 1 position (down) labeled for test operation of Class I signals, and 1 position (up) labeled for test operation of Class II signals.
3. A "signal" indication and a "call" indication each for Class I and for Class II signals. The "signal" indication denotes that a signal above the threshold level has been received. A "call" indication denotes that a steady, validly coded signal has been received. These 2 indications may be accomplished with a single indication lamp; "signal" being denoted by a flashing indication and "call" with a steady indication.

36

In addition, the front panel must be provided with a single circular, bayonet-captured, multi-pin connector for 2 auxiliary detector inputs for each channel. Connector must be a mechanical configuration complying with the requirements in Military Specification MIL-C-26482 with 10-4 insert arrangement, consisting of the following:

1. Wall mounting receptacle, with gold plated pins.
2. Plug with gold plated sockets, cable clamp and strain relief that must provide for a right angle turn within 2-1/2 inches maximum from the front panel surface of the discriminator module.

37

86-5.01D(3)(e) Cabinet Wiring

The Model 332L cabinet has provisions for connections between the optical detectors, the discriminator module and the Model 170E/2070E controller unit.

38

Wiring for a Model 332L cabinet must comply with the following:

1. Slots 12 and 13 of input file "J" have each been wired to accept a 2-channel module.
2. Field wiring for the primary detectors, except 24-V (dc) power, must terminate on either terminal board TB-9 in the controller cabinet or on the rear of input file "J," depending on cabinet configuration. Where TB-9 is used, position assignments must be as shown in the following table:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Position	Assignment
4	Channel A detector input, 1st module (Slot J-12)
5	Channel B detector input, 1st module (Slot J-12)
7	Channel A detector input, 2nd module (Slot J-13)
8	Channel B detector input, 2nd module (Slot J-13)

39

The 24-V (dc) cabinet power will be available at Position 1 of terminal board TB-1 in the controller cabinet.

40

Field wiring for the auxiliary detectors must terminate on terminal board TB-O in the controller cabinet. Position assignments are as shown in the following table:

For module 1 (J-12)		For module 2 (J-13)	
Position	Assignment	Position	Assignment
1	+24V (dc) from (J-12E)	7	+24V (dc) from (J-13E)
2	Detector ground From (J-12K)	8	Detector ground from (J-13K)
3	Channel A auxiliary detector input 1	9	Channel A auxiliary detector input 1
4	Channel A auxiliary detector input 2	10	Channel A auxiliary detector input 2
5	Channel B auxiliary detector input 1	11	Channel B auxiliary detector input 1
6	Channel B auxiliary detector input 2	12	Channel B auxiliary detector input 2

41

86-5.01D(4) System Operation

The Contractor must demonstrate that the components of each system are compatible and will perform satisfactorily as a system. Satisfactory performance must be determined using the following test procedure during the functional test period:

1. Each system to be used for testing must consist of an optical emitter assembly, an optical detector, an optical detector cable and a discriminator module.
2. The discriminator modules must be installed in the proper input file slot of the Model 170E/2070E controller assembly.
3. Two tests must be conducted: 1 using a Class I signal emitter and a distance of 1,000 feet between the emitter and the detector, the other using a Class II signal emitter and a distance of 1,800 feet between the emitter and the detector. Range adjustments on the module must be set to "Maximum" for each test.
4. Each test must be conducted for a period of 1 hour, during which the emitter must be operated for 30 cycles, each consisting of a 1 minute "on" interval and a 1 minute "off" interval. During the total test period, the emitter signal must cause the proper response from the Model 170E controller unit during each "on" interval and there must be no improper operation of either the Model 170E/2070E controller unit or the monitor during each "off" interval.

Section 86-5.02. Use for a plastic push button housing.

Replace the 1st sentence of the 1st paragraph of the RSS for section 86-5.02 with:

1. Use if a plastic push button housing is optional.

The housing for a push button assembly must be made of (1) die-cast aluminum, (2) permanent mold-cast aluminum, or (3) UV-stabilized, self-extinguishing structural plastic. The plastic housing must have a color throughout that matches color no. 17038, 27038, or 37038 of FED-STD-595.

2. Use if a plastic push button housing is required.

JS

~~The housing for a push button assembly must be made of UV-stabilized, self-extinguishing structural plastic. The plastic housing must have a color throughout that matches color no. 17038, 27038, or 37038 of FED-STD-595.~~

Section 86-6.02. Use for LED luminaires.

Replace section 86-6.02 with:

86-6.02 LED LUMINAIRES

86-6.02A General

86-6.02A(1) Summary

1

Section 86-6.02 includes specifications for installing LED luminaires.

86-6.02A(2) Definitions

2

CALiPER: Commercially Available LED Product Evaluation and Reporting. A U.S. DOE program that individually tests and provides unbiased information on the performance of commercially-available LED luminaires and lights.

correlated color temperature: Absolute temperature in kelvin of a blackbody whose chromaticity most nearly resembles that of the light source.

house side lumens: Lumens from a luminaire directed to light up areas between the fixture and the pole, such as sidewalks at intersection or areas off the shoulders on freeways.

International Electrotechnical Commission (IEC): Organization that prepares and publishes international standards for all electrical, electronic, and related technologies.

junction temperature: Temperature of the electronic junction of the LED device. The junction temperature is critical in determining photometric performance, estimating operational life, and preventing catastrophic failure of the LED.

L70: Extrapolated life in hours of the luminaire when the luminous output depreciates 30 percent from initial values.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

LM-79: Test method from the Illumination Engineering Society of North America specifying test conditions, measurements, and report format for testing solid state lighting devices, including LED luminaires.

LM-80: Test method from the Illumination Engineering Society of North America specifying test conditions, measurements, and report format for testing and estimating the long-term performance of LEDs for general lighting purposes.

National Voluntary Laboratory Accreditation Program (NVLAP): U.S. DOE program that accredits independent testing laboratories.

power factor: Ratio of the real power component to the complex power component.

street side lumens: Lumens from a luminaire directed to light up areas between the fixture and the roadway, such as traveled ways and freeway lanes.

surge protection device (SPD): Subsystem or component that protects the unit against short-duration voltage and current surges.

total harmonic distortion: Ratio of the rms value of the sum of the squared individual harmonic amplitudes to the rms value of the fundamental frequency of a complex waveform.

86-6.02A(3) Submittals

3

Submit a sample luminaire to METS for testing after the manufacturer's testing is completed. Include the manufacturer's test data.

4

Product submittals must include:

1. LED luminaire checklist.
2. Product specification sheets, including:
 - 2.1. Maximum power in watts.
 - 2.2. Maximum designed junction temperature.
 - 2.3. Heat sink area in square inches.
 - 2.4. Designed junction to ambient thermal resistance calculation with thermal resistance components clearly defined.
 - 2.5. L70 in hours when extrapolated for the average nighttime operating temperature.
3. LM-79 and LM-80 compliant test reports from a CALiPER-qualified or NVLAP-approved testing laboratory for the specific model submitted.
4. Photometric file based on LM-79 test report.
5. Initial and depreciated isofootcandle diagrams showing the specified minimum illuminance for the particular application. The diagrams must be calibrated to feet and show a 40 by 40 foot grid. The diagrams must be calibrated to the mounting height specified for that particular application. The depreciated isofootcandle diagrams must be calculated at the minimum operational life.
6. Test report showing SPD performance as tested under ANSI/IEEE C62.41.2 and ANSI/IEEE C62.45.
7. Test report showing mechanical vibration test results as tested under California Test 611 or equal.
8. Data sheets from the LED manufacturer that include information on life expectancy based on junction temperature.
9. Data sheets from the power supply manufacturer that include life expectancy information.

5

Submit documentation of a production QA performed by the luminaire manufacturer that:

1. Ensures the minimum specified performance level
2. Includes a documented process for resolving problems

6

Submit the QA documentation as an informational submittal.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

7

Submit the manufacturer's warranty documentation as an informational submittal before installing LED luminaires.

86-6.02A(4) Quality Control and Assurance

86-6.02A(4)(a) General

8

The Department may test random samples of the luminaires under section 86-2.14A. The Department tests luminaires under California Test 678 and may test any parameters specified in section 86-6.01.

9

Fit 1 sample luminaire with a thermistor or thermocouple temperature sensor. A temperature sensor must be mounted on the:

1. LED solder pad as close to the LED as possible
2. Power supply case
3. Light bar or modular system as close to the center of the module as possible

10

Other configurations must have at least 5 sensors per luminaire. The Engineer provides advice on sensor location. Thermocouples must be either Type K or C. Thermistors must be a negative-temperature-coefficient type with a nominal resistance of 20 kΩ. Use the appropriate thermocouple wire. The leads must be a minimum of 6 feet. Submit documentation with the test unit describing the type of sensor used.

11

Before performing any testing, energize the sample luminaires for a minimum of 24 hours at 100 percent on-time duty cycle and a temperature of +70 degrees F.

12

Depreciate the luminaire lighting's performance for the minimum operating life by using the LED manufacturer's data or the data from the LM-80 test report, whichever results in a higher lumen depreciation.

13

Failure of the luminaire that renders the unit noncompliant with section 86-6.02 specifications is cause for rejection.

86-6.02A(4)(b) Warranty

14. Insert the address of the District maintenance electrical shop.

JS

Provide a 7-year manufacturer's warranty against any defects or failures. The warranty period begins on the date of Contract acceptance. Furnish a replacement luminaire within 10 days after receipt of the failed luminaire. The Department does not pay for the replacement. Deliver replacement luminaires to the Department's Maintenance Electrical Shop at:

District Electrical Shop
30 Rickard Street
San Francisco, CA 94134, (415) 330-6500.

86-6.02B Materials

86-6.02B(1) General

15

The luminaire must include an assembly that uses LEDs as the light source. The assembly must include a housing, an LED array, and an electronic driver. The luminaire must:

1. Be UL listed under UL 1598 for luminaires in wet locations or an equivalent standard from a recognized testing laboratory

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

2. Have a minimum operational life of 63,000 hours
3. Operate at an average operating time of 11.5 hours per night
4. Be designed to operate at an average nighttime operating temperature of 70 degrees F
5. Have an operating temperature range from 40 to +130 degrees F
6. Be defined by the following applications:

Application	Replaces
Roadway 1	200 W high-pressure sodium luminaire mounted at 34 ft
Roadway 2	310 W high-pressure sodium luminaire mounted at 40 ft
Roadway 3	310 W high-pressure sodium luminaire mounted at 40 ft with back side control
Roadway 4	400 W high-pressure sodium luminaire mounted at 40 ft

16

The individual LEDs must be connected such that a catastrophic loss or a failure of 1 LED does not result in the loss of more than 20 percent of the luminous output of the luminaire.

86-6.02B(2) Luminaire Identification

17

Each luminaire must have the following identification permanently marked inside the unit and outside of its packaging box:

1. Manufacturer's name
2. Trademark
3. Model number
4. Serial number
5. Month and year of manufacture
6. Lot number
7. Contract number
8. Rated voltage
9. Rated wattage
10. Rated power in VA

86-6.02B(3) Electrical Requirements

18

The luminaire must operate from a 60 ± 3 Hz AC power source. The fluctuations of line voltage must have no visible effect on the luminous output. The operating voltage may range from 120 to 480 V(ac). The luminaire must operate over the entire voltage range or the voltage range must be selected from either of the following options:

1. Luminaire must operate over a voltage range of 95 to 277 V(ac). The operating voltages for this option are 120 V(ac) and 240 V(ac).
2. Luminaire must operate over a voltage range of 347 to 480 V(ac). The operating voltage for this option is 480 V(ac).

19

The power factor of the luminaire must be 0.90 or greater. The total harmonic distortion, current, and voltage induced into an AC power line by a luminaire must not exceed 20 percent. The maximum power consumption allowed for the luminaire must be as shown in the following table:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Application	Maximum consumption (watts)
Roadway 1	165
Roadway 2	235
Roadway 3	235
Roadway 4	300

86-6.02B(4) Surge Suppression and Electromagnetic Interference

20

The luminaire's onboard circuitry must include an SPD to withstand high repetition noise transients caused by utility line switching, nearby lightning strikes, and other interferences. The SPD must protect the luminaire from damage and failure due to transient voltages and currents as defined in Tables 1 and 4 of ANSI/IEEE C64.41.2 for location category C-High. The SPD must comply with UL 1449. The SPD must be tested under ANSI/IEEE C62.45 based on ANSI/IEEE C62.41.2 definitions for standard and optional waveforms for location category C-High.

21

The luminaires and associated on-board circuitry must comply with the Class A emission limits under 47 CFR 15, subpart B, for the emission of electronic noise.

86-6.02B(5) Compatibility

22

The luminaire must be operationally compatible with currently-used lighting control systems and photoelectric controls.

86-6.02B(6) Photometric Requirements

23

The luminaire must maintain a minimum illuminance level throughout the minimum operating life. The L70 of the luminaire must be the minimum operating life or greater. The measurements must be calibrated to

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

standard photopic calibrations. The minimum maintained illuminance values measured at a point must be as shown in the following table:

Application	Mounting height (ft)	Minimum maintained illuminance (fc)	Light pattern figure (isofootcandle curve)
Roadway 1	34	0.15	<p>Pattern defined by an ellipse with the equation:</p> $\frac{x^2}{(82)^2} + \frac{(y - 20)^2}{(52)^2} = 1$ <p>where: x = direction longitudinal to the roadway y = direction transverse to the roadway and the luminaire is offset from the center of the pattern by 20 feet to the house side of the pattern.</p>
Roadway 2	40	0.2	<p>Pattern defined by an ellipse with the equation:</p> $\frac{x^2}{(82)^2} + \frac{(y - 20)^2}{(52)^2} = 1$ <p>where: x = direction longitudinal to the roadway y = direction transverse to the roadway and the luminaire is offset from the center of the pattern by 20 feet to the house side of the pattern.</p>
Roadway 3	40	0.2	<p>Pattern defined by an ellipse with the equation:</p> $\frac{x^2}{(82)^2} + \frac{(y - 20)^2}{(52)^2} = 1$ <p>for $y \geq 0$ (street side)</p> <p>where: x = direction longitudinal to the roadway y = direction transverse to the roadway and the luminaire is offset from the center of the pattern by 20 feet to the house side of the pattern.</p>
Roadway 4	40	0.2	<p>Pattern defined by an ellipse with the equation:</p> $\frac{x^2}{(92)^2} + \frac{(y - 23)^2}{(55)^2} = 1$ <p>where: x = direction longitudinal to the roadway y = direction transverse to the roadway and the luminaire is offset from the center of the pattern by 23 feet to the house side of the pattern.</p>

The luminaire must have a correlated color temperature range from 3,500 to 6,500 K. The color rendering index must be 65 or greater.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

25

The luminaire must not allow more than:

1. 10 percent of the rated lumens to project above 80 degrees from vertical
2. 2.5 percent of the rated lumens to project above 90 degrees from vertical

86-6.02B(7) Thermal Management

26

The passive thermal management of the heat generated by the LEDs must have enough capacity to ensure proper operation of the luminaire over the minimum operation life. The LED maximum junction temperature for the minimum operation life must not exceed 221 degrees F.

27

The junction-to-ambient thermal resistance must be 95 degrees F per watt or less. The use of fans or other mechanical devices is not allowed. The heat sink material must be aluminum or other material of equal or lower thermal resistance.

28

The luminaire must contain circuitry that automatically reduces the power to the LEDs so the maximum junction temperature is not exceeded when the ambient outside temperature is 100 degrees F or greater.

86-6.02B(8) Physical and Mechanical Requirements

29. Edit the last item if the local agency prefers a different housing color choice.

The luminaire must:

1. Be a single, self-contained device not requiring job-site assembly for installation
2. Have an integral power supply
3. Weigh no more than 35 lb
4. Have a maximum-effective projected area of 1.4 sq ft when viewed from either side or end
5. Have a housing color that matches color number from 26152 to 26440, from 36231 to 36375, or 36440 of FED-STD-595.

30

The housing must be fabricated from materials designed to withstand a 3,000-hour salt spray test under ASTM B 117. All aluminum used in housings and brackets must be made of a marine-grade alloy with less than 0.2 percent copper. All exposed aluminum must be anodized.

31

Each refractor or lens must be made from UV-inhibited high-impact plastic such as acrylic or polycarbonate or heat- and impact-resistant glass and be resistant to scratching. Polymeric materials except lenses of enclosures containing either the power supply or electronic components of the luminaire must be made of UL94VO flame retardant materials. The housing's paint must comply with section 86-2.16. A chromate conversion undercoating must be used underneath a thermoplastic polyester powder coat.

32

Provide each housing with a slip fitter capable of mounting on a 2-inch pipe tenon. This slip fitter must fit on mast arms with outside diameters from 1-5/8 to 2-3/8 inches. The slip fitter must be capable of being adjusted a minimum of ± 5 degrees from the axis of the tenon in a minimum of 5 steps: +5, +2.5, 0, -2.5, -5. The clamping brackets of the slip fitter must not bottom out on the housing bosses when adjusted within the designed angular range. No part of the slip fitter's mounting brackets must develop a permanent set in excess of 1/32 inch when the bracket's two or four 3/8-inch-diameter cap screws are tightened to 10 ft-lb. Two sets of cap screws may be furnished to allow the slip fitter to be mounted on the pipe tenon in the acceptable range without the cap screws bottoming out in the threaded holes. The cap screws and the clamping brackets must be made of corrosion-resistant materials or treated to prevent galvanic reactions and be compatible with the luminaire housing and the mast arm.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

33

The LED luminaire must be assembled and manufactured such that its internal components are adequately supported to withstand mechanical shock and vibration from high winds and other sources. When tested under California Test 611, the luminaire to be mounted horizontally on the mast arm must be capable of withstanding the following cyclic loading for a minimum of 2 million cycles without failure of any luminaire part:

Cyclic Loading

Plane	Power supply	Minimum peak acceleration level
Vertical	Installed	3.0 g peak-to-peak sinusoidal loading (same as 1.5 g peak)
Horizontal ^a	Installed	1.5 g peak-to-peak sinusoidal loading (same as 0.75 g peak)

^aPerpendicular to the direction of the mast arm

34

The housing must be designed to prevent the buildup of water on top of the housing. Exposed heat sink fins must be oriented to allow water to freely run off of the luminaire and carry dust and other accumulated debris away from the unit. The optical assembly of the luminaire must be protected against dust and moisture intrusion to at least an ANSI/IEC rating of IP66. The power supply enclosure must be protected to at least an ANSI/IEC rating of IP43.

35. Use if ANSI C 136.41-compliant receptacles are not available. Delete par. 35.

JS

~~Furnish each mounted luminaire with an ANSI C136.10-compliant, locking-type photocontrol receptacle and a raintight shorting cap. The receptacle must comply with section 86-6.11A.~~

36. Use if ANSI C 136.41-compliant receptacles are available. Delete par. 34.

Furnish each mounted luminaire with an ANSI C136.41-compliant, locking-type photocontrol receptacle with dimming connections and a raintight shorting cap. The receptacle must comply with section 86-6.11A.

37

When the components are mounted on a down-opening door, the door must be hinged and secured to the luminaire housing separately from the refractor or flat lens frame. The door must be secured to the housing such that accidental opening is prevented. A safety cable must mechanically connect the door to the housing.

38

Field wires connected to the luminaire must terminate on a barrier-type terminal block secured to the housing. The terminal screws must be captive and equipped with wire grips for conductors up to no. 6. Each terminal position must be clearly identified.

39

The power supply must be rated for outdoor operation and have at least an ANSI/IEC rating of IP65.

40

The power supply must be rated for a minimum operational life equal to the minimum operational life of the luminaire or greater.

41

The power supply case temperature must have a self rise of 77 degrees F or less above ambient temperature in free air with no additional heat sinks.

42

The power supply must have 2 leads to accept standard 0-10 V(dc). The dimming control must be compatible with IEC 60929. If the control leads are open or the analog control signal is lost, the circuit must default to 100-percent power.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

43

Conductors and terminals must be identified.

86-6.02C Construction

44

Not Used

86-6.02D Payment

45

Not Used

{ XE "86-3_N12-13-12" }

Page 1 of 4

NSSP

NEW MM**

Section 86-3.05. Use for GPRS wireless modem assembly.

Add to section 86-3:

86-3.05 GENERAL PACKET RADIO SYSTEM WIRELESS MODEM ASSEMBLY

86-3.05A General

86-3.05A(1) Summary

1

Section 86-3.05 includes specifications for installing the general packet radio system (GPRS) wireless modem assembly at the controller cabinet as shown.

86-3.05A(2) Submittals

2

Submit warranty documentation before installation.

86-3.05A(3) Quality Control and Assurance

3. Insert address of district maintenance electrical shop.

Furnish a 1-year replacement warranty from the manufacturer of the modems and power supplies against any defects or failures. The effective date of the warranty is the date of installation. Furnish replacement modems and power supplies within 5 days after receipt of the failed parts. The Department does not pay for the replacement parts. Deliver replacement modems and power supplies to the following department maintenance electrical shop:

Caltrans Maintenance Station, 30 Rickard Street, San Francisco, CA 94134-1224.

86-3.05B Materials

86-3.05B(1) General

4

The GPRS wireless modem assembly consists of a modem, power supply, mounting bracket and hardware, serial communication cable, and antenna.

The assembly must have an operating temperature range from -30 to +70 degrees C with humidity from 5 to 95 percent (non-condensing) and have transmissions at 10 percent duty cycle above 60 degrees C.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

86-3.05B(2) Modem

5

The modem must:

1. Be configurable either remotely through the wireless network or through the modem serial port
2. Be configured before acceptance.
3. Have a minimum 53.6 Kbps raw data transfer rate.
4. Have a full duplex transceiver.
5. Have 1900/850 MHz dual band networking.
6. Have an integrated TCP/IP stack with user datagram protocol (UDP).
7. Have a user-settable password to prevent unauthorized access.
8. Include a DC power cable at least 3 feet long with a connector compatible with the modem power connector.
9. Have a packet buffering and forwarding feature that provides discipline to the output of the serial port. The packet forwarding time interval must be configurable from a rate of 0 (undisciplined) to 400 ms in increments of 100 ms or less.
10. Have a choice of "Friends Only" access mode.
11. Comply with TIA-678.
12. Weigh less than 2 lb and have overall dimensions of less than 7-1/8 by 3-1/2 by 1-1/8 inches. The housing must be constructed of anodized aluminum.
13. Have the following status indicators:
 - 13.1. Power on
 - 13.2. Channel acquired
 - 13.3. Link status
 - 13.4. Network registration
 - 13.5. Received signal strength indicator
 - 13.6. Transmit and receive data
 - 13.7. Block errors
14. Operate in a dynamic IP addressing environment of GPRS networks and meet the operational parameters shown in the following table:

(Operational parameter)	Requirements)
Receiver sensitivity	-107 dBm (2.439 % bit error rate)
Input voltage	10 to 28 V (dc)
Input current	40 to 200 mA

15. Have the following standard interfaces:
 - 15.1. Host communicates with modem using either UDP or TCP packet modes.
 - 15.2. Computer terminal platform using dial-up networking communicates with the modem using point to point protocol (PPP).

6

Provide the Engineer with the modem serial, SIM and international mobile equipment identification (IMEI) numbers 30 days before requiring the packet data protocol (PDP) context. The Engineer will provide the PDP context comprising of the assigned IP and access point name (APN) obtained from service provider.

7

The modem and associated firmware, software, hardware, protocol, and other features must be fully compatible with the existing GPRS network. The existing GPRS network utilizes the AT&T Wireless cellular system and the AirLink Gateway. Demonstrate the compatibility to the Engineer by actual installation or by other authorized means.

86-3.05B(3) Power Supply

8

The power supply must:

1. Be vertically mountable on a 19-inch standard rack rail using two machine screws and two wing nuts.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

2. Have provisions to attach the modem power cable securely without the modifying the cable.
3. Meet the requirements shown in the following table:

(Characteristics	Requirements)
Power cord	Standard 120 V(ac), 3 prong cord, at least 3 feet long (may be added by Contractor)
Type	Switching type
Power rated	40 W minimum with no minimum load required
Input voltage	From 85 to 264 V (ac) or 120 to 370 V (dc)
Input frequency	From 47 to 63 Hz
Inrush current	Cold start, 25 A at 115 V
Output voltage	12 V (dc), adjustable over a ± 10 percent range
Overload protection	From 105 to 150 percent in output pulsing mode
Over voltage protection	From 115 to 135 percent of output voltage
Setup, rise, hold up time	800 ms, 50 ms, 15 ms at 115 V (ac)
Withstand voltage	I/P-O/P: 3 kV, I/P-FG: 1.5 kV, for 60 seconds
Safety standards	UL 1012, UL 60950

86-3.05B(4) Mounting Bracket and Hardware

9

The mounting bracket must:

1. Be stainless steel.
2. Securely hold the modem in a vertical position with all cables and conductors installed.
3. Contain the modem using a method that allows the removal of the modem without tools or without removing the bracket from its attachment to the cabinet frame.

86-3.05B(5) Serial Communication Cable

10

If the modem is designed to interface with a Department-furnished Model 170E controller, provide a C2 cable. The C2 cable interfaces the controller C2 connector and the GPRS modem and includes all conductors and connectors required for that purpose. The GPRS modem connector must comply with TIA-232 standard using a 9-pin D shell miniature connector. The Department-furnished controller end connector must comply with AMP 201360-2 or equivalent. All pins in both connectors must be gold plated. The cable must have four no. 20 AWG conductors with (UL) Type CM shielded or AWM 2464 80C 300 Volts. The cable must be at least 3 feet long. The cable wiring must comply with the following:

1. AMP 201360-2-ND -L to DE9-P - 2
2. AMP 201360-2-ND -K to DE9-P - 3
3. AMP 201360-2-ND -N to DB9-P - 5
4. AMP 201360-2-ND -D to AMP 201360-2-ND - H
5. AMP 201360-2-ND -J to AMP 201360-2-ND - M

86-3.05B(6) Antenna

11

The antenna must:

1. Be the low profile disc type, and adhere to the cabinet using a factory installed double-sided waterproof acrylic foam adhesive. The coax cable must be at least 3 feet long and have a 50 Ω TNC connector on the modem end.
2. Meet the requirements as shown in the following table:

Parameter	Requirements
VSWR (at resonant point)	2:1 or less
Frequency	1850-1990 MHz and 824-894 MHz
Nominal impedance	50 Ω
Gain	2 dB
Radiation pattern	Omni-directional
Polarization	Vertical
Ground plane	Required ^a

	Chemical property	Requirement (percent)	
	Silicon dioxide (SiO ₂) ^a	90 min	
	Loss on ignition	5.0 max	
	Total alkalies as Na ₂ O equivalent	3.0 max	

^aSiO₂ in crystalline form must not exceed 1.0 percent.
^bWhen tested under AASHTO M 307 for strength activity testing of silica fume.
^cIn the test mix, Type II or V portland cement must be replaced with at least 12 percent rice hull ash by weight.

For the purpose of calculating the equations for the cementitious material specifications, consider rice hull ash to be represented by the variable UF .

~~91 PAINT~~

~~92 ASPHALTS~~

93 LIQUID ASPHALTS

94 ASPHALTIC EMULSIONS

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

AA

~~95 EPOXY~~

AA

~~96-98 RESERVED~~

DIVISION XI BUILDING CONSTRUCTION
99 BUILDING CONSTRUCTION

{ XE "RSS_A07-18-14" }
Page 1 of 346

RSS. Use in all projects. Do not add. Inserted by boilerplate merge.

REVISED STANDARD SPECIFICATIONS
DATED 07-18-14

ORGANIZATION

Revised standard specifications are under headings that correspond with the main-section headings of the *Standard Specifications*. A main-section heading is a heading shown in the table of contents of the *Standard Specifications*. A date under a main-section heading is the date of the latest revision to the section.

Each revision to the *Standard Specifications* begins with a revision clause that describes or introduces a revision to the *Standard Specifications*. For a revision clause that describes a revision, the date on the right above the clause is the publication date of the revision. For a revision clause that introduces a revision, the date on the right above a revised term, phrase, clause, paragraph, or section is the publication date of the revised term, phrase, clause, paragraph, or section. For a multiple-paragraph or multiple-section revision, the date on the right above a paragraph or section is the publication date of the paragraphs or sections that follow.

Any paragraph added or deleted by a revision clause does not change the paragraph numbering of the *Standard Specifications* for any other reference to a paragraph of the *Standard Specifications*.

ORGANIZATIONAL REVISIONS

07-19-13

Transfer section 36 from division IV to division V.

DIVISION I GENERAL PROVISIONS

1 GENERAL

02-21-14

Replace "current" in the 2nd paragraph of section 1-1.05 with:

most recent

04-20-12

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Add to the 4th paragraph of section 1-1.05:

04-20-12

Any reference directly to a revised standard specification section is for convenience only. Lack of a direct reference to a revised standard specification section does not indicate a revised standard specification for the section does not exist.

Add to the 1st table in section 1-1.06:

04-19-13

LCS	Department's lane closure system
POC	pedestrian overcrossing
QSD	qualified SWPPP developer
QSP	qualified SWPPP practitioner
TRO	time-related overhead
WPC	water pollution control

Delete the abbreviation and its meaning for *UDBE* in the 1st table of section 1-1.06.

06-20-12

Delete "Contract completion date" and its definition in section 1-1.07B.

10-19-12

Delete "critical delay" and its definition in section 1-1.07B.

10-19-12

Replace "day" and its definition in section 1-1.07B with:

10-19-12

day: 24 consecutive hours running from midnight to midnight; calendar day.

1. **business day:** Day on the calendar except a Saturday and a holiday.
2. **working day:** Time measure unit for work progress. A working day is any 24-consecutive-hour period except:
 - 2.1. Saturday and holiday.
 - 2.2. Day during which you cannot perform work on the controlling activity for at least 50 percent of the scheduled work shift with at least 50 percent of the scheduled labor and equipment due to any of the following:
 - 2.2.1. Adverse weather-related conditions.
 - 2.2.2. Maintaining traffic under the Contract.
 - 2.2.3. Suspension of a controlling activity that you and the Engineer agree benefits both parties.
 - 2.2.4. Unanticipated event not caused by either party such as:
 - 2.2.4.1. Act of God.
 - 2.2.4.2. Act of a public enemy.
 - 2.2.4.3. Epidemic.
 - 2.2.4.4. Fire.
 - 2.2.4.5. Flood.
 - 2.2.4.6. Governor-declared state of emergency.
 - 2.2.4.7. Landslide.
 - 2.2.4.8. Quarantine restriction.
 - 2.2.5. Issue involving a third party, including:
 - 2.2.5.1. Industry or area-wide labor strike.
 - 2.2.5.2. Material shortage.
 - 2.2.5.3. Freight embargo.
 - 2.2.5.4. Jurisdictional requirement of a law enforcement agency.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

- 2.2.5.5. Workforce labor dispute of a utility or nonhighway facility owner resulting in a nonhighway facility rearrangement not described and not solely for the Contractor's convenience. Rearrangement of a nonhighway facility includes installation, relocation, alteration, or removal of the facility.
- 2.3. Day during a concurrent delay.
- 3. **original working days:**
 - 3.1. Working days to complete the work shown on the *Notice to Bidders* for a non-cost plus time based bid.
 - 3.2. Working days bid to complete the work for a cost plus time based bid.

Where working days is specified without the modifier "original" in the context of the number of working days to complete the work, interpret the number as the number of original working days as adjusted by any time adjustment.

Replace "Contract" in the definition of "early completion time" in section 1-1.07B with:

work

10-19-12

Replace "excusable delay" and its definition in section 1-1.07B with:

delay: Event that extends the completion of an activity.

10-19-12

- 1. **excusable delay:** Delay caused by the Department and not reasonably foreseeable when the work began such as:
 - 1.1. Change in the work
 - 1.2. Department action that is not part of the Contract
 - 1.3. Presence of an underground utility main not described in the Contract or in a location substantially different from that specified
 - 1.4. Described facility rearrangement not rearranged as described, by the utility owner by the date specified, unless the rearrangement is solely for the Contractor's convenience
 - 1.5. Department's failure to obtain timely access to the right-of-way
 - 1.6. Department's failure to review a submittal or provide notification in the time specified
- 2. **critical delay:** Excusable delay that extends the scheduled completion date
- 3. **concurrent delay:** Occurrence of at least 2 of the following events in the same period of time, either partially or entirely:
 - 3.1. Critical delay
 - 3.2. Delay to a controlling activity caused by you
 - 3.3. Non-working day

Replace "project" in the definition of "scheduled completion date" in section 1-1.07B with:

work

10-19-12

Add to section 1-1.07B:

Contract time: Number of original working days as adjusted by any time adjustment.

10-19-12

Disadvantaged Business Enterprise: Disadvantaged Business Enterprise as defined in 49 CFR 26.5.

06-20-12

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CTA Contract No. XXX**

Replace "PO BOX 911" in the District 3 mailing address in the table in section 1-1.08 with:

04-20-12

703 B ST

Replace the Web site for the Department of General Services, Office of Small Business and DVBE Services in the table in section 1-1.11 with:

11-15-13

<http://www.dgs.ca.gov/dgs/ProgramsServices/BusServices.aspx>

AA

2 BIDDING

06-06-14

Replace the headings and paragraphs in section 2 with:

02-21-14

2-1.01 GENERAL

Section 2 includes specifications related to bid eligibility and the bidding process.

The electronic bid specifications in section 2 apply if *Electronic Bidding Contract* is shown on the cover of the *Notice to Bidders and Special Provisions*.

2-1.02 BID INELIGIBILITY

A firm that has provided architectural or engineering services to the Department for this contract before bid submittal for this contract is prohibited from any of the following:

1. Submitting a bid
2. Subcontracting for a part of the work
3. Supplying materials

2-1.03–2-1.05 RESERVED

2-1.06 BID DOCUMENTS

2-1.06A General

Standard Specifications and *Standard Plans* may be viewed at the Bidders' Exchange website and may be purchased at the Publication Distribution Unit.

The *Notice to Bidders and Special Provisions* and project plans may be viewed at the Bidders' Exchange website and at the street address.

Bid books may be ordered at the Bidders' Exchange website.

For an informal-bid contract, in addition to viewing and ordering them as specified above, the *Notice to Bidders and Special Provisions*, project plans, and *Bid* book may be obtained at the Bidders' Exchange street address.

The *Notice to Bidders and Special Provisions* includes the *Notice to Bidders*, revised standard specifications, and special provisions.

2-1.06B Supplemental Project Information

The Department makes supplemental information available as specified in the special provisions.

Logs of test borings are supplemental project information.

If an *Information Handout* or cross sections are available:

1. You may view them at the Contract Plans and Special Provisions link at the Bidders' Exchange website

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

2. For an informal-bid contract, you may obtain them at the Bidders' Exchange street address

If rock cores are available, you may view them by sending a request to Coreroom@dot.ca.gov.

If other supplemental project information is available for inspection, you may view it by phoning in a request.

Make your request at least 7 days before viewing. Include in your request:

1. District-County-Route
2. Contract number
3. Viewing date
4. Contact information, including telephone number

For rock cores, also include the bridge number in your request.

If bridge as-built drawings are available:

1. For a project in District 1 through 6 or 10, you may request them from the Office of Structure Maintenance and Investigations, fax (916) 227-8357
2. For a project in District 7, 8, 9, 11, or 12, you may request them from the Office of Structure Maintenance and Investigations, fax (916) 227-8357, and they are available at the Office of Structure Maintenance and Investigations, Los Angeles, CA, telephone (213) 897-0877

As-built drawings may not show existing dimensions and conditions. Where new construction dimensions are dependent on existing bridge dimensions, verify the field dimensions and adjust dimensions of the work to fit existing conditions.

2-1.06C–2-1.06D Reserved

2-1.07 JOB SITE AND DOCUMENT EXAMINATION

Examine the job site and bid documents.

Bid submission is your acknowledgment that you have examined the job site and bid documents and are satisfied with:

1. General and local conditions to be encountered
2. Character, quality, and scope of work to be performed
3. Quantities of materials to be furnished
4. Character, quality, and quantity of surface and subsurface materials or obstacles
5. Requirements of the contract

2-1.08 RESERVED

2-1.09 BID ITEM LIST

Submit a bid based on the bid item quantities the Department shows on the Bid Item List.

06-06-14

2-1.10 SUBCONTRACTOR LIST

On the Subcontractor List form, list each subcontractor to perform work in an amount in excess of 1/2 of 1 percent of the total bid or \$10,000, whichever is greater (Pub Cont Code § 4100 et seq.).

For each subcontractor listed, the Subcontractor List form must show:

1. Business name and the location of its place of business.
2. For a non-federal-aid contract, its California contractor license number.
3. Portion of work it will perform. Show the portion of the work by:
 - 3.1. Description of portion of subcontracted work
 - 3.2. Bid item numbers for the work involved in the portion of work listed
 - 3.3. Percentage of the portion of work in each bid item listed

2-1.11 RESERVED

2-1.12 DISADVANTAGED BUSINESS ENTERPRISES

2-1.12A General

Section 2-1.12 applies to a federal-aid contract.

Under 49 CFR 26.13(b):

The contractor, sub recipient or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the recipient deems appropriate.

Take necessary and reasonable steps to ensure that DBEs have opportunity to participate in the Contract (49 CFR 26).

2-1.12B Disadvantaged Business Enterprise Goal

2-1.12B(1) General

Section 2-1.12B applies if a DBE goal is shown on the *Notice to Bidders*.

To ensure equal participation of DBEs provided in 49 CFR 26.5, the Department shows a goal for DBEs.

Make work available to DBEs and select work parts consistent with available DBE subcontractors and suppliers.

Meet the DBE goal shown on the *Notice to Bidders* or demonstrate that you made adequate good faith efforts to meet this goal.

You are responsible to verify that the at the bid opening date the DBE firm is certified as DBE by the CA Unified Certification Program.

All DBE participation will count toward the Department's federally-mandated statewide overall DBE goal.

Credit for materials or supplies you purchase from DBEs counts toward the goal in the following manner:

1. 100 percent if the materials or supplies are obtained from a DBE manufacturer.
2. 60 percent if the materials or supplies are obtained from a DBE regular dealer.
3. Only fees, commissions, and charges for assistance in the procurement and delivery of materials or supplies, if they are obtained from a DBE that is neither a manufacturer nor regular dealer. 49 CFR 26.55 defines "manufacturer" and "regular dealer."

You receive credit toward the goal if you employ a DBE trucking company that performs a commercially useful function as defined in 49 CFR 26.55(d)(1)–(4), (6).

2-1.12B(2) DBE Commitment Submittal

Submit DBE information under section 2-1.33.

Bidders other than the apparent low bidder, the 2nd low bidder, and the 3rd low bidder are not required to submit the DBE commitment form unless the Department requests it. If the Department requests a DBE commitment form from you, submit the completed form within 4 business days of the request.

Submit written confirmation from each DBE shown on the form stating that it will be participating in the Contract. Include confirmation with the DBE commitment form. A copy of a DBE's quote will serve as written confirmation that the DBE will be participating in the Contract.

2-1.12B(3) Good Faith Efforts Submittal

If you have not met the DBE goal, complete and submit the Good Faith Efforts Documentation under section 2-1.33 showing that you made adequate good faith efforts to meet the goal. Only good faith efforts directed toward obtaining participation by DBEs are considered.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

If your DBE commitment form shows that you have met the DBE goal or if you are required to submit the DBE commitment form, you must submit good faith efforts documentation within the specified time to protect your eligibility for award of the contract in the event the Department finds that the DBE goal has not been met.

The Department may consider DBE commitments of the 2nd and 3rd bidders in determining whether the low bidder made good faith efforts to meet the DBE goal.

2-1.13–2-1.14 RESERVED

2-1.15 DISABLED VETERAN BUSINESS ENTERPRISES

2-1.15A General

Section 2-1.15 applies to a non-federal-aid contract.

Take necessary and reasonable steps to ensure that DVBEs have opportunity to participate in the Contract.

Comply with Mil & Vet Code § 999 et seq.

2-1.15B Projects \$5 Million or Less

Section 2-1.15B applies to a project with an estimated cost of \$5 million or less.

Make work available to DVBEs and select work parts consistent with available DVBE subcontractors and suppliers.

Meet the goal shown on the *Notice to Bidders*.

Complete and submit the Certified DVBE Summary form under section 2-1.33. List all DVBE participation on this form.

If a DVBE joint venture is used, submit the joint venture agreement with the Certified DVBE Summary form.

List each 1st-tier DVBE subcontractor on the Subcontractor List form regardless of percentage of the total bid.

2-1.15C Projects More Than \$5 Million

2-1.15C(1) General

Section 2-1.15C applies to a project with an estimated cost of more than \$5 million.

The Department encourages bidders to obtain DVBE participation to ensure the Department achieves its State-mandated overall DVBE goal.

If you obtain DVBE participation:

1. Complete and submit the Certified DVBE Summary form under section 2-1.33. List all DVBE participation on this form.
2. List each 1st tier DVBE subcontractor in the Subcontractor List form regardless of percentage of the total bid.

If a DVBE joint venture is used, submit the joint venture agreement with the Certified DVBE Summary form.

2-1.15C(2) DVBE Incentive

The Department grants a DVBE incentive to each bidder who achieves a DVBE participation of 1 percent or greater (Mil & Vet Code 999.5 and Code of Regs § 1896.98 et seq.).

To receive this incentive, submit the Certified DVBE Summary form under section 2-1.33.

Bidders other than the apparent low bidder, the 2nd low bidder, and the 3rd low bidder may be required to submit the Certified DVBE Summary form if the bid ranking changes. If the Department requests a Certified DVBE Summary form from you, submit the completed form within 4 business days of the request.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

2-1.15C(3) Incentive Evaluation

The Department applies the small business and non-small business preference during bid verification and proceeds with the evaluation specified below for DVBE incentive.

The DVBE incentive is a reduction, for bid comparison only, in the total bid submitted by the lesser of the following amounts:

1. Percentage of DVBE achievement rounded to 2 decimal places of the verified total bid of the low bidder
2. 5 percent of the verified total bid of the low bidder
3. \$250,000

The Department applies DVBE incentive and determines whether bid ranking changes.

A non-small business bidder cannot displace a small business bidder. However, a small business bidder with higher DVBE achievement can displace another small business bidder.

The Department proceeds with awarding the contract to the new low bidder and posts the new verified bid results at the Department's Web site.

2-1.16–2-1.17 RESERVED

2-1.18 SMALL BUSINESS AND NON-SMALL BUSINESS SUBCONTRACTOR PREFERENCES

2-1.18A General

Section 2-1.18 applies to a non-federal-aid contract.

The Department applies small business preferences and non-small business preferences under Govt Code § 14835 et seq. and 2 CA Code of Regs § 1896 et seq.

Any contractor, subcontractor, supplier, or service provider who qualifies as a small business is encouraged to apply for certification as a small business by submitting its application to the Department of General Services, Office of Small Business and DVBE Services.

Contract award is based on the total bid, not the reduced bid.

2-1.18B Small Business Preference

The Department allows a bidder certified as a small business by the Department of General Services, Office of Small Business and DVBE Services, a preference if:

1. Bidder submitted a completed Request for Small Business Preference or Non-Small Business Preference form with its bid
2. Low bidder did not request the preference or is not certified as a small business

The bidder's signature on the Request for Small Business Preference or Non-Small Business Preference form certifies that the bidder is certified as a small business at the date and time of bid or has submitted a complete application to the Department of General Services. The complete application and any required substantiating documentation must be received by the Department of General Services by 5:00 p.m. on the bid opening date.

The Department of General Services determines whether a bidder was certified on the bid opening date. The Department of Transportation confirms the bidder's status as a small business before applying the small business preference.

The small business preference is a reduction for bid comparison in the total bid submitted by the small business contractor by the lesser of the following amounts:

1. 5 percent of the verified total bid of the low bidder
2. \$50,000

If the Department determines that a certified small business bidder is the low bidder after the application of the small business preference, the Department does not consider a request for non-small business preference.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

2-1.18C Non–Small Business Subcontractor Preference

The Department allows a bidder not certified as a small business by the Department of General Services, Office of Small Business and DVBE Services, a preference if:

1. Bidder submitted a completed Request for Small Business Preference or Non–Small Business Preference form with its bid
2. Certified Small Business Listing for the Non–Small Business Preference form shows that you are subcontracting at least 25 percent to certified small businesses

Each listed subcontractor and supplier must be certified as a small business at the date and time of bid or must have submitted a complete application to the Department of General Services. The complete application and any required substantiating documentation must be received by the Department of General Services by 5:00 p.m. on the bid opening date.

The non–small business subcontractor preference is a reduction for bid comparison in the total bid submitted by the non–small business contractor requesting the preference by the lesser of the following amounts:

1. 5 percent of the verified total bid of the low bidder
2. \$50,000

2-1.19–2-1.26 RESERVED

2-1.27 CALIFORNIA COMPANIES

Section 2-1.27 applies to a non-federal-aid contract.

Under Pub Cont Code § 6107, the Department gives preference to a "California company," as defined, for bid comparison purposes over a nonresident contractor from any state that gives or requires a preference to be given to contractors from that state on its public entity construction contracts.

Complete a California Company Preference form.

The California company reciprocal preference amount is equal to the preference amount applied by the state of the nonresident contractor with the lowest responsive bid unless the California company is eligible for a small business preference or a non–small business subcontractor preference, in which case the preference amount is the greater of the two, but not both.

If the low bidder is not a California company and a California company's bid with reciprocal preference is equal to or less than the lowest bid, the Department awards the contract to the California company on the basis of its total bid.

2-1.28 RESERVED

2-1.29 OPT OUT OF PAYMENT ADJUSTMENTS FOR PRICE INDEX FLUCTUATIONS

You may opt out of the payment adjustments for price index fluctuations specified in section 9-1.07. To opt out, submit a completed Opt Out of Payment Adjustments for Price Index Fluctuations form under section 2-1.33.

2-1.30–2-1.32 RESERVED

06-06-14

2-1.33 BID DOCUMENT COMPLETION AND SUBMITTAL

Complete forms in the *Bid* book.

For a paper bid, submit your bid:

1. Under sealed cover
2. Marked as a bid
3. Identifying the contract number and the bid opening date

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CTA Contract No. XXX

For an electronic bid, complete and submit the *Bid* book under the *Electronic Bidding Guide* at the Bidders' Exchange website.

Submit the forms and form information at the times shown in the following table:

Bid Form Submittal Schedule				
Contract type	Forms to be submitted at the time of bid	Forms to be submitted no later than 24 hours after bid opening ^a	Forms to be submitted no later than 4 p.m. on the 2nd business day after bid opening ^a	Forms to be submitted no later than 4 p.m. on the 4th business day after bid opening ^a
All contracts	<ul style="list-style-type: none"> • Bid to the Department of Transportation • Business name and location and description of portion of subcontracted work on the Subcontractor List • Opt Out of Payment Adjustments for Price Index Fluctuations^c 	<ul style="list-style-type: none"> • Bid item nos. and percentage of bid item subcontracted on the Subcontractor List^b 	--	--
Non-federal-aid contracts only	<ul style="list-style-type: none"> • California contractor license number on the Subcontractor List • California Company Preference • Request for Small Business Preference or Non-Small Business Preference^c 	--	<ul style="list-style-type: none"> • Certified Small Business Listing for the Non-Small Business Preference^c 	<ul style="list-style-type: none"> • Certified DVBE Summary^d
Federal-aid contracts only	<ul style="list-style-type: none"> • Small Business Status 	--	--	<ul style="list-style-type: none"> • Caltrans Bidder - DBE - Commitment^e • Good Faith Efforts Documentation - DBE^f

^aThe forms and information may be submitted at the time of bid.

^bIf the information is not submitted at the time of bid, fax it to (916) 227-6282. This after-bid submittal does not apply to an informal-bid contract. For an informal bid contract, submit the completed form at the time of bid.

^cApplicable only if the preference or option is chosen.

^dNot applicable to an informal-bid contract or a project with an estimated cost of more than \$5 million. For an informal bid contract, submit the completed form at the time of bid. For a project with an estimated cost of more than \$5 million, applicable only if you obtain DVBE participation or you are the apparent low bidder, 2nd low bidder, or 3rd low bidder and you choose to receive the specified incentive.

^eIf not submitted at the time of bid, applicable only to the apparent low bidder, 2nd low bidder, and 3rd low bidder.

^fApplicable only if you have not met the DBE goal.

For an electronic bid:

1. Forms to be submitted at the time of bid must be submitted as described in the *Electronic Bidding Guide* or faxed to (916) 227-6282 before the bid opening date and time.
2. Your authorized digital signature is your confirmation of and agreement to all certifications and statements contained in the *Bid* book.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

3. On forms and certifications that you submit through the electronic bidding service, you agree that each form and certification where a signature is required is deemed as having your signature. On forms that you submit after bid opening, sign the forms where a signature is required in ink.

Failure to submit the forms and information as specified results in a nonresponsive bid.

If an agent other than the authorized corporation officer or a partnership member signs the bid, file a Power of Attorney with the Department either before opening bids or with the bid. Otherwise, the bid may be nonresponsive.

02-21-14

2-1.34 BIDDER'S SECURITY

Submit one of the following forms of bidder's security equal to at least 10 percent of the bid:

1. Cash
2. Cashier's check
3. Certified check
4. Signed bidder's bond by an admitted surety insurer
5. For an electronic bid, electronic bidder's bond by an admitted surety insurer submitted using an electronic registry service approved by the Department.

Submit cash, cashier's check, certified check, or bidder's bond to the Department at the Bidders Exchange before the bid opening time.

Submit electronic bidder's bond with the electronic bid.

If using a bidder's bond, you may use the form in the *Bid* book. If you do not use the form in the *Bid* book, use a form containing the same information.

2-1.35–2-1.39 RESERVED

2-1.40 BID WITHDRAWAL

For a paper bid:

1. An authorized agent may withdraw a bid before the bid opening date and time by submitting a written bid withdrawal request at the location where the bid was submitted. Withdrawing a bid does not prevent you from submitting a new bid.
2. After the bid opening time, you cannot withdraw a bid.

For an electronic bid:

1. Bids are not filed with the Department until the date and time of bid opening.
2. A bidder may withdraw or revise a bid after it has been submitted to the electronic bidding service if this is done before the bid opening date and time.

2-1.41–2-1.42 RESERVED

2-1.43 BID OPENING

The Department publicly opens and reads bids at the time and place shown on the *Notice to Bidders*.

2-1.44–2-1.45 RESERVED

2-1.46 DEPARTMENT'S DECISION ON BID

The Department's decision on the bid amount is final.

The Department may reject:

1. All bids
2. A nonresponsive bid

2-1.47 BID RELIEF

The Department may grant bid relief under Pub Cont Code § 5100 et seq. Submit any request for bid relief to the Office Engineer. The Relief of Bid Request form is available at the Department's website.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Replace section 3-1.13 with:

07-27-12

3-1.13 FORM FHWA-1273

For a federal-aid contract, form FHWA-1273 is included with the Contract form in the documents sent to the successful bidder for execution. Comply with its provisions. Interpret the training and promotion section as specified in section 7-1.11A.

Add to item 1 in the list in the 2nd paragraph of section 3-1.18:

07-27-12

, including the attached form FHWA-1273

Delete item 4 of the 2nd paragraph of section 3-1.18.

10-19-12

AA

5 CONTROL OF WORK

05-30-14

Add between "million" and ", professionally" in the 3rd paragraph of section 5-1.09A:

10-19-12

and 100 or more working days

Add to the list in the 4th paragraph of section 5-1.09A:

10-19-12

9. Considering discussing with and involving all stakeholders in evaluating potential VECPs

Add to the end of item 1.1 in the list in the 7th paragraph of section 5-1.09A:

10-19-12

, including VECPs

Replace the 1st paragraph of section 5-1.09C with:

10-19-12

For a contract with a total bid over \$10 million and 100 or more working days, training in partnering skills development is required.

Delete the 2nd paragraph of section 5-1.09C.

10-19-12

Replace "at least 2 representatives" in the 5th paragraph of section 5-1.09C with:

10-19-12

field supervisory personnel

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Replace the 1st and 2nd sentences in the 7th paragraph of section 5-1.13B(1) with:

06-20-12

If a DBE is decertified before completing its work, the DBE must notify you in writing of the decertification date. If a business becomes a certified DBE before completing its work, the business must notify you in writing of the certification date.

Replace "90" in the last sentence of the 7th paragraph of section 5-1.13B(1) with:

06-20-12

30

Replace "Underutilized" in "Underutilized Disadvantaged Business Enterprises" in the heading of section 5-1.13B(2) with:

06-20-12

Performance of

Delete *U* in *UDBE* at each occurrence in section 5-1.13B(2).

06-20-12

Replace the 3rd paragraph of section 5-1.13B(2) with:

06-20-12

Do not terminate or substitute a listed DBE for convenience and perform the work with your own forces or obtain materials from other sources without authorization from the Department.

Replace item 6 in the list in the 4th paragraph of section 5-1.13B(2) with:

06-20-12

6. Listed DBE is ineligible to work on the project because of suspension or debarment.

Add to the list in the 4th paragraph of section 5-1.13B(2):

06-20-12

8. Listed DBE voluntarily withdraws with written notice from the Contract.
9. Listed DBE is ineligible to receive credit for the type of work required.
10. Listed DBE owner dies or becomes disabled resulting in the inability to perform the work on the Contract.
11. Department determines other documented good cause.

Add between the 4th and 5th paragraphs of section 5-1.13B(2):

07-20-12

Notify the original DBE of your intent to use other forces or material sources and provide the reasons. Provide the DBE with 5 days to respond to your notice and advise you and the Department of the reasons why the use of other forces or sources of materials should not occur. Your request to use other forces or material sources must include:

1. 1 or more of the reasons listed in the preceding paragraph
2. Notices from you to the DBE regarding the request
3. Notices from the DBE to you regarding the request

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Add between "terminated" and ", you" in the 5th paragraph of section 5-1.13B(2):

07-20-12

or substituted

Replace the paragraphs of section 5-1.13C with:

11-15-13

Section 5-1.13C applies to a non-federal-aid contract.

Use each DVBE as shown on the *Certified DVBE Summary* form unless you receive authorization from the Department for a substitution. The substitute must be another DVBE unless DVBEs are not available, in which case, you must substitute with a small business. Any authorization for a substitute is contingent upon the Department of General Services' approval of the substitute.

The requirement that DVBEs be certified by the bid opening date does not apply to DVBE substitutions after Contract award.

The Department authorizes substitutions for any of the reasons provided in 2 CA Code of Regs § 1896.73.

Include in your substitution request:

1. Copy of the written notice issued to the DVBE with proof of delivery
2. Copy of the DVBE's response to the notice
3. Name and certification number of the listed DVBE and the proposed substitute

Requests for substitutions of a listed DVBE with a small business must include documentation of the unavailability of DVBEs, including:

1. Contact with the small business/DVBE advocate from the Department and the Department of Veterans Affairs
2. Search results from the Department of General Services' website of available DVBEs
3. Communication with a DVBE community organization nearest the job site, if applicable
4. Documented communication with the DVBE and small businesses describing the work to be performed, the percentage of the total bid, the corresponding dollar amount, and the responses to the communication

The Department forwards your substitution request to the Department of General Services. The Department of General Services issues a notice of approval or denial. The Department provides you this notice.

If you fail to use a listed DVBE without an authorized substitution request, the Department issues a penalty of up to 10 percent of the dollar amount of the work of the listed DVBE.

Maintain records of subcontracts made with DVBEs. Include in the records:

1. Name and business address of each business
2. Total amount paid to each business

For the purpose of determining compliance with Pub Cont Code § 10115 et seq.:

1. Upon work completion, complete and submit *Final Report - Utilization of Disabled Veteran Business Enterprises (DVBE) State Funded Projects Only* form.
2. Upon reasonable notice and during normal business hours, permit access to its premises for the purposes of:
 - 2.1. Interviewing employees.
 - 2.2. Inspecting and copying books, records, accounts and other material that may be relevant to a matter under investigation.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Replace "Reserved" in section 5-1.20C with:

10-19-12

If the Contract includes an agreement with a railroad company, the Department makes the provisions of the agreement available in the *Information Handout* in the document titled "Railroad Relations and Insurance Requirements." Comply with the requirements in the document.

Replace section 5-1.20E with:

05-30-14

5-1.20E Water Meter Charges

Section 5-1.20E applies if a bid item for water meter charges is shown on the Bid Item List. The charges are specified in a special provision for section 5-1.20E.

The local water authority will install the water meters.

The charges by the local water authority include:

1. Furnishing and installing each water meter
2. Connecting to the local water authority's main water line, including any required hot tap or tee
3. Furnishing and installing an extension pipe from the main water line to the water meter
4. Sterilizing the extension pipe

Make arrangements and pay the charges for the installation of the water meters.

If a charge is changed at the time of installation, the Department adjusts the lump sum price based on the difference between the specified charges and the changed charges.

Replace section 5-1.20F with:

05-30-14

5-1.20F Irrigation Water Service Charges

Reserved

Add between the 2nd and 3rd paragraphs of section 5-1.23A:

10-19-12

Submit action and informational submittals to the Engineer.

Add between the 5th and 6th paragraphs of section 5-1.23B(1):

07-19-13

For a revised submittal, allow the same number of days for review as for the original submittal.

Delete the 1st sentence in the 10th paragraph of section 5-1.23B(2).

07-19-13

Add to the list in the 1st paragraph of section 5-1.36A:

07-19-13

10. Survey monuments

Add to section 5-1.36C:

07-20-12

If the Contract does not include an agreement with a railroad company, do not allow personnel or equipment on railroad property.

Prevent material, equipment, and debris from falling onto railroad property.

07-19-13

Protect survey monuments on and off the highway. Upon discovery of a survey monument not identified and located immediately:

- Do not resume work near the monument until authorized.

10-19-12

10-19-12

10-19-12

AA

04-19-13

Steel and iron materials must be melted and manufactured in the United States except:

- All melting and manufacturing processes for these materials, including an application of a coating, must occur in the United States. Coating includes all processes that protect or enhance the value of the material to which the coating is applied.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Replace "Precast concrete members specified section 11-2" in the table in section 6-3.05B with:

07-19-13

Precast concrete members specified as tier 1 or tier 2 in section 90-4.01D(1)

AA

7 LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC

05-30-14

Replace "\$50" in the 1st sentence in the 6th paragraph of section 7-1.02K(2) with:

07-19-13

\$200

Replace "\$25" in the 2nd sentence in the 13th paragraph of section 7-1.02K(3) with:

07-19-13

\$100

Delete "water or" in the 9th paragraph of section 7-1.03.

05-30-14

Replace "20 days" in the 14th paragraph of section 7-1.04 with:

09-16-11

25 days

Replace "90 days" in the 14th paragraph of section 7-1.04 with:

09-16-11

125 days

Add between the 18th and 19th paragraphs of section 7-1.04:

09-16-11

Temporary facilities that could be a hazard to public safety if improperly designed must comply with design requirements described in the Contract for those facilities or, if none are described, with standard design criteria or codes appropriate for the facility involved. Submit shop drawings and design calculations for the temporary facilities and show the standard design criteria or codes used. Shop drawings and supplemental calculations must be sealed and signed by an engineer who is registered as a civil engineer in the State.

Replace the 2nd paragraph of section 7-1.11A with:

07-27-12

A copy of form FHWA-1273 is included in section 7-1.11B. The training and promotion section of section II refers to training provisions as if they were included in the special provisions. The Department specifies the provisions in section 7-1.11D of the *Standard Specifications*. If a number of trainees or apprentices is required, the Department shows the number on the *Notice to Bidders*. Interpret each FHWA-1273 clause shown in the following table as having the same meaning as the corresponding Department clause:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CTA Contract No. XXX**

FHWA-1273 Nondiscrimination Clauses

FHWA-1273 section	FHWA-1273 clause	Department clause
Training and Promotion	In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision.	If section 7-1.11D applies, section 7-1.11D supersedes this subparagraph.
Records and Reports	If on-the-job training is being required by special provision, the contractor will be required to collect and report training data.	If the Contract requires on-the-job training, collect and report training data.

Replace the form in section 7-1.11B with:

07-20-12

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

FHWA-1273 – Revised May 1, 2012

**REQUIRED CONTRACT PROVISIONS
FEDERAL-AID CONSTRUCTION CONTRACTS**

- I. General
- II. Nondiscrimination
- III. Nonsegregated Facilities
- IV. Davis-Bacon and Related Act Provisions
- V. Contract Work Hours and Safety Standards Act Provisions
- VI. Subletting or Assigning the Contract
- VII. Safety: Accident Prevention
- VIII. False Statements Concerning Highway Projects
- IX. Implementation of Clean Air Act and Federal Water Pollution Control Act
- X. Compliance with Governmentwide Suspension and Debarment Requirements
- XI. Certification Regarding Use of Contract Funds for Lobbying

ATTACHMENTS

A. Employment and Materials Preference for Appalachian Development Highway System or Appalachian Local Access Road Contracts (included in Appalachian contracts only)

I. GENERAL

1. Form FHWA-1273 must be physically incorporated in each construction contract funded under Title 23 (excluding emergency contracts solely intended for debris removal). The contractor (or subcontractor) must insert this form in each subcontract and further require its inclusion in all lower tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services).

The applicable requirements of Form FHWA-1273 are incorporated by reference for work done under any purchase order, rental agreement or agreement for other services. The prime contractor shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Form FHWA-1273 must be included in all Federal-aid design-build contracts, in all subcontracts and in lower tier subcontracts (excluding subcontracts for design services, purchase orders, rental agreements and other agreements for supplies or services). The design-builder shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Contracting agencies may reference Form FHWA-1273 in bid proposal or request for proposal documents, however, the Form FHWA-1273 must be physically incorporated (not referenced) in all contracts, subcontracts and lower-tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services related to a construction contract).

2. Subject to the applicability criteria noted in the following sections, these contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract.

3. A breach of any of the stipulations contained in these Required Contract Provisions may be sufficient grounds for withholding of progress payments, withholding of final payment, termination of the contract, suspension / debarment or any other action determined to be appropriate by the contracting agency and FHWA.

4. Selection of Labor: During the performance of this contract, the contractor shall not use convict labor for any purpose within the limits of a construction project on a Federal-aid highway unless it is labor performed by convicts who are on parole, supervised release, or probation. The term Federal-aid highway does not include roadways functionally classified as local roads or rural minor collectors.

II. NONDISCRIMINATION

The provisions of this section related to 23 CFR Part 230 are applicable to all Federal-aid construction contracts and to all related construction subcontracts of \$10,000 or more. The provisions of 23 CFR Part 230 are not applicable to material supply, engineering, or architectural service contracts.

In addition, the contractor and all subcontractors must comply with the following policies: Executive Order 11246, 41 CFR 60, 29 CFR 1625-1627, Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The contractor and all subcontractors must comply with: the requirements of the Equal Opportunity Clause in 41 CFR 60-1.4(b) and, for all construction contracts exceeding \$10,000, the Standard Federal Equal Employment Opportunity Construction Contract Specifications in 41 CFR 60-4.3.

Note: The U.S. Department of Labor has exclusive authority to determine compliance with Executive Order 11246 and the policies of the Secretary of Labor including 41 CFR 60, and 29 CFR 1625-1627. The contracting agency and the FHWA have the authority and the responsibility to ensure compliance with Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), and Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The following provision is adopted from 23 CFR 230, Appendix A, with appropriate revisions to conform to the U.S. Department of Labor (US DOL) and FHWA requirements.

1. Equal Employment Opportunity: Equal employment opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (28 CFR 35, 29 CFR 1630, 29 CFR 1625-1627, 41 CFR 60 and 49 CFR 27) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140 shall constitute the EEO and specific affirmative action standards for the contractor's project activities under

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

this contract. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR 35 and 29 CFR 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

a. The contractor will work with the contracting agency and the Federal Government to ensure that it has made every good faith effort to provide equal opportunity with respect to all of its terms and conditions of employment and in their review of activities under the contract.

b. The contractor will accept as its operating policy the following statement:

"It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, color, national origin, age or disability. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, pre-apprenticeship, and/or on-the-job training."

2. EEO Officer: The contractor will designate and make known to the contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active EEO program and who must be assigned adequate authority and responsibility to do so.

3. Dissemination of Policy: All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer.

b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.

c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minorities and women.

d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

4. Recruitment: When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minorities and women in the area from which the project work force would normally be derived.

a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minorities and women. To meet this requirement, the contractor will identify sources of potential minority group employees, and establish with such identified sources procedures whereby minority and women applicants may be referred to the contractor for employment consideration.

b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, the contractor is expected to observe the provisions of that agreement to the extent that the system meets the contractor's compliance with EEO contract provisions. Where implementation of such an agreement has the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Federal nondiscrimination provisions.

c. The contractor will encourage its present employees to refer minorities and women as applicants for employment. Information and procedures with regard to referring such applicants will be discussed with employees.

5. Personnel Actions: Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, national origin, age or disability. The following procedures shall be followed:

a. The contractor will conduct periodic inspections of project sites to insure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.

c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with its obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of their avenues of appeal.

6. Training and Promotion:

a. The contractor will assist in locating, qualifying, and increasing the skills of minorities and women who are

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

applicants for employment or current employees. Such efforts should be aimed at developing full journey level status employees in the type of trade or job classification involved.

b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs, i.e., apprenticeship, and on-the-job training programs for the geographical area of contract performance. In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision. The contracting agency may reserve training positions for persons who receive welfare assistance in accordance with 23 U.S.C. 140(a).

c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.

d. The contractor will periodically review the training and promotion potential of employees who are minorities and women and will encourage eligible employees to apply for such training and promotion.

7. Unions: If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use good faith efforts to obtain the cooperation of such unions to increase opportunities for minorities and women. Actions by the contractor, either directly or through a contractor's association acting as agent, will include the procedures set forth below:

a. The contractor will use good faith efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minorities and women for membership in the unions and increasing the skills of minorities and women so that they may qualify for higher paying employment.

b. The contractor will use good faith efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, national origin, age or disability.

c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the contracting agency and shall set forth what efforts have been made to obtain such information.

d. In the event the union is unable to provide the contractor with a reasonable flow of referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, national origin, age or disability; making full efforts to obtain qualified and/or qualifiable minorities and women. The failure of a union to provide sufficient referrals (even though it is obligated to provide exclusive referrals under the terms of a collective bargaining agreement) does not relieve the contractor from the requirements of this paragraph. In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the contracting agency.

8. Reasonable Accommodation for Applicants / Employees with Disabilities: The contractor must be familiar

with the requirements for and comply with the Americans with Disabilities Act and all rules and regulations established there under. Employers must provide reasonable accommodation in all employment activities unless to do so would cause an undue hardship.

9. Selection of Subcontractors, Procurement of Materials and Leasing of Equipment: The contractor shall not discriminate on the grounds of race, color, religion, sex, national origin, age or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall take all necessary and reasonable steps to ensure nondiscrimination in the administration of this contract.

a. The contractor shall notify all potential subcontractors and suppliers and lessors of their EEO obligations under this contract.

b. The contractor will use good faith efforts to ensure subcontractor compliance with their EEO obligations.

10. Assurance Required by 49 CFR 26.13(b):

a. The requirements of 49 CFR Part 26 and the State DOT's U.S. DOT-approved DBE program are incorporated by reference.

b. The contractor or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the contracting agency deems appropriate.

11. Records and Reports: The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following the date of the final payment to the contractor for all contract work and shall be available at reasonable times and places for inspection by authorized representatives of the contracting agency and the FHWA.

a. The records kept by the contractor shall document the following:

(1) The number and work hours of minority and non-minority group members and women employed in each work classification on the project;

(2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women; and

(3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minorities and women;

b. The contractors and subcontractors will submit an annual report to the contracting agency each July for the duration of the project, indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on [Form FHWA-1391](#). The staffing data should represent the project work force on board in all or any part of the last payroll period preceding the end of July. If on-the-job training is being required by special provision, the contractor

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

will be required to collect and report training data. The employment data should reflect the work force on board during all or any part of the last payroll period preceding the end of July.

III. NONSEGREGATED FACILITIES

This provision is applicable to all Federal-aid construction contracts and to all related construction subcontracts of \$10,000 or more.

The contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex, or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensure that its employees are not assigned to perform their services at any location, under the contractor's control, where the facilities are segregated. The term "facilities" includes waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, washrooms, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees. The contractor shall provide separate or single-user restrooms and necessary dressing or sleeping areas to assure privacy between sexes.

IV. DAVIS-BACON AND RELATED ACT PROVISIONS

This section is applicable to all Federal-aid construction projects exceeding \$2,000 and to all related subcontracts and lower-tier subcontracts (regardless of subcontract size). The requirements apply to all projects located within the right-of-way of a roadway that is functionally classified as Federal-aid highway. This excludes roadways functionally classified as local roads or rural minor collectors, which are exempt. Contracting agencies may elect to apply these requirements to other projects.

The following provisions are from the U.S. Department of Labor regulations in 29 CFR 5.5 "Contract provisions and related matters" with minor revisions to conform to the FHWA-1273 format and FHWA program requirements.

1. Minimum wages

a. All laborers and mechanics employed or working upon the site of the work, will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions

of paragraph 1.d. of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph 1.b. of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

b. (1) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(ii) The classification is utilized in the area by the construction industry; and

(iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(2) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(3) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Wage and Hour Administrator for determination. The Wage and Hour Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

will notify the contracting officer within the 30-day period that additional time is necessary.

(4) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs 1.b.(2) or 1.b.(3) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

c. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

d. If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program. Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

2. Withholding

The contracting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this contract, or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the contracting agency may, after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

3. Payrolls and basic records

a. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-

Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

b.(1) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the contracting agency. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <http://www.dol.gov/esa/whd/forms/wh347instr.htm> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the contracting agency for transmission to the State DOT, the FHWA or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the contracting agency..

(2) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(i) That the payroll for the payroll period contains the information required to be provided under §5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under §5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(ii) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

(3) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 3.b.(2) of this section.

(4) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

c. The contractor or subcontractor shall make the records required under paragraph 3.a. of this section available for inspection, copying, or transcription by authorized representatives of the contracting agency, the State DOT, the FHWA, or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the FHWA may, after written notice to the contractor, the contracting agency or the State DOT, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

4. Apprentices and trainees

a. Apprentices (programs of the USDOL).

Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice.

The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed.

Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly

rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.

In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

b. Trainees (programs of the USDOL).

Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration.

The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration.

Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

c. Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

d. Apprentices and Trainees (programs of the U.S. DOT).

Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeymen shall not be greater than permitted by the terms of the particular program.

5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

6. Subcontracts. The contractor or subcontractor shall insert Form FHWA-1273 in any subcontracts and also require the subcontractors to include Form FHWA-1273 in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

7. Contract termination: debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

9. Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of eligibility.

a. By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

b. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

c. The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

The following clauses apply to any Federal-aid construction contract in an amount in excess of \$100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by 29 CFR 5.5(a) or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

1. Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

2. Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (1.) of this section, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1.) of this section, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1.) of this section.

3. Withholding for unpaid wages and liquidated damages. The FHWA or the contracting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2.) of this section.

4. Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1.) through (4.) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1.) through (4.) of this section.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

VI. SUBLETTING OR ASSIGNING THE CONTRACT

This provision is applicable to all Federal-aid construction contracts on the National Highway System.

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the contracting agency. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635.116).

a. The term "perform work with its own organization" refers to workers employed or leased by the prime contractor, and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor or lower tier subcontractor, agents of the prime contractor, or any other assignees. The term may include payments for the costs of hiring leased employees from an employee leasing firm meeting all relevant Federal and State regulatory requirements. Leased employees may only be included in this term if the prime contractor meets all of the following conditions:

- (1) the prime contractor maintains control over the supervision of the day-to-day activities of the leased employees;
- (2) the prime contractor remains responsible for the quality of the work of the leased employees;
- (3) the prime contractor retains all power to accept or exclude individual employees from work on the project; and
- (4) the prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.

b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid or propose on the contract as a whole and in general are to be limited to minor components of the overall contract.

2. The contract amount upon which the requirements set forth in paragraph (1) of Section VI is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.

3. The contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the contracting officer determines is necessary to assure the performance of the contract.

4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the contracting agency has assured that each subcontract is

evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract.

5. The 30% self-performance requirement of paragraph (1) is not applicable to design-build contracts; however, contracting agencies may establish their own self-performance requirements.

VII. SAFETY: ACCIDENT PREVENTION

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract.

2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704).

3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C.3704).

VIII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, Form FHWA-1022 shall be posted on each Federal-aid highway project (23 CFR 635) in one or more places where it is readily available to all persons concerned with the project:

18 U.S.C. 1020 reads as follows:

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

"Whoever, being an officer, agent, or employee of the United States, or of any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 1, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined under this title or imprisoned not more than 5 years or both."

IX. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

By submission of this bid/proposal or the execution of this contract, or subcontract, as appropriate, the bidder, proposer, Federal-aid construction contractor, or subcontractor, as appropriate, will be deemed to have stipulated as follows:

1. That any person who is or will be utilized in the performance of this contract is not prohibited from receiving an award due to a violation of Section 508 of the Clean Water Act or Section 306 of the Clean Air Act.
2. That the contractor agrees to include or cause to be included the requirements of paragraph (1) of this Section X in every subcontract, and further agrees to take such action as the contracting agency may direct as a means of enforcing such requirements.

X. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, consultant contracts or any other covered transaction requiring FHWA approval or that is estimated to cost \$25,000 or more – as defined in 2 CFR Parts 180 and 1200.

1. Instructions for Certification – First Tier Participants:

- a. By signing and submitting this proposal, the prospective first tier participant is providing the certification set out below.
- b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this

covered transaction. The prospective first tier participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective first tier participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction.

c. The certification in this clause is a material representation of fact upon which reliance was placed when the contracting agency determined to enter into this transaction. If it is later determined that the prospective participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the contracting agency may terminate this transaction for cause of default.

d. The prospective first tier participant shall provide immediate written notice to the contracting agency to whom this proposal is submitted if any time the prospective first tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

e. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. "First Tier Covered Transactions" refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). "Lower Tier Covered Transactions" refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). "First Tier Participant" refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). "Lower Tier Participant" refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

f. The prospective first tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction.

g. The prospective first tier participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions," provided by the department or contracting agency, entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the \$25,000 threshold.

h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (<https://www.epls.gov/>), which is compiled by the General Services Administration.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

i. Nothing contained in the foregoing shall be construed to require the establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of the prospective participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

j. Except for transactions authorized under paragraph (f) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

2. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – First Tier Participants:

a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:

- (1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency;
- (2) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
- (3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (a)(2) of this certification; and
- (4) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

2. Instructions for Certification - Lower Tier Participants:

(Applicable to all subcontracts, purchase orders and other lower tier transactions requiring prior FHWA approval or estimated to cost \$25,000 or more - 2 CFR Parts 180 and 1200)

a. By signing and submitting this proposal, the prospective lower tier is providing the certification set out below.

b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department, or agency with which

this transaction originated may pursue available remedies, including suspension and/or debarment.

c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances.

d. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations. "First Tier Covered Transactions" refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). "Lower Tier Covered Transactions" refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). "First Tier Participant" refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). "Lower Tier Participant" refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the \$25,000 threshold.

g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (<https://www.epls.gov/>), which is compiled by the General Services Administration.

h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Lower Tier Participants:

1. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency.

2. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

XI. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts which exceed \$100,000 (49 CFR 20).

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

3. The prospective participant also agrees by submitting its bid or proposal that the participant shall require that the language of this certification be included in all lower tier subcontracts, which exceed \$100,000 and that all such recipients shall certify and disclose accordingly.

8 PROSECUTION AND PROGRESS

10-19-12

Replace "working days" in the 1st paragraph of section 8-1.02B(1) with:

10-19-12

original working days

Replace "working days" at each occurrence in the 1st paragraph of section 8-1.02C(1) with:

10-19-12

original working days

Delete the 4th paragraph of section 8-1.02C(1).

04-20-12

Replace "Contract" in the 9th paragraph of section 8-1.02C(1) with:

10-19-12

work

Replace the 1st paragraph of section 8-1.02C(3)(a) with:

04-20-12

Submit a description of your proposed schedule software for authorization.

Delete the last paragraph of section 8-1.02C(3)(a).

04-20-12

Replace section 8-1.02C(3)(b) with:

10-19-12

8-1.02C(3)(b) Reserved

Delete the 3rd paragraph of section 8-1.02C(5).

04-20-12

Replace "Contract" in the last paragraph of section 8-1.02C(5) with:

10-19-12

original

Replace "working days" in the 1st paragraph of section 8-1.02D(1) with:

10-19-12

original working days

Replace "8-1.02D(1)" in the 2nd paragraph of section 8-1.02D(1) with:

01-20-12

8-1.02C(1)

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CTA Contract No. XXX**

Replace "Contract" in the 3rd paragraph of section 8-1.02D(2) with:

work

10-19-12

Replace "Contract" in item 9 in the list in the 4th paragraph of section 8-1.02D(4) with:

work

10-19-12

Replace "Contract completion" in the 4th paragraph of section 8-1.02D(6) with:

work completion

10-19-12

Replace "Contract working days" in the 4th paragraph of section 8-1.02D(6) with:

original working days

10-19-12

Delete items 1.3 and 1.4 in the list in the 1st paragraph of section 8-1.02D(10).

04-20-12

Replace the last paragraph of section 8-1.04B with:

The Department does not adjust time for starting before receiving notice of Contract approval.

10-19-12

Replace the 1st paragraph of section 8-1.05 with:

Contract time starts on the last day specified to start job site activities in section 8-1.04 or on the day you start job site activities, whichever occurs first.

10-19-12

Replace the 2nd paragraph of section 8-1.05 with:

Complete the work within the Contract time.

10-19-12

Delete "unless the Contract is suspended for reasons unrelated to your performance" in the 4th paragraph of section 8-1.05.

10-19-12

Replace the headings and paragraphs in section 8-1.06 with:

The Engineer may suspend work wholly or in part due to conditions unsuitable for work progress. Provide for public safety and a smooth and unobstructed passageway through the work zone during the suspension as specified under sections 7-1.03 and 7-1.04. Providing the passageway is force account work. The Department makes a time adjustment for the suspension due to a critical delay.

10-19-12

The Engineer may suspend work wholly or in part due to your failure to (1) fulfill the Engineer's orders, (2) fulfill a Contract part, or (3) perform weather-dependent work when conditions are favorable so that weather-related unsuitable conditions are avoided or do not occur. The Department may provide for a smooth and unobstructed passageway through the work during the suspension and deduct the cost from payments. The Department does not make a time adjustment for the suspension.

Upon the Engineer's order of suspension, suspend work immediately. Resume work when ordered.

10-19-12

10-19-12

10-19-12

08-05-11

10-19-12

11-15-13

07-19-13

01-18-13

10-19-12

10-19-12

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Cost	Percent markup
Labor	30
Materials	10
Equipment rental	10

Delete ", Huntington Beach," in the 3rd paragraph of section 9-1.07A.

04-20-12

Replace the formula in section 9-1.07B(2) with:

$$Q_h = HMATT \times X_a$$

04-20-12

Replace "weight of dry aggregate" in the definition of the variable X_a in section 9-1.07B(2) with:

total weight of HMA

04-20-12

Replace the formula in section 9-1.07B(3) with:

$$Q_{rh} = RHMATT \times 0.80 \times X_{arb}$$

04-20-12

Replace "weight of dry aggregate" in the definition of the variable X_{arb} in section 9-1.07B(3) with:

total weight of rubberized HMA

04-20-12

Replace the heading of section 9-1.07B(4) with:

Hot Mix Asphalt with Modified Asphalt Binder

04-20-12

Add between "in" and "modified" in the introductory clause of section 9-1.07B(4):

HMA with

04-20-12

Replace the formula in section 9-1.07B(4) with:

$$Q_{mh} = MHMATT \times [(100 - X_{am}) / 100] \times X_{mab}$$

04-20-12

Replace "weight of dry aggregate" in the definition of the variable X_{mab} in section 9-1.07B(4) with:

total weight of HMA

04-20-12

Replace the formula in section 9-1.07B(5) with:

$$Q_{rap} = HMATT \times X_{aa}$$

04-20-12

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CTA Contract No. XXX**

Replace "weight of dry aggregate" in the definitions of the variables *Xaa* and *Xta* in section 9-1.07B(5) with:

total weight of HMA

04-20-12

Add after the variable definitions in section 9-1.07B(9):

The quantity of extender oil is included in the quantity of asphalt.

04-20-12

Replace the headings and paragraphs in section 9-1.11 with:

10-19-12

9-1.11A General

Section 9-1.11 applies if a bid item for time-related overhead is included in the Contract. If a bid item for time-related overhead is included, you must exclude the time-related overhead from every other bid item price.

9-1.11B Payment Quantity

The TRO quantity does not include the number of working days to complete plant establishment work.

For a contract with a TRO lump sum quantity on the Bid Item List, the Department pays you based on the following conversions:

1. LS unit of measure is replaced with WDAY
2. Lump sum quantity is replaced with the number of working days bid
3. Lump sum unit price is replaced with the item total divided by the number of working days bid

9-1.11C Payment Inclusions

Payment for the TRO bid item includes payment for time-related field- and home-office overhead for the time required to complete the work.

The field office overhead includes time-related expenses associated with the normal and recurring construction activities not directly attributed to the work, including:

1. Salaries, benefits, and equipment costs of:
 - 1.1. Project managers
 - 1.2. General superintendents
 - 1.3. Field office managers
 - 1.4. Field office staff assigned to the project
2. Rent
3. Utilities
4. Maintenance
5. Security
6. Supplies
7. Office equipment costs for the project's field office

The home-office overhead includes the fixed general and administrative expenses for operating your business, including:

1. General administration
2. Insurance
3. Personnel and subcontract administration
4. Purchasing
5. Accounting
6. Project engineering and estimating

Payment for the TRO bid item does not include payment for:

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

1. The home-office overhead expenses specifically related to:
 - 1.1. Your other contracts or other businesses
 - 1.2. Equipment coordination
 - 1.3. Material deliveries
 - 1.4. Consultant and legal fees
2. Non-time-related costs and expenses such as mobilization, licenses, permits, and other charges incurred once during the Contract
3. Additional overhead involved in incentive/disincentive provisions to satisfy an internal milestone or multiple calendar requirements
4. Additional overhead involved in performing additional work that is not a controlling activity
5. Overhead costs incurred by your subcontractors of any tier or suppliers

9-1.11D Payment Schedule

For progress payments, the total work completed for the TRO bid item is the number of working days shown for the pay period on the *Weekly Statement of Working Days*.

For progress payments, the Department pays a unit price equal to the lesser of the following amounts:

1. Price per working day as bid or as converted under section 9-1.11B.
2. 20 percent of the total bid divided by the number of original working days

For a contract without plant establishment work, the Department pays you the balance due of the TRO item total as specified in section 9-1.17B.

For a contract with plant establishment work, the Department pays you the balance due of the TRO item total in the 1st progress payment after all non-plant establishment work is completed.

9-1.11E Payment Adjustments

The 3rd paragraph of section 9-1.17C does not apply.

The Department does not adjust the unit price for an increase or decrease in the TRO quantity except as specified in section 9-1.11E.

Section 9-1.17D(2)(b) does not apply except as specified for the audit report below.

If the TRO bid item quantity exceeds 149 percent of the quantity shown on the Bid Item List or as converted under section 9-1.11B, the Engineer may adjust or you may request an adjustment of the unit price for the excess quantity. For the adjustment, submit an audit report within 60 days of the Engineer's request. The report must be prepared as specified for an audit report for an overhead claim in section 9-1.17D(2)(b).

Within 20 days of the Engineer's request, make your financial records available for an audit by the State for the purpose of verifying the actual rate of TRO described in your audit. The actual rate of TRO described is subject to the Engineer's authorization.

The Department pays the authorized actual rate for TRO in excess of 149 percent of the quantity shown on the Bid Item List or as converted under section 9-1.11B.

The Department pays for 1/2 the cost of the report; the Contractor pays for the other 1/2. The cost is determined under section 9-1.05.

Replace the paragraphs of section 9-1.16D with:

07-19-13

9-1.16D(1) General

Section 9-1.16D applies if a bid item for mobilization is shown on the Bid Item List.

Payments for mobilization made under section 9-1.16D are in addition to the partial payments made under Pub Cont Code § 10261.

Section 9-1.16D(2) applies unless the Contract includes a special provision for section 9-1.16D(1) that specifies section 9-1.16D(3) applies.

9-1.16D(2) Mobilization for Projects Except for Those Over Water Requiring Marine Access

The Department makes partial payments for mobilization under Pub Cont Code § 10264(a) except the amount of work completed does not include the amount earned for mobilization. The partial payment amount is reduced by a prorated amount bid in excess of the maximum allowed under Pub Cont Code § 10264(a)(5).

9-1.16D(3) Mobilization for Projects Over Water Requiring Marine Access

The Department makes partial payments for mobilization under Pub Cont Code § 10264(b) except the amount of work completed does not include the amount earned for mobilization. The partial payment amount is reduced by a prorated amount bid in excess of the maximum allowed under Pub Cont Code § 10264(b)(6).

Delete "revised Contract" in item 1 of the 1st paragraph of section 9-1.16E(2).

2020

Submit either a written acceptance of the proposed final estimate or a claim statement postmarked or hand delivered before the 31st day after receiving the proposed final estimate.

proposed

The CPA's audit must be performed as an examination-level engagement under the attestation engagements in the *Government Auditing Standards* published by the Comptroller General of the United States.

Contract Number 04-4H1604

DIVISION II GENERAL CONSTRUCTION

10 GENERAL

05-30-14

Replace the headings and paragraphs in section 10 with:

04-19-13

10-1 GENERAL

10-1.01 GENERAL

Section 10 includes general specifications for general construction work.

10-1.02 WORK SEQUENCING

Before obliterating any traffic stripes, pavement markings, and pavement markers to be replaced at the same location, reference the stripes, markings, and markers. Include limits and transitions with control points to reestablish the new stripes, markings, and markers.

10-1.03 TIME CONSTRAINTS

Reserved

10-1.04 TRAINING AND MEETINGS

Training and meetings are held at times and locations you and the Engineer agree to.

10-1.05–10-1.10 RESERVED

10-2 SUSTAINABLE DESIGN REQUIREMENTS

10-2.01 GENERAL

10-2.01A General

Reserved

10-2.01B–10-2.01H Reserved

10-2.02 CALGREEN TIER 1

10-2.02A–10-2.02H Reserved

10-2.03 LEED

10-2.03A–10-2.03H Reserved

10-3 RESERVED

Replace section 10-4 with:

05-30-14

10-4 WATER USAGE

Section 10-4 includes general specifications for your use of water for construction activities.

The Department encourages you to conserve water in all construction activities.

The Engineer notifies you of any (1) water shortage or (2) mandate from a local water authority to ration water. Within 10 days of the notification, submit a water conservation plan. The plan must include:

1. List of construction activities that require water
2. Measures you will implement for each activity to conserve water
3. Method for curing concrete other than the water method if included in the work
4. Dust palliative you will use for dust control

Any unavailability of water that delays a controlling activity is a material shortage.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Replace section 10-5 with:

05-30-14

10-5 DUST CONTROL

Section 10-5 includes general specifications for controlling dust resulting from the work.

Prevent and alleviate dust by:

1. Applying a dust palliative under section 18
2. Applying temporary soil stabilization under section 13-5
3. Managing material stockpiles under section 13-4.03C(3)

04-19-13

10-6 JOB SITE WATER CONTROL

10-6.01 GENERAL

Section 10-6 includes specifications for controlling water to provide a dry working area at the job site.

10-6.02 WATER-FILLED COFFERDAM

Reserved

10-6.03–10-6.10 RESERVED

10-7–10-20 RESERVED

AA

11 QUALITY CONTROL AND ASSURANCE

07-19-13

Replace section 11-2 with:

07-19-13

11-2 RESERVED

Replace the table in the 3rd paragraph of section 11-3.01A with:

07-19-13

AWS code	Year of adoption
D1.1	2010
D1.3	2008
D1.4	2011
D1.5	2010
D1.6	2007
D1.8	2009

Replace "does" in the definition of "continuous inspection" in section 11-3.01B with:

do

07-19-13

Replace "gross nonconformance" and its definition in section 11-3.01B with:

07-19-13

gross nonconformance: Rejectable indications are present in more than 20 percent of the tested weld length.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Replace the introductory clause in the 1st paragraph of section 11-3.01C with:

07-19-13

Replace clause 6.1.3 of AWS D1.1, the 1st paragraph of clause 7.1.2 of AWS D1.4, and clause 6.1.2 of AWS D1.5 with:

Replace the 3rd paragraph of section 11-3.01C with:

07-19-13

For each inspection, including fit-up, WPS verification, and final weld inspection, the QC Inspector must confirm and document compliance with the specifications, AWS welding codes, and any referenced drawings.

Replace the paragraphs in section 11-3.01D with:

07-19-13

The Engineer has the authority to verify the qualifications or certifications of any welder, QC Inspector, or NDT personnel to specified levels by retests or other means determined by the Engineer. If welding will be performed without gas shielding, then qualification must also include welding without gas shielding.

Replace clause 6.14.6.1 of AWS D1.1, clause 7.8 of AWS D1.4, and clause 6.1.3.4 of AWS D1.5 with:

Personnel performing NDT must be qualified and certified under American Society for Nondestructive Testing (ASNT) Recommended Practice No. SNT-TC-1A and the written practice of the NDT firm. The written practice of the NDT firm must comply with or exceed the guidelines of the ASNT Recommended Practice No. SNT-TC-1A. Individuals who perform NDT, review the results, and prepare the written reports must be one of the following:

1. Certified NDT Level II technicians
2. Level III technicians certified to perform the work of Level II technicians

Replace the heading and the 1st through 3rd paragraphs of section 11-3.01E with:

07-19-13

11-3.01E Weld Joint Details

If weld joint details proposed for use in the work are not prequalified under clause 3 of AWS D1.1 or figure 2.4 or 2.5 of AWS D1.5, submit the proposed WPS and the intended weld joint locations.

Upon authorization of the proposed joint detail locations and qualification of the proposed joint details, welders and welding operators using these details must weld an additional qualification test plate using the WPS variables and the weld joint detail to be used in production. The test plate must:

1. Have the maximum thickness to be used in production and a minimum length of 18 inches.
2. Be mechanically and radiographically tested. Mechanical and radiographic testing and acceptance criteria must comply with the applicable AWS codes.

If a nonprequalified weld joint configuration is proposed using a combination of WPSs for work welded under AWS D1.1, you may conduct a single test combining the WPSs to be used in production, if the essential variables, including weld bead placement, of each process are limited to those established in table 4.5 of AWS D1.1.

Replace the 1st paragraph of section 11-3.01F with:

07-19-13

Replace paragraph 3 of clause 6.26.3.2 of AWS D1.5 with:

3. If indications that exhibit these planar characteristics are present at scanning sensitivity, or other evidence exists to suggest the presence of transverse cracks, a more detailed evaluation of the discontinuity by other means must be performed (e.g., alternate UT techniques, RT,

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CTA Contract No. XXX**

grinding, or gouging for visual inspection or MT of the excavated areas.). For welds that have transverse cracks, excavate the full length of the crack plus 2 inches of weld metal on each side adjacent to the crack and reweld.

Replace "section" in the 2nd paragraph of section 11-3.01F with:

07-19-13

clause

Replace the 1st paragraph of section 11-3.02A with:

07-19-13

Except for stud welding, section 11-3.02 applies to (1) work welded under sections 49, 52, 55, and 75-1.03E and (2) work in section 99 that must comply with an AWS welding code.

Replace the 4th through 6th paragraphs of section 11-3.02C(2) with:

07-19-13

Submit an amended welding QC plan or an addendum to the welding QC plan for any changes to:

1. WPSs
2. NDT firms
3. QC personnel or procedures
4. NDT personnel or procedures
5. Systems for tracking and identifying welds
6. Welding personnel

Allow 15 days for the Engineer's review of an amended welding QC plan or an addendum to the welding QC plan.

Submit 7 copies of each authorized QC plan and any authorized addendums. Make 1 copy available at each location where work is performed.

Replace the 1st paragraph of section 11-3.02C(3) with:

07-19-13

Submit a welding report within 7 days following the performance of any welding. The welding report must include:

1. Daily production log for welding for each day that welding is performed
2. Reports of all visual weld inspections and NDT performed, whether specified, additional, or informational
3. Radiographs and radiographic reports, and other required NDT reports
4. Summary of welding and NDT activities that occurred during the reporting period
5. Reports of each application of heat straightening
6. Summarized log listing the rejected lengths of weld by welder, position, process, joint configuration, and piece number
7. Documentation that you have:
 - 7.1. Evaluated all radiographs and radiograph reports and NDT and NDT reports
 - 7.2. Corrected all rejectable deficiencies and that all repaired welds have been reexamined using the required NDT and found acceptable
8. Reports or chart recordings of each application of any stress relieving used
9. Reports and chart recordings for any electroslag welding used

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Add between "radiographic" and "envelopes" in the introductory clause in the 3rd paragraph of section 11-3.02C(3):

film

07-19-13

Delete the 3rd sentence in the 5th paragraph of section 11-3.02C(3).

07-19-13

Replace the introductory clause in the 1st paragraph of section 11-3.02D with:

07-19-13

Clauses 6.1.4.1 and 6.1.4.3 of AWS D1.1, the 2nd paragraph of clause 7.1.2 of AWS D1.4, clauses 6.1.3.1 through 6.1.3.3 of AWS D1.5, and clause 7.2.3 of AWS D1.8 are replaced with:

Replace items 1 and 2 in the list in the 2nd paragraph of section 11-3.02D with:

07-19-13

1. Work is welded at a permanent fabrication or manufacturing plant that is certified under the AISC Certification Program for Steel Bridge Fabricators, Intermediate Bridges, and Fracture-Critical Member endorsement if required.
2. Structural steel for building construction work is performed at a permanent fabrication or manufacturing plant that is certified under the AISC Quality Certification Program, Category STD, Standard for Steel Building Structures.

Delete the 3rd paragraph of section 11-3.02D.

07-19-13

Replace the 1st sentence in the 4th paragraph of section 11-3.02D with:

07-19-13

Except for the exempt facilities identified above, an authorized independent third party must witness the qualification tests for welders or welding operators.

Replace the paragraph in section 11-3.02F with:

07-19-13

Welding procedures qualification for work welded under AWS D1.5 must comply with clause 5.12 or 5.12.4 of AWS D1.5 and the following:

1. Unless considered prequalified, qualify fillet welds in each position. Conduct the fillet weld soundness test using the essential variables of the WPS as established by the PQR.
2. For qualifying joints that do not comply with figures 2.4 and 2.5 of AWS D1.5, conduct the test complying with figure 5.3 using the welding parameters that were established for the test conducted complying with figure 5.1.
3. Macroetch tests are required for WPS qualification tests, and acceptance must comply with clause 5.19.3 of AWS D1.5.
4. If a nonstandard weld joint is to be made using a combination of WPSs, you may conduct a test under figure 5.3, combining the qualified or prequalified WPSs to be used in production, if the essential variables, including weld bead placement, of each process are limited to those established in table 5.3 of AWS D1.5.
5. Before preparing mechanical test specimens, inspect the PQR welds by visual and radiographic tests. The backing bar must be 3 inches in width and must remain in place during NDT. Results of the visual and radiographic tests must comply with clause 6.26.2 of AWS D1.5 excluding clause 6.26.2.2. All other requirements for clause 5.17 are applicable.

07-19-13

07-19-13

AA

05-30-14

05-30-14

10-19-12

10-19-12

04-19-13

10-19-12

07-19-13

12-3.19–12-3.25 RESERVED

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX
Replace the 7th through 9th paragraphs of section 12-4.02A with:

07-19-13

If pedestrian traffic is allowed to pass through construction areas, provide a temporary pedestrian facility through the construction areas within the highway. Include protective overhead covering as necessary to ensure protection from falling objects and drippings from overhead structures.

At locations where pedestrian openings through falsework are required, provide a temporary pedestrian facility with protective overhead covering during all bridge construction activities.

Temporary pedestrian facilities must comply with section 12-7.

If an activity requires a closure of a walkway, another walkway must be made available nearby, off of the traveled way.

07-19-13

Delete the 12th paragraph of section 12-4.02A.

Replace section 12-4.03 with:

07-19-13

12-4.03 CLOSURE SCHEDULES AND CONDITIONS

12-4.03A General

Submit closure schedule requests and closure schedule amendments using LCS to show the locations and times of the requested closures.

The Department provides LCS training. Request the LCS training at least 30 days before submitting the 1st lane closure request. The Department provides the training within 15 days after your request. The training may be web based.

Except for web-based training, the training is held at a time and location you and the Engineer agree to.

For web-based training, the Engineer provides you the website address to access the training.

Within 5 business days after completion of the training, the Department provides LCS accounts and user identifications to your assigned, trained representatives.

Each representative must maintain a unique password and current user information in the LCS.

12-4.03B Closure Schedules

Every Monday by noon, submit a closure schedule request of planned closures for the next week period. The next week period is defined as Sunday noon through the following Sunday noon.

Submit a closure schedule request not less than 25 days and not more than 125 days before the anticipated start of any activity that reduces:

1. Horizontal clearances of traveled ways, including shoulders, to 2 lanes or less due to activities such as temporary barrier placement and paving
2. Vertical clearances of traveled way, including shoulders, due to activities such as pavement overlays, overhead sign installation, falsework, or girder erection

Submit closure schedule amendments, including adding additional closures, by noon at least 3 business days before a planned closure.

Cancel closure requests using LCS at least 48 hours before the start time of the closure.

You will be notified through LCS of unauthorized closures or closures that require coordination with other parties as a condition for authorization.

The Engineer may reschedule a closure cancelled due to unsuitable weather.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

If a closure is not opened to traffic by the specified time, suspend work. No further closures are allowed until the Engineer has reviewed and authorized a work plan submitted by you that ensures that future closures will be opened to traffic by the specified time. Allow 2 business days for review of your proposed work plan. The Department does not compensate you for your losses due to the suspension of work resulting from the late opening of closures.

Notify the Engineer of delays in your activities caused by:

1. Your closure schedule request being denied although your requested closures are within the specified time frame allowed for closures. The Department does not compensate you for your losses due to amendments to the closure schedule that are not authorized.
2. Your authorized closure being denied.

If you are directed to remove a closure before the time designated in the authorized closure schedule, you will be compensated for the delay.

12-4.03C Contingency Plan

Section 12-4.03C applies if a contingency plan is specified in the special provisions or if a contingency plan is requested.

If a contingency plan is requested, submit the contingency plan within 1 business day of the request.

The contingency plan must identify the activities, equipment, processes, and materials that may cause a delay in the opening of a closure to traffic. The plan must include:

1. List of additional or alternate equipment, materials, or workers necessary to ensure continuing activities and on-time opening of closures if a problem occurs. If the additional or alternate equipment, materials, or workers are not on site, specify their location, the method for mobilizing these items, and the required time to complete mobilization.
2. General time-scaled logic diagram displaying the major activities and sequence of planned operations. For each activity, identify the critical event when the contingency plan will be activated.

Based on the Engineer's review, additional materials, equipment, workers, or time to complete activities from that specified in the contingency plan may be required.

Submit revisions to a contingency plan at least 3 business days before starting the activity requiring a contingency plan. Allow 2 business days for review of the revised contingency plan.

Replace section 12-7 with:

07-19-13

12-7 TEMPORARY PEDESTRIAN FACILITIES

12-7.01 GENERAL

Section 12-7 includes specifications for constructing temporary pedestrian facilities.

Temporary pedestrian facilities must comply with the *California MUTCD*, Part 6, Chapter 6D, "Pedestrian and Worker Safety."

Design temporary pedestrian facilities with protective overhead covering to support all imposed loads.

The design load and maximum allowable stresses for temporary pedestrian facilities with protective overhead covering must comply with section 48-2.01D(3). The minimum design live load for the temporary pedestrian facilities with protective overhead covering must be 150 psf for the entire structure.

The minimum width of the temporary pedestrian facilities with protective overhead covering between the inside face of handrails must be 60 inches. The clear height of the temporary pedestrian facilities with protective overhead covering measured from the floor surface to the canopy overhead must be at least 8 feet. Provide adequate lighting at all times. Lighting must comply with section 86-6.13.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CTA Contract No. XXX**

Submit shop drawings with supporting calculations for temporary pedestrian facilities with protective overhead covering. Shop drawings and calculations must be signed by an engineer who is registered as a civil engineer in the State.

12-7.02 MATERIALS

Walkways must be surfaced with HMA, portland cement concrete, or wood. The surface must be skid resistant and free of irregularities.

Hand railings must be S4S lumber and painted white.

Protective overhead covering of temporary pedestrian facilities must be plywood at least 3/4 inch thick or wood planking with a nominal thickness of 2 inches minimum.

12-7.03 CONSTRUCTION

Construct hand railings on each side of a temporary pedestrian facility as necessary to protect pedestrian traffic from hazards due to work activities or adjacent vehicular traffic.

Maintain temporary pedestrian facilities in good condition and keep them clear of obstructions.

12-7.04 PAYMENT

Not Used

AA

13 WATER POLLUTION CONTROL

05-30-14

Delete item 3 in the list in the 4th paragraph of section 13-1.01A.

04-19-13

Add to section 13-1.01A:

11-15-13

Comply with the Department's general permit issued by the State Water Resources Control Board for Order No. 2012-0011-DWQ, NPDES No. CAS000003, *National Pollutant Discharge Elimination System (NPDES) Permit, Statewide Storm Water Permit and Waste Discharge Requirements (WDRs) for the State of California, Department of Transportation (Caltrans)*. The Department's general permit governs stormwater and nonstormwater discharges from the Department's properties, facilities, and activities. The Department's general permit may be viewed at the Web site for the State Water Resources Control Board, Storm Water Program, Caltrans General Permit.

Add to the list in the 1st paragraph of section 13-1.01D(3)(b):

10-21-11

3. Have completed SWRCB approved QSD training and passed the QSD exam

Add to the list in the 2nd paragraph of section 13-1.01D(3)(b):

10-21-11

3. Have completed SWRCB approved QSP training and passed the QSP exam

Replace "NEL violation" in item 3.6.2 in the list in the 1st paragraph of section 13-1.01D(3)(c) with:

04-19-13

receiving water monitoring trigger

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Replace the 1st paragraph in section 13-2.01B with:

04-19-13

Within 7 days after Contract approval, submit 2 copies of your WPCP for review. Allow 5 business days for review.

After the Engineer authorizes the WPCP, submit an electronic copy and 3 printed copies of the authorized WPCP.

If the RWQCB requires review of the authorized WPCP, the Engineer submits the authorized WPCP to the RWQCB for its review and comment. If the Engineer orders changes to the WPCP based on the RWQCB's comments, amend the WPCP within 3 business days.

Replace the 1st paragraph in section 13-3.01B(2)(a) with:

04-19-13

Within 15 days of Contract approval, submit 3 copies of your SWPPP for review. The Engineer provides comments and specifies the date when the review stopped if revisions are required. Change and resubmit a revised SWPPP within 15 days of receiving the Engineer's comments. The Department's review resumes when a complete SWPPP has been resubmitted.

When the Engineer authorizes the SWPPP, submit an electronic copy and 4 printed copies of the authorized SWPPP.

If the RWQCB requires review of the authorized SWPPP, the Engineer submits the authorized SWPPP to the RWQCB for its review and comment. If the Engineer requests changes to the SWPPP based on the RWQCB's comments, amend the SWPPP within 10 days.

Replace "NELs" in item 3.1 in the 3rd paragraph of section 13-3.01B(2)(a) with:

04-19-13

receiving water monitoring triggers

Replace section 13-3.01B(6)(c) with:

04-19-13

13-3.01B(6)(c) Receiving Water Monitoring Trigger Report

Whenever a receiving water monitoring trigger is exceeded, notify the Engineer and submit a receiving water monitoring trigger report within 48 hours after conclusion of a storm event. The report must include:

1. Field sampling results and inspections, including:
 - 1.1. Analytical methods, reporting units, and detection limits
 - 1.2. Date, location, time of sampling, visual observation and measurements
 - 1.3. Quantity of precipitation from the storm event
2. Description of BMPs and corrective actions

Replace "NEL" in the 6th paragraph of section 13-3.01C(1) with:

04-19-13

receiving water monitoring trigger

Replace section 13-3.01C(3) with:

04-19-13

13-3.01C(3) Receiving Water Monitoring Trigger

For a risk level 3 project, receiving water monitoring triggers must comply with the values shown in the following table:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Receiving Water Monitoring Trigger

Parameter	Test method	Detection limit (min)	Unit	Value
pH	Field test with calibrated portable instrument	0.2	pH	Lower limit = 6.0 Upper limit = 9.0
Turbidity	Field test with calibrated portable instrument	1	NTU	500 NTU max

The storm event daily average for storms up to the 5-year, 24-hour storm must not exceed the receiving water monitoring trigger for turbidity.

The daily average sampling results must not exceed the receiving water monitoring trigger for pH.

Delete "and NELs are violated" in the 3rd paragraph of section 13-3.03C.

04-19-13

Replace "working days" at each occurrence in section 13-3.04 with.

original working days

10-19-12

Delete the 1st sentence in the 2nd paragraph of section 13-4.03C(3).

04-19-13

Add between the 2nd and 3rd paragraphs of section 13-4.03C(3):

Manage stockpiles by implementing water pollution control practices on:

04-19-13

1. Active stockpiles before a forecasted storm event
2. Inactive stockpiles according to the WPCP or SWPPP schedule

Delete the 7th paragraph of section 13-4.03C(3).

05-30-14

Replace the heading of section 13-4.03E(1) with:

General

05-30-14

Delete the 1st through 5th sentences in the 2nd paragraph of section 13-4.03E(1).

05-30-14

Replace the 1st sentence of the 1st paragraph of section 13-4.03E(3) with:

Limit vehicle and equipment cleaning or washing at the job site to that needed for safety and protection of the equipment and compliance with PLACs.

05-30-14

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Replace the paragraph in section 13-4.04 with:

Not Used

04-20-12

Replace "20-7.02D(6)" in section 13-5.02C with:

20-5.03E

07-19-13

Delete "or stockpile" in the 3rd paragraph of section 13-5.02F.

10-19-12

Replace "20-7.03I(10)" in section 13-5.03C with:

20-5.03E(3)

07-19-13

Replace section 13-5.03F with:

13-5.03F Reserved

04-20-12

Delete "or stockpile" in item 1 in the list in the 1st paragraph of section 13-5.03K.

10-19-12

Delete the 3rd paragraph of section 13-5.03K.

10-19-12

Replace the 2nd sentence in the 1st paragraph of section 13-9.01A with:

You may use any of the following systems for temporary concrete washout:

10-19-12

1. Temporary concrete washout facility
2. Portable temporary concrete washout
3. Temporary concrete washout bin

Replace the 2nd paragraph of section 13-9.01B with:

Retain and submit an informational submittal for records of disposed concrete waste.

10-19-12

Delete the 4th paragraph of section 13-9.01B.

10-19-12

Delete "if authorized" in the 1st sentence in the 1st paragraph of section 13-9.02A.

10-19-12

Replace "at least 3-inch" in the 3rd sentence in the 1st paragraph of section 13-9.02A with:

6-inch

10-19-12

[illegible]

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Saw cut (1) no more than 2 days before removing pavement and (2) such that traffic will not dislodge any pavement piece or segment. Saw cut perpendicular to the traveled way except you may cut parallel or diagonal to the traveled way when removing the pavement during the same lane closure as the saw cutting.

You may make additional saw cuts within the sawed outline.

Saw cuts must be the full depth of the pavement unless otherwise shown.

Saw cut at longitudinal and transverse joints to remove entire slabs. For partial-slab areas, the Engineer determines the exact saw-cut locations.

15-2.02B(5)(c) Reserved

15-2.02B(6) Reserved

15-2.02B(7) Payment

Reserved

Replace section 15-2.02G with:

07-19-13

15-2.02G Remove Guardrail

Where removing guardrail, remove any concrete anchors and steel foundation tubes.

Replace the 1st paragraph of section 15-2.02K with:

07-19-13

Box culverts, concrete pipes, inlets, headwalls, and endwalls must be completely removed if any portion of these structures is (1) within 3 feet of the grading plane in excavation areas, (2) within 1 foot of original ground in embankment areas, or (3) shown to be removed.

Replace "Metal beam guard railing" in the table in the 2nd paragraph of section 15-2.03A(2)(a) with:

07-19-13

Guardrail

Replace the heading of section 15-2.03B with:

07-19-13

Salvage Guardrail

Replace the heading of section 15-2.04D with:

07-19-13

Reconstruct Guardrail

Replace section 15-2.09D with:

07-19-13

15-2.09D Reserved

Replace the 4th paragraph of section 15-2.10B with:

01-18-13

Instead of using new materials similar in character to those in the existing structure, you may use raising devices to adjust a manhole to grade. Before starting paving work, measure and fabricate raising devices. Raising devices must:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

1. Comply with the specifications for section 75 except that galvanizing is not required
2. Have a shape and size that matches the existing frame
3. Be match marked by painting identification numbers on the device and corresponding structure
4. Result in an installation that is equal to or better than the existing one in stability, support, and nonrocking characteristics
5. Be fastened securely to the existing frame without projections above the surface of the road or into the clear opening

Replace the heading of section 15-2.10D with:

07-19-13

Adjust Guardrail

Replace the paragraphs of section 15-3.01 with:

07-19-13

Section 15-3 includes specifications for removing all or a portion of a concrete facility.

Concrete facilities include curbs, gutters, gutter depressions, sidewalks, driveways, slope paving, island paving, barriers, retaining walls, sound walls, minor structures, aprons, spillways, and dams.

Where broken-concrete slope protection is shown, use removed concrete for the construction of the broken-concrete slope protection.

Instead of disposing of removed concrete by removing it from the job site, you may dispose of it on the job site by one of the following methods:

1. Burying it in embankments at authorized locations. Removed concrete must be broken into pieces that can be readily handled and incorporated into embankments and placed at a depth of at least 3 feet below finished grade and slope lines. Concrete must not be buried in areas where piling is to be placed or within 10 feet of trees, pipelines, poles, buildings or other permanent objects or structures.
2. Placing it at authorized locations. The removed concrete must not present an unsightly appearance from the highway.

Replace the paragraph of section 15-3.02 with:

07-19-13

Not Used

Delete the 5th paragraph of section 15-3.03.

07-19-13

Add to the end of section 15-4.01A(2):

04-19-13

Allow 20 days for review of the bridge removal work plan.

Replace the 1st paragraph of section 15-5.01C(1) with:

10-19-12

Before starting deck rehabilitation activities, complete the removal of any traffic stripes, pavement markings, and pavement markers.

Replace the 2nd and 3rd paragraphs of section 15-5.01C(2) with:

10-19-12

Perform the following activities in the order listed:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CTA Contract No. XXX**

1. Abrasive blast the deck surface with steel shot. Perform abrasive blasting after the removal of any unsound concrete and placement of any rapid setting concrete patches.
2. Sweep the deck surface.
3. Blow the deck surface clean using high-pressure air.

Replace the 2nd paragraph of section 15-5.01C(4) with:

10-19-12

Before removing asphalt concrete surfacing, verify the depth of the surfacing at the supports and midspans of each structure (1) in each shoulder, (2) in the traveled way, and (3) at the roadway crown, if a crown is present.

Delete "and concrete expansion dams" in the 3rd paragraph of section 15-5.01C(4).

04-19-13

Replace the 2nd paragraph of section 15-5.03A(2) with:

10-19-12

For a contract with less than 60 original working days, submit certificates of compliance for the filler material and bonding agents.

Replace "51-1.02C" in the 1st paragraph of section 15-5.03B with:

04-19-13

51-1.02F

Replace the 4th paragraph of section 15-5.03B with:

10-19-12

For a contract with less than 60 original working days, alternative materials must be authorized before use.

Add between the 5th and 6th paragraphs of section 15-5.03C:

10-19-12

The final surface finish of the patched concrete surface must comply with section 51-1.03F.

Delete the 4th paragraph of section 15-5.05C.

10-19-12

Replace "51-1.03F(5)" in the 3rd paragraph of section 15-5.06C(1) with:

07-19-13

51-1.01D(4)(b)

Replace "51-1.03E(5)" in the 5th paragraph of section 15-5.06C(1) with:

10-19-12

51-1.03F(5)

Delete the 9th paragraph of section 15-5.06C(1).

10-19-12

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CTA Contract No. XXX**

Delete the 15th paragraph of section 15-5.06C(1).

04-19-13

Add between the 18th and 19th paragraphs of section 15-5.06C(1):

07-19-13

Texture the polyester concrete surface before gelling occurs by longitudinal tining under 51-1.03F(5)(b)(iii), except do not perform initial texturing.

Replace section 15-5.06C(2) with:

04-19-13

15-5.06C(2) Reserved

Delete the 3rd paragraph of section 15-5.06D.

04-19-13

Replace the 1st paragraph in section 15-5.07B(4) with:

10-19-12

Payment for furnishing dowels is not included in the payment for core and pressure grout dowel.

Replace section 15-5.09 with:

04-19-13

15-5.09 POLYESTER CONCRETE EXPANSION DAMS

15-5.09A General

Section 15-5.09 includes specifications for constructing polyester concrete expansion dams.

Polyester concrete expansion dams must comply with the specifications for polyester concrete overlays in section 15-5.06, except a trial slab is not required.

Reinforcement must comply with section 52.

15-5.09B Materials

Not Used

15-5.09C Construction

For new asphalt concrete overlays, place the asphalt concrete overlay before starting polyester concrete activities. Saw cut and remove asphalt concrete at expansion dam locations.

For existing asphalt concrete overlays, remove expansion dams and asphalt concrete to the limits shown. Removing expansion dams must comply with section 15-4 except a bridge removal work plan is not required.

Where a portion of the asphalt concrete overlay is to remain, saw cut a 2-inch-deep neat line along the edge to remain in place before removing the asphalt concrete. Do not damage the existing surfacing to remain in place.

Prepare the deck surface under section 15-5.01C(2).

You may use a mechanical mixer to mix the polyester concrete for expansion dams. The mixer capacity must not exceed 9 cu ft unless authorized. Initiate the resin and thoroughly blend it immediately before mixing it with the aggregate. Mix the polyester concrete for at least 2 minutes before placing.

The application rate of methacrylate resin must be approximately 100 sq ft/gal.

You may place and finish expansion dams using hand methods.

Protect expansion dams from moisture, traffic, and equipment for at least 4 hours after finishing.

For expansion dams over 6 feet long, install 1/4-inch-wide joint material at 6-foot intervals across the width of the expansion dam. Joint material must be either expanded polyurethane or expanded polyethylene.

Not Used

07-19-13

Within 5 days of completing annular space grouting at a culvert, submit the grouting records.

07-19-13

41-2

07-19-13

41-2

01-18-13

INVERT PAVING

07-19-13

Section 15-6.13 includes specifications for installing machine spiral wound PVC pipeliners directly into the culvert.

07-19-13

Machine Spiral Wound PVC Pipeliners, Grouted

[illegible]

07-19-13

07-19-13

20-2.02C(2)

07-19-13

20-3.01C(2)

AA

18 DUST PALLIATIVE

05-30-14

Replace section 18 with:

05-30-14

18 DUST PALLIATIVES

18-1.01 GENERAL

18-1.01A Summary

Section 18 includes specifications for applying dust palliatives.

The dust palliative must be any of the following:

1. Water
2. Dust suppressant
3. Dust control binder

Water must comply with section 17.

18-1.01B Definitions

Reserved

18-1.01C Submittals

If a dust suppressant or dust control binder is to be used, submit a dust treatment plan at least 15 days before starting job site activities. The dust treatment plan must include:

1. Product name and type
2. Manufacturer's name
3. Polymer emulsion type if synthetic polymer emulsion is used, including identification of:
 - 3.1. Individual components greater than 5 percent by volume in blends of polymers of different compositions
 - 3.2. Additives greater than 2 by volume
4. MSDS
5. Proposed methods for applying products
6. Application rates and number of passes
7. Required weather conditions for application, including ambient and surface temperatures, wind conditions, and allowable period before expected precipitation
8. Drying time or curing time required before traffic is allowed on the treated surface

Submit the manufacturer's instructions for the material to be used as an informational submittal.

Submit a certificate of compliance for the dust suppressant, dust control binders, and fibers.

For dust suppressants, include with the certificate of compliance:

1. Test results verifying compliance with the quality characteristic requirements in section 18-1.01D. The results must be from a test conducted within 6 months before the date of the certificate of compliance.
2. Test results from a test conducted within 2 years before the date of the certificate of compliance verifying compliance with the following environmental requirements:
 - 2.1. Maximum constituent concentration levels
 - 2.2. US EPA regulatory requirements for:
 - 2.2.1. Volatile organic compounds
 - 2.2.2. Semivolatile organic compounds
 - 2.2.3. Toxicity characteristic leaching
 - 2.2.3. Modified synthetic leaching procedure
 - 2.3. Aquatic toxicity

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

18-1.01D Quality Control and Assurance

Dust palliatives must comply with US EPA requirements and RWQCB requirements for soil stabilizers.

Dust suppressants must be tested by an EPA-accredited laboratory. Liquid chemical treatments must be tested before dilution. Solid products must be mixed with water to a 25 percent concentration before testing. The chemical constituent concentration for each dust suppressant must not exceed the maximum levels shown in the following table:

Maximum Constituent Concentration Levels		
Constituent	Test method	Requirement maximum level (ppm)
Arsenic	EPA Method 200.7	5.0
Barium		100.0
Cadmium		0.2
Chromium		1.0
Copper		1.0
Lead		1.0
Mercury	EPA Method 245.1	0.05
Selenium	EPA Method 200.7	5.0
Zinc		10.0
Phosphorus	EPA Method 365.4	2500.0
Cyanide	EPA Method 335.4	0.2

Dust suppressants must comply with the US EPA requirements for the quality characteristics when tested under the test methods shown in the following table:

Quality characteristic	Test method
Volatile organic compounds (VOC)	EPA Method 8260
Semivolatile organic compounds (SVOC)	EPA Method 8270
Toxicity characteristic leaching procedure	EPA Method 1311
Modified synthetic leaching procedure	EPA Method 1312

The aquatic toxicity for dust suppressant must comply with the requirements shown in the following table:

Aquatic Toxicity Requirements		
Quality characteristic	Test method	Requirement
Aquatic toxicity ^a (LC50 min, ppm)	ASTM E729 or EPA Method 600/4-90/027F and EPA Method 600/4-91/002	10
Aquatic toxicity ^a (rating)	ASTM E729 or EPA Method 600/4-90/027F and EPA Method 600/4-91/002	slightly toxic or better
Renewal toxicity ^b (LC50 min, ppm)	ASTM E1295	10
Renewal toxicity ^b (rating)	ASTM E1295	slightly toxic or better

^aUsing *Ceriodaphnia dubia* (water flea), *Oncorhynchus mykiss* (rainbow trout), *Pimephales promelas* (fathead minnow), and *Americamysis bahia* (mysid shrimp)

^bUsing *Ceriodaphnia dubia* (water flea)

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

18-1.02 MATERIALS

18-1.02A General

Dust suppressants and control binders must be either (1) miscible in water or (2) a material that is directly applied to the surface without mixing with water.

18-1.02B Dust Suppressants

18-1.02B(1) General

Dust suppressants must be one of the following:

1. Petroleum-based organic product
2. Nonpetroleum-based organic product
3. Hygroscopic product
4. Synthetic polymer emulsions

18-1.02B(2) Petroleum-Based Organic Products

Petroleum-based organic dust suppressants must be asphalt emulsion, petroleum resin, base oil, mineral oil, or synthetic fluid.

Asphalt emulsion must be Grade SS1h.

Petroleum resin must comply with the requirements shown in the following table:

Petroleum Resin Requirements

Quality characteristic	Test method	Requirement
Residue (min, %)	ASTM D6934	60
pH	ASTM D1429	4.0–7.0
Specific gravity at 16 °C (min)	ASTM D1298	1.00
Kinematic viscosity at 25 °C (min, Saybolt Furol seconds ^a)	ASTM D2170	188
Flash point (min °C)	ASTM D92	205
Particle charge test	ASTM D7402	Positive

^a Use ASTM D2161 to convert the mm²/s value to Saybolt Furol seconds

Base and mineral oils must comply with the requirements shown in the following table:

Base and Mineral Oils Requirements

Quality characteristic	Test method	Requirement
Base and mineral oil content (min, %)	-	75
Specific gravity at 16 °C (min)	ASTM D1298	0.85–0.90
Brookfield absolute viscosity at 68 °C (max, cP)	ASTM D2196	250
Flash point (min, °C)	ASTM D93	150

Synthetic fluids must comply with 40 CFR 35 and the requirements shown in the following table:

Synthetic Fluids Requirements

Quality characteristic	Test method	Requirement
Base and mineral oil content (min, %)	--	75
Specific gravity at 16 °C (min)	ASTM D1298	0.85–0.90
Brookfield absolute viscosity at 68 °C (max, cP)	ASTM D2196	250
Flash point (min, °C)	ASTM D93	150

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

18-1.02B(3) Nonpetroleum-Based Organic Products

Nonpetroleum-based organic dust suppressants must be lignosulfonate, plant oil, or tall oil pitch rosin.

Lignosulfonate must comply with the requirements shown in the following table:

Lignosulfonate Requirements

Quality characteristic	Test method	Requirement
Lignin sulfonate content ready to use (min, %)	ASTM D4900	25
Residue total solids content (min %)	ASTM D4903 or D2834	52
Lignin sulfonate content of residue (min, %)	--	50
Reducing sugars content of residue (min, %)	ASTM D5896 or D6406	25
pH	ASTM D1293	6.0–9.0
Specific gravity (min)	ASTM D1429	1.20
Brookfield absolute viscosity at 25° C (max, cP)	ASTM D2196	1,000

Plant oil must comply with the requirements shown in the following table:

Plant Oil Requirements

Quality characteristic	Test method	Requirement
Residue active solids content (min, %)	ASTM D4903	50
Specific gravity (min)	ASTM D1429	0.93
Brookfield viscosity (cP)	ASTM D2196	48

Tall oil pitch rosin must comply with the requirements shown in the following table:

Tall Oil Pitch Rosin Requirements

Quality characteristic	Test method	Requirement
Rosin acid content (min, %)	ASTM D1240	10
Residue active solids content (min, %)	ASTM D2834	45
pH	ASTM D1293	3.0–9.0
Specific gravity (min)	ASTM D1429	1.00
Brookfield absolute viscosity at 25 °C (cP)	ASTM D2196	50–200

18-1.02B(4) Hygroscopic Products

Hygroscopic dust suppressants must be calcium chloride, calcium chloride flake, or magnesium chloride.

Calcium chloride must comply with the requirements shown in the following table:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Calcium Chloride^a Requirements

Quality characteristic	Test method	Requirement
Calcium chloride content (%)	ASTM E449	28–42
Total magnesium as MgCl ₂ (max, %)	ASTM E449	6.0
Total alkali chlorides as NaCl (max, %)	ASTM E449	6.0
Calcium hydroxide content (max, %)	ASTM E449	0.2
pH with 5 percent solution	ASTM D1293	7.0–9.0
Specific gravity	ASTM D1429	1.28–1.44

^aASTM D98 or AASHTO M144

Calcium chloride flake must comply with the requirements shown in the following table:

Calcium Chloride Flake^a Requirements

Quality characteristic	Test method	Requirement
Calcium chloride content (%)	ASTM E449	28–42
Total magnesium as MgCl ₂ (max, %)	ASTM E449	6.0
Total alkali chlorides as NaCl (max, %)	ASTM E449	6.0
Calcium hydroxide content (max, %)	ASTM E449	0.2
pH with 5 percent solution	ASTM D1293	7.0–9.0
Gradation percent passing	ASTM C136	
3/8–inch sieve		100
#4 sieve		80–100
#30 sieve		0–5

^aASTM D98 or AASHTO M144

Magnesium chloride must comply with the requirements shown in the following table:

Magnesium Chloride Requirements

Quality characteristic	Test method	Requirement
Magnesium chloride content (%)	ASTM D4691 or ASTM D511 ^a	28–33
Sulfate content as magnesium sulfate (max, %)	ASTM D4691 ^a	4.0
Potassium content as potassium chloride (max, %)	ASTM E449	0.5
Sodium chloride content (max, %)	ASTM E449	1.0
pH with 5% solution	ASTM D1293	7.0–9.0
Specific gravity	ASTM D1429	1.31 ± 0.02

^aYou may use another appropriate atomic absorption spectrophotometry method such as that in *Standard Methods for the Examination of Water and Waste Water* by APHA-AWWA-WPCF.

18-1.02B(5) Synthetic Polymer Emulsions

Synthetic polymer emulsions must comply with the requirements shown in the following table:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Synthetic Polymer Emulsion Requirements

Quality characteristic	Test method	Requirement
Residue active solids content (min, %)	ASTM D2834	40
pH	ASTM D1429	4.0–9.5
Specific gravity at 16 °C	ASTM D1298	1.00–1.15
Brookfield absolute viscosity (max, cP)	ASTM D2196	1,000
Polymer film tensile strength – dry (psi)	ASTM D412	500
Retained coagulum on #100 sieve (max, %)	ASTM D1417	0.1
Ash content (max, %)	ASTM D5040	2

18-1.02C Dust Control Binders

Dust control binders must comply with the specifications for a general purpose tackifier in section 21-1.02F(1).

Fibers must comply with section 21-1.02E.

18-1.03 CONSTRUCTION

18-1.03A General

Monitor dust conditions and apply dust palliative for dust control as described and as ordered. Reapply dust palliative at any time to control dust.

Apply a dust suppressant to:

1. Temporary haul roads
2. Construction staging, material storage, and layout areas
3. Compacted soil or aggregate base roads or driveways
4. Paved surfaces

Apply a dust control binder to:

1. Rough-graded soils
2. Completed slopes
3. Soil stockpiles unless another practice is already used

Do not use a dust suppressant or dust control binder within 100 feet of a wetland or body of water.

18-1.03B Equipment

Apply dust suppressants that are miscible in water with either (1) a pressure-type water distributor truck equipped with a spray system or (2) a pressure-type asphalt distributor truck as specified in section 93-1.03C.

Apply dust suppressant flakes to the surface using a spreader or spinner disk.

Apply dust control binders with either (1) a pressure-type water distributor truck equipped with a spray system or (2) hydraulic spray equipment as specified for applying hydromulch in section 21-1.03E.

18-1.03C Mixing and Application Rates

Use the mix proportions and application rate for the corresponding dust suppressant as shown in the following table:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Dust suppressant	Mix proportions	Application rate
Asphaltic emulsion, Grade SS1H	5 parts water to 1 part emulsion	0.20–1.0 gal/sq yd
Petroleum resin emulsion	5 parts water to 1 part emulsion	0.20–1.0 gal/sq yd
Base and mineral oil	Apply undiluted	0.30–0.35 gal/sy yd
Lignosulfonate	1 part water to 1 part concentrate	1.0 gal/sq yd
Plant oil	Apply undiluted	0.25–0.50 gal/sq yd
Tall oil pitch rosin	5 parts water to 1 part emulsion for clayey soil and 10 parts water to 1 part emulsion for sandy soil.	0.30–1.0 gal/sq yd
Calcium chloride solution (Hygroscopic)	Apply undiluted	0.20–0.35 gal/sq yd
Calcium chloride flakes (Hygroscopic)	--	1.0–1.5 lb/sq yd
Magnesium chloride (Hygroscopic)	Apply undiluted	0.30–0.50 gal/sq yd
Synthetic polymer emulsion	9 parts water to 1 part concentrate	0.50 gal/sq yd

Apply hygroscopic materials under the manufacturer's instructions.

Apply calcium chloride flakes to a moist surface.

Allow surfaces treated with a dust suppressant to cure before opening to traffic.

Use the mix proportions and application rate for the corresponding dust control binder as shown in the following table:

Dust control binder	Mix proportions	Application rate
Guar	11 to 15 pounds per 1,000 gallons of water	44–59 lb/acre
Psyllium	Enough water to allow for uniform slurry flow	80–200 lb/acre
Starch	Manufacturer's recommended mix proportions with water	150 lb/acre
Liquid acrylic copolymers and polymers ^a	10 parts water to 1 part polymer	1,175 gal/acre
Liquid methacrylate and acrylate polymers	Manufacturer's recommended mix proportions with water	20 gal/acre
Copolymers of sodium acrylates and acrylamides	Manufacturer's recommended mix proportions with water	3–10 lb/acre
Polyacrylamide and copolymer of acrylamide	10 pounds per 1,000 gallons of water	5 lb/acre
Hydro-colloid polymers	Manufacturer's recommended mix proportions with water	54–64 lb/acre

^aMix and handle the polymeric compound in a manner that will not cause foaming. You may add an antifoaming agent.

Do not allow stormwater runoff from polyacrylamide treated soils unless water passes through:

1. Sediment basin if the total drainage area is greater than or equal to 5 acres.
2. Sediment trap or a series of check dams if the total drainage area is less than 5 acres. Maximize the number of check dams used and space them evenly in the drainage channel so as to maximize sediment settlement.

You may use reduced application rates when reapplying dust palliatives if authorized.

Not Used

07-19-13

07-19-13

07-19-13

07-19-13

07-01-11

01-20-12

04-19-13

01-20-12

For ground anchor walls, a wall zone is the entire wall unless otherwise specified in the special provisions.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Delete the 2nd sentence in the 4th paragraph of section 19-3.01A(3)(b).

01-20-12

Replace "90" in the paragraph of section 19-3.02G with:

90-1

01-18-13

Add to section 19-3.02:

19-3.02I Filter Fabric

Filter fabric must be Class A.

07-19-13

Replace the heading of section 19-3.03C with:

19-3.03B(4) Cofferdams

04-19-13

Replace the heading of section 19-3.03D with:

19-3.03B(5) Water Control and Foundation Treatment

04-19-13

Replace the 1st paragraph of section 19-3.03E(3) with:

Compact structure backfill behind lagging of soldier pile walls by hand tamping, mechanical compaction, or other authorized means.

01-20-12

Add to the end of section 19-3.03E(3):

If filter fabric is shown behind the lagging:

07-19-13

1. Immediately before placing the filter fabric, remove any loose or extraneous material and sharp objects from the surface to receive the filter fabric.
2. Handle and place the filter fabric under the manufacturer's instructions. Stretch, align, and place the fabric without wrinkling.
3. Stitch the adjacent borders of filter fabric or overlap the adjacent borders by 12 to 18 inches. If stitching the border, use yarn of a contrasting color. Yarn size and composition must be as recommended by the fabric manufacturer. Use 5 to 7 stitches per inch of seam.
4. Repair any damaged filter fabric by placing a piece of filter fabric large enough to cover the damaged area and comply with the overlapping or stitching requirements.

Replace the 2nd paragraph of section 19-3.03F with:

Do not backfill over or place material over slurry cement backfill until 4 hours after placement. When concrete sand is used as aggregate and the in-place material is free draining, you may start backfilling as soon as the surface water is gone.

01-20-12

Add between the 2nd and 3rd paragraphs of section 19-3.03K:

Before you excavate for the installation of ground anchors in a wall zone:

01-20-12

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

1. Complete stability testing
2. Obtain authorization of test data

Replace the 2nd sentence of the 7th paragraph of section 19-3.03K:

01-20-12

Stop construction in unstable areas until remedial measures have been taken. Remedial measures must be submitted and authorized.

Add between the 8th and 9th paragraphs of section 19-3.03K:

01-20-12

When your excavation and installation methods result in a discontinuous wall along any soil nail row, the ends of the structurally completed wall section must extend beyond the ends of the next lower excavation lift by a distance equal to twice the lift height. Maintain temporary slopes at the ends of each wall section to ensure slope stability.

Replace the 9th paragraph of section 19-3.03K:

01-20-12

Do not excavate to the next underlying excavation lift until the following conditions have been attained for the portion of the soil nail or ground anchor wall in the current excavation lift:

1. Soil nails or ground anchors are installed and grouted.
2. Reinforced shotcrete facing is constructed.
3. Grout and shotcrete have cured for at least 72 hours.
4. Specified tests are complete for that portion of wall and the results are authorized.
5. Soil nail facing anchorages are attached or ground anchors are locked off.

01-18-13

01-20-12

Replace the 2nd sentence in the 7th paragraph of section 19-3.04 with:

01-18-13

Structure excavation more than 0.5 foot from the depth shown is paid for as a work-character change if you request an adjustment or the Engineer orders an adjustment.

Replace "Contract completion time" in the 8th paragraph of section 19-6.03D with:

10-19-12

work completion date

Add to section 19:

01-18-13

19-10-19-20 RESERVED

AA

20 LANDSCAPE

05-30-14

Replace the headings and paragraphs in section 20 with:

07-19-13

20-1 GENERAL

20-1.01 GENERAL

20-1.01A Summary

Section 20-1 includes general specifications for performing landscaping.

If an irrigation system is to be installed in an existing planting area to be maintained, check for plant deficiencies under section 20-3.02A(4) before starting irrigation work.

Perform a functional test for each irrigation system under 20-2.01A(4)(d):

1. Before planting the plants
2. After planting the plants
3. Before the start of the plant establishment work

If a plant is to be transplanted or an irrigation component is to be relocated, transplant plant or protect irrigation components before performing other construction activities in the area.

Perform roadside clearing:

1. As required to prepare the job site for construction work
2. Until the start of the plant establishment work or Contract acceptance, whichever comes first

20-1.01B Definitions

Reserved

20-1.01C Submittals

At least 15 days before applying any pesticide, submit a copy of the licensed pest control adviser's recommendation.

At the end of each week, submit a report documenting the application of all pesticides as an informational submittal. Use form *Report of Chemical Spray Operations*.

Before mixing a pesticide, submit a copy of the registered label for the pesticide as an informational submittal. If unable to copy, allow the Engineer to read the label on the container.

20-1.01D Quality Control and Assurance

20-1.01D(1) General

Obtain a recommendation from a licensed pest control adviser for the use of all pesticides under the Food & Agri Code. The recommendation must include the pesticides to be used, rates of application, methods of application, and application areas.

The pesticide applicator must have an active and valid qualified applicator license or certificate from the Department of Pesticide Regulation.

20-1.01D(2) Progress Inspections

The Engineer will perform progress inspections before:

1. Cultivating work starts
2. Pressure testing of irrigation pipe on the supply side of control valves
3. Testing of low voltage conductors
4. Planting work starts
5. Completion of planting work

Notify the Engineer at least 4 business days before each inspection is required. Allow at least 3 business days for the Engineer's inspection.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

Unless otherwise authorized, do not proceed with the next construction activity until the inspection has been completed and any required corrective work has been performed and authorized.

20-1.02 MATERIALS

20-1.02A General

Reserved

20-1.02B Water

Water available from an existing Department-owned facility within the project limits or an irrigation system to be installed under the Contract is furnished at no charge.

If water is not available, make arrangements for supplying water. Water must be of a quality that will promote plant growth.

20-1.02C Pesticides

Pesticides must comply with the Department of Pesticide Regulation.

Insecticide must be imidacloprid.

Rodenticides must be brodifacoum, bromadiolone, or diphacinone.

Do not use oil or pelleted forms of pesticides for weed control.

For weed control, use a pesticide with a photosensitive dye that produces a contrasting color when sprayed on the ground. The color must disappear between 2 to 3 days after being applied. The dye must not stain surfaces or injure plants or wildlife when applied at the manufacturer's recommended application rate.

20-1.03 CONSTRUCTION

20-1.03A General

Take precautions to prevent irrigation water from:

1. Wetting vehicles, pedestrians, and pavement
2. Eroding soil

05-30-14

3. Causing excess runoff

Water plants under the Model Water Efficient Landscape Ordinance, 23 CA Code of Regs § 490 et seq., and local water agency requirements.

Water plants at night unless otherwise authorized.

07-19-13

Dispose of removed, pruned, and damaged vegetative material.

You may reduce removed vegetative material to chips with a maximum thickness of 1/2 inch and spread within the job site at locations determined by the Engineer. Chipped material must not be substituted for wood mulch, nor must the chipped material be placed within areas to receive wood mulch.

20-1.03B Pesticides

Notify the Engineer of pesticide application times at least 24 hours before each application.

Mix and apply pesticides under the requirements of the Department of Pesticide Regulation and the instructions on the pesticide product label.

Do not apply pesticides:

1. On Saturdays and holidays unless authorized
2. Whenever weather and wind conditions are unsuitable for application
3. Within the plant basin
4. On the foliage and woody parts of the plant

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CTA Contract No. XXX

If a granular preemergent is used, it must be covered with mulch on the same work day. Do not apply granular preemergent in plant basins.

Do not apply preemergents:

1. To groundcover plants before the plants have been planted a minimum of 3 days and have been thoroughly watered
2. Within 18 inches of trees, shrubs, and seeded areas

20-1.03C Roadside Clearing

20-1.03C(1) General

Perform roadside clearing by:

1. Removing and disposing of trash and debris
2. Controlling the following pests:
 - 2.1. Rodents
 - 2.2. Insects
 - 2.3. Weeds
3. Removing existing plants as described

Control rodents by using rodenticides or traps.

20-1.03C(2) Remove Existing Plants

Remove existing plants as described. Removal of existing plants includes removing their stumps and roots 2 inches or larger in diameter to a minimum depth of 12 inches below finished grade. Backfill holes resulting from stump removal to finished grade with material obtained from adjacent areas.

If a plant is to be planted within existing groundcover area, remove existing groundcover from within an area 6 feet in diameter centered at each plant location.

20-1.03C(3) Weed Control

Control weeds by the use of pesticides, hand pulling, or mowing.

If pesticides are used to control weeds, apply pesticides before the weeds reach the seed stage of growth or exceed 4 inches in length, whichever occurs first. Do not use pesticides at cutting plant locations.

Where cuttings are to be planted, control weeds by hand pulling within an area 2 feet in diameter centered at each plant location.

If weeds are to be controlled by hand pulling, hand pull weeds before they reach the seed stage of growth or exceed 4 inches in length, whichever occurs first.

Where liner, plug, or seedling plants are to be planted 10 feet or more apart, control weeds by the use of pesticides or hand pulling within an area 2 feet in diameter centered at each plant location. Where liner, plug, or seedling plants are to be planted less than 10 feet apart, control weeds by the use of pesticides within the entire area.

Control weeds by mowing outside of mulched areas, plant basins, groundcover areas, and within areas to be seeded. Mowing must extend to the edges of pavement, dikes, curbs, sidewalks, walls, and fences.

If mowing is to be performed within areas to be seeded, perform mowing as needed until the start of the seeding operation specified in section 21.

Mowing must be performed before the weeds reach the seed stage of growth or exceed 6 inches in length, whichever occurs first. Mow weeds to a height of 3 inches.

20-1.03C(4) Disposal of Removed Groundcover, Weeds, and Mowed Material

Dispose of hand pulled weeds the same day they are pulled. Dispose of removed groundcover within 3 days.

Dispose of mowed material from the initial mowing. Disposal of material from subsequent mowing is not required.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

20-1.03D Cultivation

Cultivation must be by mechanical methods and performed until the soil is in a loose condition to a minimum depth of 6 inches. Soil clods must not be larger than 2 inches in maximum dimension after cultivation.

The areas to be cultivated must extend 12 inches beyond the outer limit of each planting area requiring cultivation.

After initial cultivation, place soil amendment and fertilizer at specified rates.

Recultivate to thoroughly mix native soil and amendments.

Do not drive on cultivated areas after cultivation.

Planting areas that have been cultivated and become compacted must be recultivated.

Rocks and debris encountered during soil preparation in planting areas must be brought to the surface of the ground.

Remove rocks and debris as ordered. This work is change order work.

20-1.03E Weed Germination

Reserved

20-1.04 PAYMENT

Items paid for by area are measured parallel to the ground surface.

Planting areas that do not require cultivation but are within the cultivation areas will not be deducted.

20-2 IRRIGATION

20-2.01 GENERAL

20-2.01A General

20-2.01A(1) Summary

Section 20-2 includes specifications for installing irrigation systems.

The irrigation systems shown are diagrammatic.

20-2.01A(2) Definitions

Reserved

20-2.01A(3) Submittals

20-2.01A(3)(a) General

Submit shop drawings for the electrical components of the irrigation system except electrical service 30 days before installation. The drawings must:

1. Include schematic wiring diagrams showing wire sizes and routes between electrical components
2. Show conduit sizes
3. Bear the written approval of the controller manufacturer or the manufacturer's authorized agent
4. Be accompanied by:
 - 4.1. Colored wire and splice samples
 - 4.2. Manufacturer's descriptive and technical literature

After the work shown on the drawing is complete, submit 3 copies of the as-built shop drawings including any wire modifications for each controller installed.

For each controller, laminate and place in an envelope 1 copy of:

1. As-built schematic wiring diagram including wiring modifications
2. 11 by 17 inches as-built irrigation plan

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

The laminate must be clear, mat-finished plastic that is at least 10 mils thick. The envelope must be heavy-duty plastic.

Attach the envelope to the inside of the controller enclosure or cabinet door. If the door is not large enough to secure the envelope, submit the envelope and its contents.

20-2.01A(3)(b) Manufacturer's Instructions

Submit as an informational submittal the manufacturer's installation instructions 15 days before installing:

1. Couplings for conduits used for irrigation conduits
2. Plastic pipe and fittings
3. Solvent cement for plastic pipe and flexible hose
4. Sprinklers
5. Flow sensors

20-2.01A(3)(c) Maintenance and Operation Manuals

Before Contract acceptance, submit as an informational submittal a manufacturer's maintenance and operation manual for each type of controller installed.

20-2.01A(4) Quality Control and Assurance

20-2.01A(4)(a) General

Reserved

20-2.01A(4)(b) Pressure Testing

20-2.01A(4)(b)(i) General

Perform pressure testing for leakage on irrigation supply lines:

1. In the Engineer's presence
2. On business days between 8 a.m. and 5 p.m. unless authorized
3. Before backfilling supply line trenches
4. With irrigation system gate valves open
5. With open ends of the supply line and fittings plugged or capped

Notify the Engineer at least 48 hours before performing a pressure test.

Choose either Method A or B to test supply lines installed by trenching and backfilling and supply lines that are completely visible after installation.

All other supply lines, including those installed in the ground by methods other than trenching and backfilling must be tested by Method A.

Test irrigation supply line in conduit by Method A with the testing period modified to 0.5 hour and no allowable pressure drop.

20-2.01A(4)(b)(ii) Method A

Method A pressure testing procedures for leakage must comply with the following:

1. Pressure gauge must be calibrated from 0 to 200 psi in 5 psi increments and be accurate to within a tolerance of 2 psi.
2. Supply line must be filled with water and connected to a pressure gauge. Place the pipeline under a pressure of 125 psi. Remove the source of pressure and leave the line under the required pressure.
3. Test the supply line under the required pressure for a period of 1 hour. The pressure gauge must remain in place until each test period is complete.
4. Leaks that develop in the tested portion of the system must be located and repaired after each test period if a drop of more than 5 psi is indicated by the pressure gauge. After the leaks have been repaired, repeat the 1 hour pressure test until the drop in pressure is 5 psi or less.

If a system consists of a new supply line connected to an existing line, the new supply line must be isolated from the existing line and tested.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

20-2.01A(4)(b)(iii) Method B

Method B pressure testing procedures for leakage must comply with the following:

1. Before any portion of the supply line on the upstream side of a control valve is backfilled, water must be turned on for that portion of the line and maintained at full pressure from the water source for a period not less than 8 consecutive hours after all air has been expelled from the line. Before any portion of the supply line on the downstream side of the control valve is backfilled, perform the same test for a period not less than 1 hour.
2. Repair leaks that develop in the tested portion of the system. After the leaks have been repaired, repeat the pressure test until no leaks occur as determined by the Engineer.

20-2.01A(4)(c) Sprinkler Coverage Check

After installation of the sprinklers, check and adjust the entire sprinkler system for proper orientation and uniform coverage.

20-2.01A(4)(d) Irrigation System Functional Tests

The functional tests for each irrigation controller or group of controllers and associated irrigation system served by a single electric service point must consist of at least 1 complete cycle of operation. The Engineer determines the length of the cycle.

Notify the Engineer at least 10 days before performing each functional test.

20-2.01A(4)(e) Final Irrigation System Check

Perform the final check of the existing and new irrigation system between 20 and 30 days before Contract acceptance. The Engineer determines the length of the cycle.

Remote control valves connected to existing and new irrigation controllers must be checked for automatic operation when the controllers are in automatic mode.

20-2.01B Materials

20-2.01B(1) General

Use minor concrete for replacing removed concrete facilities.

HMA for replacing removed asphalt concrete surfacing and facilities must comply with section 39. You may use minor HMA if authorized.

20-2.01B(2) Garden Valves

Each garden valve must:

1. Be inverted nose type and of brass or bronze construction with female thread inlet
2. Have a replaceable seat washer, rising valve stem within a protective collar, and male thread hose outlet
3. Have a loose key handle

20-2.01B(3) Recycled Water Identification

Irrigation components used for recycled water must be manufactured or painted purple. Recycled water irrigation pipe and tubing must have a permanent label with the wording "CAUTION RECYCLED WATER" every 24 inches in 2 rows spaced approximately 180 degrees apart in the longitudinal direction of the pipe or tubing.

The recycled water warning sign must be a decal or a decal attached to a 1/16-inch thick aluminum plate or tag.

Each warning sign decal must:

1. Show the phrase "Recycled Water, Do Not Drink" and the drinking glass graphic symbol
2. Be UV fade and weather resistant and manufactured from flexible vinyl with or without mylar
3. Have a purple background, black text, and self-adhesive backing

Each warning tag must:

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

1. Show the phrase "RECYCLED WATER" and the drinking glass graphic symbol
2. Be UV fade and weather resistant
3. Be purple, double-sided, and manufactured from polyurethane
4. Have an integral neck attachment and attachment hole capable of withstanding 178 lb of pull-out resistance
5. Have hot-stamped black lettering

Posts and hardware for warning signs must comply with section 56-4.

Concrete sprinkler protectors used with recycled water must be painted purple.

20-2.01B(4) Location Markers

Location markers must be schedule 40 white PVC plastic pipe.

20-2.01B(5) Pull Boxes

Pull boxes must comply with section 86-2.06 and be no. 5 or larger unless otherwise shown. Pull boxes for low voltage conductors must not have side openings.

Pull box covers used solely for irrigation electrical service must be marked "IRRIGATION".

20-2.01B(6) Unions

Unions must be brass or malleable iron capable of withstanding the maximum required working pressure.

20-2.01B(7) Valve Boxes and Covers

Valve boxes must be precast concrete.

Covers must be:

1. Concrete, steel, or cast iron.
2. Marked "WATER" in cast-in letters not less than 1 inch high.
3. 1 piece, except 2 pieces are required when the weight of the valve box cover exceeds 35 lb.

The valve box covers must include a polyurethane label with the appropriate controller letter and station number as shown.

20-2.01B(8) Wye Strainers

Wye strainers must:

1. Have a cast iron or all bronze body
2. Have a removable stainless steel strainer screen:
 - 2.1. With an open area equal to at least 3 times the cross-sectional area of the pipe based on an iron pipe size
 - 2.2. With 40-mesh woven wire, except:
 - 2.2.1. For a backflow preventer assembly, the screen must be 20-mesh woven wire mesh or perforated sheet with 0.045-inch diameter holes
 - 2.2.2. For a valve assembly, the screen must be 80-mesh woven wire mesh
3. Be capable of withstanding a working pressure of 150 psi
4. Be equipped with a garden valve at the outlet

The wye strainer filter housing must:

1. Withstand a working pressure of 150 psi
2. Be manufactured of reinforced polypropylene plastic

20-2.01C Construction

20-2.01C(1) General

Immediately shut off water to broken supply lines, valves, or sprinkler assemblies. Repair irrigation systems within 24 hours after a malfunction or damage occurs.

05-30-14

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

07-19-13

Connect underground metallic pipes, valves, or fittings made of dissimilar metals through a dielectric coupling or bushing.

You may install conduits, conductors, and supply lines by methods other than trenching provided that they are not damaged and are installed at the depths specified.

20-2.01C(2) Trenching and Backfilling

Trench and backfill under section 86-2.01.

Remove plants under 20-1.03C as necessary to perform trenching. If plants are to remain, adjust trench alignment to minimize damage.

If removal of:

1. Turf is required, remove to a maximum width of 12 inches.
2. Groundcover is required, remove to a maximum width of 6 feet. Existing *Carpobrotus* and *Delosperma* may be rototilled if the backfill for the trenches does not contain plants longer than 6 inches in length.

Make a 2-inch deep sawcut along neat lines around the perimeter of the pavement to be removed at locations determined by the Engineer.

The trench must have uniform bearing throughout the entire length and must be free of jagged rubble or sharp objects. Ensure conduit, supply line, and joints are not moved or damaged by backfill operations.

For a project with multiple water service points, excavate and backfill trenches for 1 service point at a time.

11-15-13

Trenches for irrigation supply lines and conduits 3 inches and larger must be 5 times the pipe or conduit diameter deep and 2 times the pipe or conduit diameter wide.

Trenches for irrigation supply lines and conduits 2-1/2 inches or less in diameter must be a minimum of 12 inches below finished grade, measured from the top of the installed pipe.

07-19-13

Trenches must be at least 4 feet from curbs, dikes, and paved shoulders.

Rocks and debris encountered during trenching operations must be brought to the surface of the ground. Remove rocks and debris as ordered. This work is change order work.

If trenching requires the removal of plants, in areas with:

1. Turf, replace turf with sod under section 20-3.03C(3)(e).
2. Groundcover, replace groundcover plants from flats and plant at 12 inches on center under section 20-3.03C. No replacement of *Carpobrotus* and *Delosperma* is required if removed by rototilling.

11-15-13

Where existing surfacing is removed, replace the structural section to match the materials removed. Replacement concrete must be of uniform smoothness, color, and texture equal to the adjacent concrete surface. Dispose of removed material. Install supply line and conduits at the bottom of trenches and backfill with sand to a depth of 2 inches over the top of the supply lines and conduits. Excluding the part of the trench backfilled with surfacing or pavement, the remainder of the trench must be backfilled with material that is excavated from the trench. Rock, broken concrete, asphalt concrete and other particles larger than 2 inches in greatest dimension must not be used.

07-19-13

20-2.01C(3) Pull Boxes

Install pull boxes under section 86-2.06 at the following locations:

1. At all conductor splices except splices made in valve boxes
2. Within 5 feet of irrigation controllers
3. At ends of electrical conduits

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

4. At other locations shown

20-2.01C(4) Valve Boxes and Covers

Install and identify each valve box as shown.

In walkways and paved areas, install the top of the valve box flush with the surrounding finished grade.

20-2.01C(5) Recycled Water Warning Signs

Install recycled water warning signs on irrigation facilities using recycled water.

Install sign decals directly to clean, smooth surfaces. Clean the surface with alcohol or an equivalent cleaner before applying the decal.

Install a 4 by 4 inch warning sign decal to each:

1. Backflow preventer assembly
2. Irrigation controller enclosure cabinet door

Install a 2 by 2 inch warning tag to the each remote control valve and valve box cover.

Install a 2-1/2 by 3 inches sign decal to each sprinkler riser.

Under local regulations, install a 12 by 12 inch warning sign decal on an aluminum plate and attach to gates, fences, and walls located in the vicinity of a recycled water irrigation system. On gates and fences, install signs with S hooks and C clips or 14-gauge galvanized steel wire. On concrete walls or other rough surfaces, install signs with a silicon-based adhesive.

20-2.01C(6) Garden Valves

Furnish 3 keys for each garden valve before Contract acceptance.

20-2.01D Payment

Not Used

20-2.02 EXISTING IRRIGATION FACILITIES

20-2.02A General

20-2.02A(1) Summary

Section 20-2.02 includes specifications for checking, testing, operating, replacing, and relocating existing irrigation facilities.

20-2.02A(2) Definitions

Reserved

20-2.02A(3) Submittals

Submit a list of irrigation system deficiencies within 7 days after checking the existing facilities.

20-2.02A(4) Quality Control and Assurance

After irrigation facilities have been relocated, demonstrate in the presence of the Engineer that the relocated facilities function properly.

Certify each existing backflow preventer under section 20-2.03A(4).

20-2.02B Materials

Valve box covers must be the same size as the covers they replace.

Control and neutral conductors must be the same size and color as the control and neutral conductors they replace.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

20-2.02C Construction

20-2.02C(1) General

Notify the Engineer at least 4 business days before shutting off the water supply to any portion of the existing irrigation system and immediately after restoring the water supply to any portion of the existing irrigation system.

If an irrigation facility to be relocated is determined unsuitable by the Engineer, replace irrigation facility under section 20-2. This work is change order work.

20-2.02C(2) Check and Test Existing Irrigation Facilities

Before performing irrigation system work, check existing irrigation facilities to remain in place or to be relocated. The Engineer determines the test watering cycle lengths. Check for deficiencies including missing parts, damaged components, and improper operation. Correct deficiencies as ordered. The correction of deficiencies is change order work.

20-2.02C(3) Operate Existing Irrigation Facilities

If the Contract includes a bid item for operate existing irrigation facilities, after performing work under section 20-2.02C(2), operate existing irrigation facilities through Contract acceptance.

Operate existing irrigation facilities except for water meters, underground supply lines, control and neutral conductors, and electrical conduits.

Check for proper operation at least once every 30 days. Adjust, repair, or replace existing irrigation facilities within 7 days of finding any deficiency.

Operate irrigation systems using the automatic irrigation controller until Contract acceptance. You may operate irrigation controllers manually during plant replacement, fertilization, weed germination, and repair work.

Program the irrigation controllers for seasonal requirements.

20-2.02C(4) Replace Valve Box Covers

Existing valve box covers shown to be replaced must remain in place until the new covers are ready to be installed.

Dispose of removed valve box covers.

20-2.02C(5) Relocate Backflow Preventer Assemblies

Relocate backflow preventer assembly as shown and install under section 20-2.03C.

20-2.02C(6) Relocate Water Meters

Relocate water meter as shown.

20-2.02C(7) Relocate Irrigation Controllers

Relocate irrigation controller as shown and install under section 20-2.07C.

20-2.02D Payment

Not Used

20-2.03 BACKFLOW PREVENTER ASSEMBLIES

20-2.03A General

20-2.03A(1) Summary

Section 20-2.03 includes specifications for installing a backflow preventer assembly.

20-2.03A(2) Definitions

Reserved

20-2.03A(3) Submittals

Reserved

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

20-2.03A(4) Quality Control and Assurance

Each backflow preventer assembly must be certified by a backflow preventer tester. The tester must have an active and valid certification from the water purveyor having jurisdiction.

If the local water purveyor does not have a certification program, the tester must be certified by AWWA or a nearby county with a certification program.

Notify the Engineer at least 5 business days before certifying backflow preventer assembly.

Certify each backflow preventer assembly annually and within 10 days before Contract acceptance.

20-2.03B Materials

20-2.03B(1) General

Each backflow preventer assembly must include:

1. Backflow preventer including gate valve, wye strainer, brass or malleable iron unions, fittings, and supports
2. Blanket
3. Enclosure
4. Concrete pad

Concrete for the pad must be minor concrete, except the concrete must not contain less than 463 pounds of cementitious material per cubic yard. Hand mixing of the concrete is allowed.

20-2.03B(2) Backflow Preventers

Each backflow preventer must:

1. Be reduced-pressure principle type.
2. Comply with the requirements of the water purveyor that has jurisdiction.
3. Be factory-assembled with:
 - 3.1. 2 check valves
 - 3.2. 1 pressure differential relief valve
 - 3.3. 4 test cocks
 - 3.4. 2 shut-off valves manufactured from iron or bronze. Shut-off valves must be one of the following:
 - 3.4.1. Resilient wedge gate valves
 - 3.4.2. Resilient seated and fully ported ball valves
 - 3.4.3. Resilient seated butterfly valves

Backflow preventer components must be capable of withstanding a working pressure of 150 psi.

20-2.03B(3) Backflow Preventer Blankets

Each backflow preventer blanket must:

1. Be polyester fabric coated with vinyl or polymeric resin
2. Be resistant to UV light, water, mildew, and fire
3. Have an R-value from R-30 to R-38

Blankets must have a securing mechanism that includes either zippers, hook-pile tape, grommets, snaps, buttons, or any combination of these. Wherever the backflow preventer is not in an enclosure, the securing mechanism must be capable of accepting a padlock.

20-2.03B(4) Backflow Preventer Enclosures

Each backflow preventer enclosure must:

1. Have expanded metal sides, ends, and top panels fabricated from 9-gauge minimum thickness stainless sheet steel with openings of approximately 3/4 by 1-3/4 inches
2. Have expanded metal panels attached to the 3/16-inch thick steel frame by a series of welds not less than 1/4 inch in length and spaced not more than 4 inches on center, along the edges of the enclosure

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

3. Have Type 304 stainless steel lock guards with a minimum thickness of 12 gauge.
4. Have hexagonal nuts and lock-type washers
5. Be powder coated by the manufacturer to match color no. 20450 of FED-STD-595.
6. Have padlock clasp or latch and lock mechanism

20-2.03C Construction

Finish exposed top surfaces of concrete pad with a medium broom finish applied parallel to the long dimension of pads.

Install hold-downs for the backflow preventer assembly enclosure when concrete is still plastic.

20-2.03D Payment

Not Used

20-2.04 CAM COUPLER ASSEMBLIES

20-2.04A General

Section 20-2.04 includes specifications for installing a cam coupler assembly.

20-2.04B Materials

Each cam coupler assembly must consist of a cam coupler, dust cap, check valve, pipes, fittings, concrete thrust block, and valve box with woven wire cloth and gravel.

Cam couplers and keys must be manufactured of brass or bronze and be able to withstand a working pressure of 150 psi.

Furnish 3 loose cam coupler keys before Contract acceptance.

20-2.04C Construction

Install cam coupler assemblies in valve boxes as shown.

20-2.04D Payment

Not Used

20-2.05 CONTROL AND NEUTRAL CONDUCTORS

20-2.05A General

20-2.05A(1) Summary

Section 20-2.05 includes specifications for installing control and neutral conductors.

20-2.05A(2) Definitions

Reserved

20-2.05A(3) Submittals

Reserved

20-2.05A(4) Quality Control and Assurance

Perform field tests on control and neutral conductors. Field tests must comply with the specifications for lighting circuits in section 86-2.14B.

Where the conductors are installed by trenching and backfilling, perform field tests after a minimum of 6 inches of backfill material has been placed and compacted over the conductors.

20-2.05B Materials

Control and neutral conductors must comply with the requirements in section 86-2.08.

For connections between 24-volt irrigation controllers and valve solenoids, use control and neutral conductors. Conductors must include a control conductor for each valve and a common neutral.

Conductor insulation color, except for the stripes, must be continuous throughout. The color of the conductors must be consistent from the controller to each valve. Neutral conductors must be white. Do

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

not use white for control conductors. Do not use conductors with green insulation except as permitted by the NEC.

Conductors must be:

1. No. 12 AWG or larger or no. 14 AWG or larger for armor-clad
2. Rated for 36 V or 600 V for armor-clad
3. Rated for direct burial
4. Underground feeder cable Type UF and TWU
5. Solid, uncoated copper for armor-clad
6. Not less than 90 percent of the AWG diameter required

No. 10 and smaller conductors must be insulated with a minimum of 56 mils of PVC or a minimum of 41 mils of polyethylene. No. 8 and larger conductors must be insulated with a minimum of 70 mils of PVC.

No. 10 and smaller armor-clad conductors must be insulated with a minimum of 41 mils of polyethylene. No. 8 and larger armor-clad conductors must be insulated with 54 to 60 mils of PVC.

Armor-clad conductors must include:

1. Stainless steel tape armor, Type 304 and helically wrapped with a 33 percent minimum overlap. The tape must be 0.5 inch wide and at least 0.005 inch thick.
2. PVC outer conductor jacket that is UV resistant and complies with the ICEA S-61-402, NEMA standard WC5 and UL listing 1263. The jacket nominal thickness must be 24 to 30 mils thick.

20-2.05C Construction

20-2.05C(1) General

Reserved

20-2.05C(2) In Open Trenches

Do not install control and neutral conductors above each other in an open trench. Wrap conductors together with electrical tape at 5 foot intervals.

Where conductors are installed in the same trench as supply line, install at the same depth as the line. At other locations, install conductors not less than 12 inches below finished grade.

Where conductors are not in a supply line trench, install conductors at least 4 feet from curbs, dikes, and paved shoulders.

20-2.05C(3) In Conduits

Install conductors in electrical conduit if conductors are to be:

1. Surface mounted
2. Installed in or on structures
3. Installed under paved areas
4. Installed in irrigation conduits
5. Placed in concrete

20-2.05C(4) Splicing

Splice low voltage control and neutral conductors under sections 86-2.09C, 86-2.09D, and 86-2.09E, except do not use method B. Tape used for splice insulation must be PVC tape.

Leave at least 2 feet of slack for each conductor at each:

1. Pull box
2. Valve box for each conductor that is connected to other facilities within the box or spliced within the box

Do not splice conductors in irrigation controller cabinets.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

Permanent splice connections must be made with freshly cut and skinned conductors. Do not use temporary splices made for testing valve circuits as permanent splices.

20-2.05C(5) Marking

Mark control and neutral conductors in pull boxes, valve boxes, at irrigation control terminals, and at splices.

Mark conductor terminations and splices with adhesive cloth wrap-around markers. Seal markers with clear, heat-shrinkable sleeves.

Mark nonspliced conductors with clip-on C-shaped white extruded PVC sleeves. Sleeves must have black indented legends of uniform depth with transparent overlays over the legends and chevron cuts for the alignment of 2 or more sleeves.

Identify markers for the control conductors with the appropriate irrigation controller and station number.

20-2.05D Payment

Not Used

20-2.06 FLOW SENSORS

20-2.06A General

Section 20-2.06 includes specifications for installing a flow sensor.

20-2.06B Materials

Each flow sensor must be an inline type with a nonmagnetic spinning impeller as the only moving part.

The electronics housing must:

1. Be schedule 80 PVC or cast 85-5-5 bronze
2. Include glass-filled polyphenylene sulfide
3. Be easily removable from the meter body and include 2 ethylene-propylene O-rings

The impeller must be tungsten carbide.

The electronics must be rated to withstand prolonged water immersion conditions and include 2 single conductor 18 AWG leads, 48 inches long.

The insulation must be direct burial UF type colored red for the positive lead and black for the negative lead.

The flow sensor must be capable of withstanding:

1. 100 to 400 psi operating pressure depending on sensor size shown
2. Liquid temperatures up to 220 degrees F
3. Flows from 1/2 to 15 ft/sec

20-2.06C Construction

Install flow sensor as shown.

20-2.06D Payment

Not Used

20-2.07 IRRIGATION CONTROLLERS

20-2.07A General

20-2.07A(1) Summary

Section 20-2.07 includes specifications for installing irrigation controllers.

20-2.07A(2) Definitions

irrigation controller: "Smart" irrigation controller as defined by the Irrigation Association.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CTA Contract No. XXX

remote irrigation control system (RICS): Centralized water management system that consists of a base station, centralized server, satellite controllers.

base station: Designated computer located at a Department maintenance facility or District Office that collects data from a series of satellite controllers through a centralized server.

centralized server: Designated server or web-based application that collects data from all base stations.

web-based application: Encrypted managing software that is coded in a browser-supported language and is executable via a common internet web browser (e.g., Microsoft Internet Explorer, Firefox, Safari, etc.).

satellite controller: Irrigation controller that communicates directly to a base station or centralized server.

network communication: Identified means through which satellite controllers, base stations, and a centralized server communicate to one another (i.e., fiber optics, spread spectrum, phone line, etc.).

remote access device: Device (i.e., FCC compliant radio remote, cell phone or wireless, etc.) used to communicate with satellite controllers from a remote location.

20-2.07A(3) Submittals

Submit as an informational submittal, a complete manufacturer's maintenance and operations manual for each type of controller installed. Submit the manual at the time the wiring plans and diagrams are placed inside the controller enclosure or cabinet door.

20-2.07A(4) Quality Control and Assurance

Provide training by a qualified person on the use and adjustment of the irrigation controllers installed 30 days before Contract acceptance.

Modifications to electrical components must be done by the manufacturer before shipment to the job site.

The installation date and expiration date of the manufacturer's guarantee for the controllers must be permanently marked on the inside face of the controller.

20-2.07B Materials

20-2.07B(1) General

Conventional A/C powered irrigation controllers must operate on 110/120 V, 60 Hz(ac) and supply 24 to 30 VAC, 60 Hz(ac) for operating electrical remote control valves.

Concrete for the pad and foundation must be minor concrete, except the concrete must not contain less than 463 pounds of cementitious material per cubic yard. Hand mixing of the concrete is allowed.

20-2.07B(2) Irrigation Controllers

20-2.07B(2)(a) General

The irrigation controllers must:

1. Be A/C, battery, solar, or 2-wire as shown
2. Be from a single manufacturer.
3. Be fully automatic and capable of operating a complete 30-day or longer irrigation program.
4. Have a switch or button on the face of the irrigation control panel showing that the irrigation controller can be turned on or off and provide for automatic or manual operation. Manual operation must allow cycle start at the desired station and allow for the minimum activation of a single station or have the option to operate multiple stations in sequential or simultaneous operation modes.
5. Have non-volatile memory.
6. Have a watering time display on the face of the control panel.
7. Have a panel and circuit board connected to the low voltage control and neutral conductors by means of a plug and receptacle connectors located within the cabinet enclosure.
8. Have a variable or incremental timing adjustment ranging from 1 minute to 360 minutes per station.
9. Be capable of operating at least 3 program schedules.
10. Be capable of having at least 4 start times per program schedule.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

11. Have an output that can energize a pump start circuit or a remote control master valve.
12. Be protected by fuses and circuit breakers.
13. Display a program and station affected by a sensory alert without altering other watering schedules not affected by the alert.
14. Be capable of global manual and automatic seasonal adjustments to all valves in any given program.
15. Automatically alter watering schedule in accordance with evapotranspiration data provided by a local weather station or have an internal programmed default of historical evapotranspirational data for a given region.
16. Support a flow sensor, rain sensor, or weather station and have automatic shut-off capability.
17. Be capable of communicating with the remote access device.

If the irrigation controller is installed in an enclosure cabinet, the cabinet must be stainless steel and must comply with section 86-3.04A.

Irrigation controllers not installed in enclosure cabinets must be weatherproof, constructed of fiberglass or metal and have a door lock with 2 keys provided.

RICS must meet the requirements of an irrigation controller and be capable of being accessible only through a secured and encrypted server that is password and firewall protected by the Department or be accessible through a firewall secure remote server that is independent from any Department servers. The Department will set up and manage the network communication.

20-2.07B(2)(b) Battery Powered Irrigation Controllers

Reserved

20-2.07B(2)(c) Solar Powered Irrigation Controllers

Reserved

20-2.07B(2)(d) Two-wire Irrigation Controllers

Reserved

20-2.07B(3) Irrigation Controller Enclosure Cabinets

The irrigation controller enclosure cabinet must:

1. Be stainless steel.
2. Include a mounting panel. Fabricate mounting panels with one of the following:
 - 2.1. 3/4-inch exterior AC grade veneer plywood. Paint panels with 1 application of an exterior, latex based, wood primer and 2 applications of an exterior, vinyl acrylic enamel, white in color. Paint panels on all sides and edges before installation of the panels in the cabinets and the equipment on the panels.
 - 2.2. 3/16-inch thick aluminum sheets.
 - 2.3. 10-gauge cold-rolled steel sheets.
 - 2.4. 0.157-inch stainless steel metal sheets.
3. Provide cross ventilation, roof ventilation, or a combination of both. Ventilation must not compromise the weather resistance properties of the cabinet and must be fabricated by the cabinet manufacturer.
4. Include protection against lightning damage.
5. Have an area inside the cabinet doors for storage of the as-built schematic wiring diagram and irrigation plans.
6. Have padlock clasp or latch and lock mechanism.

20-2.07B(4) Rain Sensors

A rain sensor unit must be a solid state, automatic shut-off type, and compatible with the irrigation controller. The rain sensor unit must automatically interrupt the master remote control valves when approximately 1/8 inch of rain has fallen. The irrigation controller must automatically be enabled again when the accumulated rainfall evaporates from the rain sensor unit collection cup.

Rain sensor units must be one of the following:

1. Rated 24 V(ac) to 30 V(ac)
2. Wireless and FCC compliant

20-2.07C Construction

Finish exposed top surface of concrete pad with a medium broom finish applied parallel to the long dimension.

Locate irrigation controllers in pedestal or wall mounted enclosures as shown.

Install electrical components for automatic irrigation systems under section 86-1.02.

Install irrigation controllers under the manufacturer's instructions and as shown.

If 2 or more irrigation controllers operate the same remote master control valve, furnish and install an isolation relay under the controller manufacturer's instructions.

Where direct burial conductors are to be connected to the terminal strip, connect the conductors with the open-end-crimp-on wire terminals. Exposed wire must not extend beyond the crimp of the terminal and the wires must be parallel on the terminal strip.

Install rain sensor units for irrigation controllers on the irrigation controller enclosure cabinets. Provide protection against lightning damage.

20-2.07D Payment

Payment for electrical service for 120-volt or higher is not included in the payment for irrigation controller.

20-2.08 IRRIGATION CONDUIT

20-2.08A General

20-2.08A(1) Summary

Section 20-2.08 includes specifications for installing irrigation conduit under a roadway or other facility to accommodate electrical conduit for control and neutral conductors and irrigation supply lines.

Before performing work on irrigation systems, locate existing conduits shown to be incorporated into the new work.

Before removing or disturbing existing Type A pavement markers that show the location of the existing conduit, mark the location of the existing conduit on the pavement.

20-2.08A(2) Definitions

Reserved

20-2.08A(3) Submittals

Reserved

20-2.08A(4) Quality Control and Assurance

Demonstrate the conduits are free of obstructions after placement of base and surfacing.

Before and after extending the irrigation supply line in a conduit, pressure test the supply line under section 20-2.01A(4)(b).

After conductors are installed in a conduit, test the conductors under section 20-2.05A(4).

Assign a technical representative to direct and control the directional bore activities. The representative must be present during directional bore activities. Unless otherwise authorized, perform directional bore activities in the presence of the Engineer.

20-2.08B Materials

20-2.08B(1) General

Reserved

20-2.08B(2) ABS Composite Pipe Conduit

ABS composite pipe and couplings must comply with ASTM D 2680. Couplings must be solvent cement type.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

20-2.08B(3) Corrugated High Density Polyethylene Pipe Conduit

Corrugated high density polyethylene pipe must comply with ASTM F 405 and F 667 or be Type S and comply with AASHTO M252 and M294. Couplings and fittings must be as recommended by the pipe manufacturer.

20-2.08B(4) Corrugated Steel Pipe Conduit

Corrugated steel pipe conduit must comply with section 66. The nominal thickness of metal sheets for pipe must be 0.064 inch for corrugated steel pipe and 0.060 inch for corrugated aluminum pipe. Coupling bands and hardware must comply with section 66.

20-2.08B(5) Polyvinyl Chloride Pipe Conduit

PVC pipe conduit must be schedule 40 and comply with ASTM D 1785.

Fittings must be schedule 80.

20-2.08B(6) Welded Steel Pipe Conduit

Welded steel pipe must comply with ASTM A 53. Pipe must be black and have either welded or threaded joints.

The minimum wall thickness for the various sizes of welded steel pipe must comply with the dimensions shown in the following table:

Pipe size, nominal (inch)	Minimum wall thickness (inch)
3	0.216
4	0.237
6	0.280
8	0.277
10	0.279
12	0.330

20-2.08C Construction

20-2.08C(1) General

When existing conduits are to be incorporated in new work, excavate exploratory holes for locating existing conduits at the locations indicated by existing markers or as directed. Excavate and backfill exploratory holes to a maximum size of 2-1/2 feet in width, 5 feet in depth, and 5 feet on each side of the marker or directed location parallel to the roadway. If the conduit is not found and if ordered, increase the size of the exploratory holes beyond the dimensions specified. The additional excavation and backfill is change order work.

If extending an existing conduit, remove conductors from the conduit.

Use a coupling band if the new conduit matches the existing conduit diameter, otherwise overlap the conduit at least 12 inches.

After extending existing conduits, install conductors that match the color and size of the existing conductors without splices. Splice conductors in adjacent pull boxes.

If installing a control and neutral conductor and electrical conduit through the irrigation conduit, install a no. 5 pull box at each end.

Remove debris found in the conduit before performing other work. Debris found more than 3 feet from the ends of the conduits is removed as change order work.

Extend conduit 2 feet beyond all paving unless otherwise shown.

Cap the ends of unused conduit.

Designate the location of each conduit by cementing a Type A pavement marker as shown. Type A pavement markers and adhesive must comply with section 85.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

20-2.08C(2) Welded Steel Pipe Conduit

20-2.08C(2)(a) General

Install welded steel pipe by directional boring or jack and drill.

Install top of conduits:

1. 18 to 30 inches below the finished surface in sidewalk areas
2. 40 to 52 inches below the finished grade in other paved areas

20-2.08C(2)(b) Directional Boring

Notify the Engineer 2 business days before starting directional bore activities.

The diameter of the boring tool for directional boring must be only as large as necessary to install the conduit.

Mineral slurry or wetting solution may be used to lubricate the boring tool and to stabilize the soil surrounding the boring path. The mineral slurry or wetting solution must be water based.

The directional bore equipment must have directional control of the boring tool and have an electronic boring tool location detection system. During operation, the directional bore equipment must be able to determine the location of the tool both horizontally and vertically.

20-2.08C(2)(c) Jack and Drill

Notify the Engineer 2 business days before starting jack and drill activities.

Jacking or drilling pits must be no closer than 2 feet from pavement edge whenever possible.

If authorized, small holes may be cut in the pavement to locate or remove obstructions.

Do not use excessive water that will soften subgrade or undermine pavement.

20-2.08C(3) Schedule 40 Pipe Conduit

Where schedule 40 pipe conduit 2 inches or less in outside diameter is installed under surfacing, you may install by directional boring under section 20-2.08C(2)(b).

For conduit 2 inches or less in diameter, the top of the conduit must be a minimum of 18 inches below surfacing.

Extend schedule 40 pipe conduit 6 inches beyond surfacing. Cap ends of conduit until used.

20-2.08D Payment

Schedule 40 PVC pipe conduit is paid for as plastic pipe (schedule 40) (supply line).

20-2.09 IRRIGATION SUPPLY LINE

20-2.09A General

20-2.09A(1) Summary

Section 20-2.09 includes specifications for installing irrigation supply line.

If the supply line location interferes with the excavation of plant holes, relocate the plant hole to clear the supply line. Do not install supply lines through plant holes unless shown.

Supply lines, control and neutral conductors and electrical conduits installed in common trenches must not be installed above each other.

20-2.09A(2) Definitions

Reserved

20-2.09A(3) Submittals

Submit a certificate of compliance for polyethylene pipe and plastic pipe supply line.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

20-2.09A(4) Quality Control and Assurance

Solvent cement must comply with the local Air Quality Management District requirements.

20-2.09B Materials

20-2.09B(1) General

Irrigation supply pipe must be metal or plastic as shown.

PCC for thrust blocks must be produced from commercial-quality aggregates. The concrete must contain at least 295 pounds of cementitious material per cubic yard.

20-2.09B(2) Copper Pipe Supply Line

Copper pipe must be Type K rigid pipe and comply with ASTM B 88. Fittings must be wrought copper or cast bronze either soldered or threaded.

Solder must be 95 percent tin and 5 percent antimony.

20-2.09B(3) Galvanized Steel Pipe Supply Line

Galvanized steel pipe supply line and couplings must be standard weight and comply with ASTM A 53, except that the zinc coating must not be less than 90 percent of the specified amount. Except for couplings, fittings must be galvanized malleable iron, banded and threaded, and comply with ANSI B16.3, Class 150.

Joint compound must be nonhardening and noncorrosive. Do not use pipe thread sealant tape.

20-2.09B(4) Drip Irrigation Tubing

Drip irrigation tubing must be virgin polyethylene plastic and comply with ASTM D 2737.

The drip irrigation tubing must be distribution tubing with preinstalled in-line emitters.

If preinstalled in-line drip irrigation tubing is not shown, you may install emitters that match the distribution requirements shown. The emitters must be barbed or threaded-type outlet devices with dual silicone diaphragms and installed under the manufacturer's instructions.

The emitters must meet the flow rate and operating pressure range shown.

The wall thickness of polyethylene tubing must comply with the following requirements when tested under ASTM D 2122:

Pipe size, nominal (inch)	Minimum wall thickness (inch)	Maximum wall thickness (inch)
1/2	0.050	0.070
5/8	0.055	0.075
3/4	0.060	0.080

The polyethylene tubing fittings must be leak-free, compression type and have female sockets with an internal barb to provide a positive pipe-to-fitting connection that will not separate at the designed pressure.

20-2.09B(5) Plastic Pipe Supply Line

Plastic pipe supply line must be PVC pipe that is NSF approved.

Schedule 40 plastic pipe supply line must comply with ASTM D 1785.

Class 315 plastic pipe supply line must comply with ASTM D 2241.

PVC gasketed bell joints must comply with ASTM D 2672, ASTM D2241, ASTM D 3139, and ASTM F 477.

For solvent-cemented type joints, the primer and solvent cement must be made by the same manufacturer. The primer color must contrast with the color of the pipe and fittings.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CTA Contract No. XXX

Solvent-cemented fittings must be injection molded PVC, schedule 40, and comply with ASTM D 2466.

Fittings for supply line placed in irrigation conduit must be schedule 80.

Fittings for plastic pipe supply line larger than 4 inches must be ductile iron under section 20-2.14C(2)(b).

If UV-resistant plastic pipe supply line is required, the pipe must be homogeneous, uniform color and be manufactured of:

1. At least 80 percent vinyl chloride resin with UV stabilizers
2. Non-PVC resin modifiers and coloring ingredients
3. Coloring ingredients with UV stabilizers

20-2.09C Construction

20-2.09C(1) General

Cut pipe straight and true. After cutting, ream out the ends to the full inside diameter of the pipe.

05-30-14

Prevent foreign material from entering the irrigation system during installation. Immediately before assembling, clean all pipes, valves, and fittings. Flush lines before attaching sprinklers, emitters, and other terminal fittings. Reuse water from waterline flushing for landscape irrigation if practicable.

07-19-13

Pipe supply lines installed between the water meter and backflow preventer assembly must be installed not less than 18 inches below finished grade measured to the top of the pipe.

Where a connection is made to existing supply lines, bell and gasketed fittings or compression fittings may be used.

Install a thrust block at each change in direction on the main supply line, terminus run, and at other locations shown.

Where supply lines cross paved ditches more than 3 feet deep at their flow line, install galvanized steel pipe for the entire span of the ditch.

Secure UV resistant plastic pipe supply line on grade as shown.

20-2.09C(2) Galvanized Steel Pipe Supply Line

Coat male pipe threads on galvanized steel pipe according to the manufacturer's instructions.

20-2.09C(3) Drip Irrigation Tubing

Install drip irrigation tubing on grade and under manufacturer's instructions.

Install a flush valve and an air-relief valve if recommended by the drip valve assembly manufacturer.

20-2.09C(4) Plastic Pipe Supply Line

For PVC pipe 1-1/2 inches in diameter or smaller, cut the pipe with PVC cutters.

For solvent-cemented type joints, apply primer and solvent-cement separately under the manufacturer's instructions.

Wrap the male portion of each threaded plastic pipe fitting with at least 2 layers of pipe thread sealant tape.

Install plastic pipe supply line mains with solvent-cemented type joints not less than 18 inches below finished grade measured to the top of the pipe.

Install plastic pipe supply line laterals with solvent-cemented type joints not less than 12 inches below finished grade measured to the top of the pipe.

Snake plastic pipe installed by trenching and backfilling methods.

20-2.09D Payment

Supply line pipe and drip irrigation tubing are measured along the slope.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

20-2.10 SPRINKLER ASSEMBLIES

20-2.10A General

Section 20-2.10 includes specifications for installing sprinkler assemblies.

20-2.10B Materials

20-2.10B(1) General

Each sprinkler assembly must meet the characteristics shown in the irrigation legend.

Where shown, a sprinkler assembly must have a flow shut-off device that automatically stops the flow of water on the downstream side of the device when the assembly is broken. You may use a sprinkler assembly with a preinstalled flow shut-off device or you must install a flow shut-off device under the manufacturer's instructions.

Flexible hose for sprinkler assembly must be leak-free, nonrigid and comply with ASTM D 2287, cell Type 6564500. The hose wall thickness must comply with ASTM D 2122 for the hose diameters shown in the following table:

Hose diameter, nominal (inch)	Minimum wall thickness (inch)
1/2	0.127
3/4	0.154
1	0.179

Solvent cement and fittings for flexible hose must comply with section 20-2.09B(5).

20-2.10B(2) Pop-Up Sprinkler Assemblies

Each pop-up sprinkler assembly must include a body, nozzle, swing joint, pressure compensation device, check valve, sprinkler protector, and fittings as shown.

20-2.10B(3) Riser Sprinkler Assemblies

11-15-13

Each riser sprinkler assembly must include a riser or flexible hose, threaded nipple, swing joint, check valve, and nozzle as shown. The riser must be UV resistant schedule 80, PVC 1120 or PVC 1220 pipe and comply with ASTM D 1785.

20-2.10B(4) Tree Well Sprinkler Assemblies

Each tree well sprinkler assembly must include a body, riser, swing joint, perforated drainpipe, and drain cap.

07-19-13

The perforated drainpipe must be commercial grade, rigid, PVC pipe with holes spaced not more than 6 inches on center on 1 side of the pipe.

Drain cap must be commercially available, 1 piece, injection molded drain grate manufactured from structural foam polyolefins with UV light inhibitors. Drain grate must be black.

Gravel for filling the drainpipe must be graded such that 100 percent passes the 3/4-inch sieve and 100 percent is retained on the 1/2-inch sieve. Gravel must be clean, washed, dry, and free from clay or organic material.

20-2.10C Construction

Install pop-up and riser sprinkler assembly:

1. 6-1/2 to 8 feet from curbs, dikes, and sidewalks
2. 10 feet from paved shoulders
3. 3 feet from fences and walls

If sprinkler assembly cannot be installed within these limits, the location will be determined by the Engineer.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

Set sprinkler assembly riser on slopes perpendicular to the plane of the slope.

Install tree well sprinkler assembly as shown.

20-2.10D Payment

Not Used

20-2.11 VALVES

20-2.11A General

Section 20-2.11 includes specifications for installing valves.

20-2.11B Materials

20-2.11B(1) General

Valves must:

1. Include a valve box and cover
2. Be the same size as the supply line that the valve serves unless otherwise shown
3. Be bottom, angled, or straight inlet configuration

20-2.11B(2) Ball Valves

Ball valve must be a two-piece brass or bronze body and comply with the requirements shown in the following table:

Property	Requirements
Nonshock working pressure, min	400 psi
Seats	PTFE
O-ring seals	PTFE

Ball valve must be the same size as the supply line that the valve serves.

20-2.11B(3) Check Valves

Each check valve must:

1. Be schedule 80 PVC and factory set to 5 psi for adjustable spring check valve
2. Be Class 200 PVC for swing check valves on non pressurized plastic irrigation supply line

20-2.11B(4) Drip Valve Assemblies

Each drip valve assembly must include:

1. Remote control valve
2. Wye filter with:
 - 2.1. Filter housing that:
 - 2.1.1. Can withstand a working pressure of 150 psi
 - 2.1.2. Is manufactured of reinforced polypropylene plastic
 - 2.2. Reusable stainless steel filter cartridge with a 200 mesh size filtration
3. Ball valve under 20-2.11B(2)
4. Schedule 80 PVC pipes and fittings
5. Pressure regulator

20-2.11B(5) Garden Valve Assemblies

Each garden valve assembly must have:

1. Garden valve
2. Location marker

20-2.11B(6) Gate Valves

Gate valves must be:

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

1. Flanged or threaded type
2. Iron or bronze body
3. Bronze trimmed with one of the following:
 - 3.1. Internally threading rising stem
 - 3.2. Nonrising stem
4. Able to withstand a working pressure of 150 psi
5. Same size as the pipeline that the valves serves unless otherwise shown

Gate valves smaller than 3 inches must have a cross handle.

Gate valves 3 inches or larger must be flanged type with a square nut. Furnish 3 long shank keys before Contract acceptance.

Gate valves attached to the outlets of a wye strainer must have seating rings on the discharge side of the gate valves must be PTFE. Valve wedges must be driven obliquely by cam action into the seating rings.

20-2.11B(7) Pressure Regulating Valves

Pressure regulating valve must be:

1. Flanged or threaded type
2. Brass, bronze, cast iron, or plastic body
3. Spring diaphragm type
4. Pilot controlled

Pressure regulating valve must have no internal filter screens.

20-2.11B(8) Pressure Relief Valves

Pressure relief valve must have a brass or bronze body, stainless steel springs, bronze nickel chrome seats, composition seat discs, female bottom inlets, and female side outlets.

20-2.11B(9) Quick Coupling Valves

Quick coupling valve must be 3/4 inch double slotted with a self-closing cap, 3/4-inch brass key and 3/4-inch brass hose swivel unless otherwise shown. Except for the cap, quick coupling valve must be brass or bronze construction. Furnish 3 loose quick coupling brass keys and brass hose swivels before Contract acceptance.

20-2.11B(10) Remote Control Valves

20-2.11B(10)(a) General

Each remote control valve must:

1. Be normally closed type.
2. Be glass filled nylon, brass, or bronze.
3. Be completely serviceable from the top without removing the valve body from the system.
4. Be equipped with a device that regulates and adjusts the flow of water and be provided with a manual shut-off. The manual shut-off for valves larger than 3/4 inch must be operated by a cross handle.
5. Have solenoids compatible with the irrigation controller.
6. Have a manual bleed device.
7. Be capable of withstanding a pressure of 200 psi
8. Have replaceable compression discs or diaphragms.
9. Have threaded fittings for inlets and outlets.
10. Have DC latching solenoids when used with solar or battery controllers. Solenoids must operate on 3.5 V.

20-2.11B(10)(b) Remote Control Valves with Flow Sensor

Reserved

20-2.11B(10)(c) Remote Control Valves with Pressure Regulator

Each remote control valve with pressure regulator must be factory assembled as 1 unit.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

20-2.11B(11) Wye Strainer Assemblies

Each wye strainer assembly must include:

1. Wye strainer
2. Garden valve

20-2.11C Construction

20-2.11C(1) General

Install control valves:

1. 6-1/2 to 8 feet from curbs, dikes, and sidewalks
2. 10 feet from paved shoulders
3. 3 feet from fences, walls, or both

If a control valve cannot be installed within these limits, the location will be determined by the Engineer.

20-2.11C(2) Check Valves

Unless otherwise shown, install spring-action check valves as necessary to prevent low head drainage.

20-2.11C(3) Garden Valve Assemblies

Install a location marker 8 to 10 inches from the back of each garden valve.

20-2.11C(4) Pressure Regulating Valves

Install pressure regulating valves with threaded connections and a union on the inlet side of the valves.

20-2.11C(5) Wye Strainer Assemblies

Unless shown, install wye strainer assembly on the upstream side of the remote control valves.

Install garden valve so that when the system is flushed, the discharge sprays out of the valve box.

20-2.11D Payment

Not Used

20-2.12–20-2.13 RESERVED

05-30-14

07-19-13

20-2.14 SUPPLY LINE ON STRUCTURES

20-2.14A General

20-2.14A(1) General

20-2.14A(1)(a) Summary

Section 20-14 includes specifications for installing water supply lines through bridges and on the exterior of concrete structures.

20-2.14A(1)(b) Definitions

Reserved

20-2.14A(1)(c) Submittals

Submit a work plan for temporary casing support at the abutments as an informational submittal.

20-2.14A(1)(d) Quality Control and Assurance

20-2.14A(1)(d)(i) General

Before installing seismic expansion assemblies or expansion assemblies, the Engineer must authorize the extension setting.

20-2.14A(1)(d)(ii) Regulatory Requirements

Piping materials must bear the label, stamp, or other markings of the specified standards.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

20-2.14A(1)(d)(iii) Site Tests

Test water supply lines before:

1. Backfilling
2. Beginning work on box girder cell decks
3. Otherwise covering the water supply lines

Furnish pipe anchorages to resist thrust forces occurring during testing.

Test the water supply lines as 1 unit. The limits of the unit must be 5 feet beyond the casing at each end of the bridge.

Cap each end of the water supply lines before testing. Caps must be rated for the test pressure.

Test water supply lines under section 20-2.01A(4)(b), except that the testing period must be 4 hours with no pressure drop.

For water supply lines 4 inches and larger testing must meet the following additional requirements:

1. Testing pressure must be at least 120 psi
2. Air relief valve must not be subjected to water pressure due to testing

If water supply lines fail testing, retest the lines after repair.

20-2.14A(2) Materials

20-2.14A(2)(a) General

Protect stored piping from moisture and dirt. Elevate piping above grade. Support piping to prevent sagging and bending.

Protect flanges, fittings, and assemblies from moisture and dirt.

20-2.14A(2)(b) Air Release Valve Assemblies

Air release valve assemblies include an air release valve, ball valve, tank vent, nipples, and pipe saddle. Assemblies must comply with the following:

1. Air release valves must have a cast iron body with stainless steel trim and float, 1-inch NPT inlet, 1/2-inch NPT outlet, and 3/16-inch orifice.
2. Ball valves must have a 2-piece bronze body with chrome plated or brass ball, 1-inch full-size port, and be rated for at least 400 psi.
3. Tank vents must have a 1/2-inch NPT inlet and downward-facing double openings with screened covers.
4. Nipples must be schedule 40 galvanized steel pipe.
5. Pipe saddle must be rated for at least 150 psi and compatible with water supply line. Pipe saddle must be (1) single strap pipe saddle for water supply lines smaller than 4 inches or (2) double strap pipe saddle for water supply lines 4 inches and larger. You may use a tee fitting for galvanized steel water supply lines.

20-2.14A(2)(c) Casings

Casings must be welded steel pipe casing complying with section 70-7.

20-2.14A(2)(d) Pipe Wrap Tape

Pipe wrap tape must be pressure sensitive tape made from PVC or polyethylene. Pipe wrap tape must be at least 50 mils thick and not wider than 2 inches.

20-2.14A(2)(e) Pipe Hangers

Pipe hangers must comply with section 70-7.02C.

The pipe hanger must be rated for the water supply line. If casings are shown, include the casings weight.

20-2.14A(2)(f) Epoxy Adhesives

Epoxy used for anchoring concrete pipe supports must comply with section 70-7.02D.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

20-2.14A(2)(g) Concrete Pipe Supports

Concrete pipe supports must comply with section 70-7.02D.

20-2.14A(2)(h) Pipe Clamps and Anchors

Metal clamps must be commercial quality steel complying with section 75-1.02. Anchors must comply with the specifications for concrete anchorage devices in section 75-1.03C.

20-2.14A(2)(i) Pull Boxes

Pull boxes and covers must comply with section 20-2.01B(5).

20.2.14A(3) Construction

20-2.14A(3)(a) General

Support water supply lines as described.

Where water supply lines penetrate bridge superstructure concrete, either form or install pipe sleeves at least 2 pipe sizes larger than the pipe.

20-2.14A(3)(b) Preparation

Clean the interior of the pipe before installation. Cap or plug openings as pipe is installed to prevent the entrance of foreign material. Leave caps or plugs in place until the next pipe section is installed.

20-2.14A(3)(c) Installation

20-2.14A(3)(c)(i) General

Reserved

20-2.14A(3)(c)(ii) Casings

Install casings under section 70-7.03.

Seal casing end with 8 inches of polyurethane foam at dirt stop or pipe end seal.

20-2.14A(3)(c)(iii) Wrapping Water Supply Line

Wrap damaged supply line coatings with pipe wrap tape. Wrap field joints and fittings that are in contact with the earth.

Wrapping must comply with the following:

1. Clean and prime area as recommended by the tape manufacturer.
2. Tightly wrap tape with 1/2 uniform overlap, free from wrinkles and voids, to provide not less than a 100 mil thickness.
3. The tape must conform to joint or fitting contours.
4. Extend tape at least 6 inches over adjacent pipe.

20-2.14A(3)(c)(iv) Pipe Clamps and Anchors

Install water supply lines on the exterior surfaces of bridges or other concrete structures with metal clamps and anchors.

Drilling of holes for anchors must comply with the following:

1. Drill holes to manufacturers recommended depth.
2. Drilling tools must be authorized.
3. Do not drill holes closer than 6 inches to the edge of a concrete structure.
4. Relocate holes if reinforcing steel is encountered. Fill abandoned holes with mortar. Mortar must comply with section 51-1.02F.

Where water supply lines are mounted vertically for more than 2 feet, install clamps and anchors within 6 inches of the elbows.

Where water supply lines are mounted vertically for more than 10 feet, install additional clamps and anchors at 10 foot centers unless otherwise shown.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

20-2.14A(3)(d) Sequences of Operation

If the bridge superstructure is to be prestressed do not place mortar around casings in abutments and hinges until bridge superstructure prestressing has been completed.

20-2.14A(4) Payment

Supply line on structures is measured from end to end, along the centerline.

The Department does not pay for failed tests.

20-2.14B Supply Line on Structures, Less than 4 Inches

20-2.14B(1) General

20-2.14B(1)(a) Summary

Section 20-2.14B includes specifications for installing water supply lines smaller than 4 inches.

20-2.14B(1)(b) Definitions

Reserved

20-2.14B(1)(c) Submittals

Product data for materials includes catalog cuts, performance data, and installation instructions.

Submit product data for:

1. Water supply line
2. Expansion assemblies
3. Casing insulators
4. Pipe end seals
5. Pipe anchorages
6. Air release valve assemblies
7. Casings
8. Pipe hangers
9. Epoxy adhesives
10. Concrete pipe supports

20-2.14B(1)(d) Quality Control and Assurance

Reserved

20-2.14B(2) Materials

20-2.14B(2)(a) General

Reserved

20-2.14B(2)(b) Water Supply Line

Water supply lines must comply with section 20-2.09.

20-2.14B(2)(c) Expansion Assemblies

Expansion assemblies must consist of a hose with ends, insulated flange connections, and elbows. Expansion assemblies must have the same nominal inside diameter as the water supply line. Working pressure must be at least 150 psi.

Hose must be medium or heavy weight, crush and kink resistant, rated for at least 150 psi. Cover must be flexible, oil resistant rubber or synthetic, reinforced with at least 2-ply synthetic yarn or steel wire. The inner tube must meet FDA and USDA Standards for potable water. Hose ends must be stainless steel flanged connections with stainless steel crimped bands or swaged end connectors. Do not use barbed ends with band clamps.

Elbows must be 45 degree, standard weight galvanized steel fittings.

20-2.14B(2)(d) Casing Insulators

Casing insulators must be:

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CTA Contract No. XXX

1. 2-piece, high-density, injection-molded polyethylene, nonconductive inner liner, with cadmium-plated nuts and bolts.
2. Factory constructed to ensure the water supply line is centered in the casing. Insulators must not allow any contact between pipe and casing and have at least 2 runners seated on the bottom of the casing.
3. Sized for the casing and water supply line shown.

20-2.14B(2)(e) Pipe Anchorages

Pipe anchorages must consist of an I-beam, U-bolts, anchors, and double nuts.

Use concrete anchorage devices for anchors on existing bridges. Use L-anchor bolts for anchors on new bridges.

Fabricate the I-beam from 1/2-inch steel plate. Steel plate, U-bolts, L-anchors, and nuts must comply with section 75-1.02. Concrete anchorage devices must comply with section 75-1.03C.

20-2.14B(2)(f) Pipe End Seals

Pipe end seals must consist of a pipe end seal, stainless steel bands, and polyurethane foam.

Pipe end seal must be factory constructed from seamless neoprene and sized for the casing and water supply line shown. Neoprene must be at least 1/8 inch thick. Stainless steel bands must be crimped.

Polyurethane foam must be expanding foam spray that is water resistant and moisture cured.

20-2.14B(3) Construction

Locate pipe anchorage halfway between expansion assemblies.

Pipe end seal must be pulled onto the casing during pipe installation. Do not use wrap-around type end seals.

20-2.14B(4) Payment

Supply line on structures is paid for as galvanized steel pipe (supply line on bridge).

20-2.14C Supply Line on Structures, 4 Inches and Larger

20-2.14C(1) General

20-2.14C(1)(a) Summary

Section 20-2.14C includes specifications for installing water supply lines 4 inches and larger.

20-2.14C(1)(b) Definitions

Reserved

20-2.14C(1)(c) Submittals

Product data for materials includes catalog cuts, performance data, and installation instructions.

Submit product data for:

1. Water supply line
2. Expansion assemblies
3. Flange insulating gaskets
4. Casing insulators
5. Seismic expansion assemblies
6. Lateral restraint assemblies
7. Air release valve assemblies
8. Casings
9. Pipe hangers
10. Epoxy adhesives
11. Concrete pipe supports

Submit the maximum range and preset dimension for each expansion assembly or seismic expansion assembly as an informational submittal.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

Submit at least 5 sets of product data to OSD, Documents Unit. Each set must be bound together and include an index stating equipment names, manufacturers, and model numbers. Two sets will be returned. Notify the Engineer of the submittal. Include in the notification the date and contents of the submittal.

20-2.14C(1)(d) Quality Control and Assurance

Reserved

20-2.14C(2) Materials

20-2.14C(2)(a) General

Reserved

20-2.14C(2)(b) Water Supply Line

Water supply lines must consist of ductile iron pipe and fittings. Pipe must comply with ANSI/AWWA C151/A21.51, Class 350. Fittings must comply with ANSI/AWWA C110/A21.10, rated for a working pressure of 350 psi.

Ductile iron pipe connections to expansion assemblies must be a flanged joint complying with ANSI/AWWA C115/A21.15. Flange gaskets must be rated for a working pressure of 350 psi. Fasteners must comply with section 75-1.02, except that stainless steel fasteners must not be used.

All other ductile iron pipe and fitting joints must be push-on, restrained type complying with ANSI/AWWA C111/A21.11. Push-on, restrained type joints may use proprietary dimensions and proprietary restrained joint locking systems.

Ductile iron pipe and fittings must have an asphaltic coating complying with ANSI/AWWA C151/A21.51, and a cement mortar lining complying with ANSI/AWWA C104/A21.4.

20-2.14C(2)(c) Expansion Assemblies

Expansion assemblies must be a sleeve type expansion joint. The expansion assembly must have:

1. Ductile iron body complying with ANSI/AWWA C153/A21.53
2. Flanged ends complying with ANSI/AWWA C110/A21.10
3. Fusion bonded epoxy internal lining complying with ANSI/AWWA C213 at least 15 mils thick
4. Internal expansion sleeve limiting stop collars and be pressure balanced
5. Working pressure of at least 350 psi for sizes 24 inches and smaller and 250 psi for sizes larger than 24 inches
6. NSF 61 certification

The expansion assembly must be factory set at 1/2 the extension capacity.

20-2.14C(2)(d) Flange Insulating Gaskets

Flange insulating gaskets must consist of a dielectric flange gasket, insulating washers and sleeves, and commercial quality steel bolts and nuts. Dielectric flange gasket must have a dielectric strength of at least 500 vpm.

20-2.14C(2)(e) Casing Insulators

Casing insulators must be:

1. 2-piece, 8-inch, 14-gauge epoxy-coated or galvanized steel band, four 2-inch-wide glass-reinforced polyester or polyethylene runners, with cadmium-plated nuts and bolts.
2. Coated with at least 15-mils heat-fused PVC to provide a nonconductive inner liner.
3. Factory constructed to ensure the water supply line is centered in the casing. Insulators must not allow any pipe to casing contact and have at least 2 runners seated on the bottom of the casing.
4. Sized for the casing and water supply line shown.

20-2.14C(2)(f) Dirt Stops

Dirt stops must consist of a redwood cover with polyurethane foam.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

Use construction heart grade redwood complying with 57-2.01B(2). Construct cover to fit snugly around the water supply line. The cover must be 2 inches taller and 2 inches wider than the casing.

Polyurethane foam must be expanding foam spray that is water resistant and moisture cured.

20-2.14C(2)(g) Seismic Expansion Assemblies

Seismic expansion assemblies must be a sleeve type expansion joint with integral ball joints at each end.

Seismic expansion assemblies must have:

1. Ability to withstand at least 15 degree angular deflection at each end and maximum movement in all 3 planes at the same time
2. Ductile iron body complying with ANSI/AWWA C153/A21.53
3. Flanged ends complying with ANSI/AWWA C110/A21.10
4. Fusion bonded epoxy internal lining complying with ANSI/AWWA C213 at least 15 mils thick
5. Internal expansion sleeve limiting stop collars and pressure balanced
6. Ball joints contained in flanged retainers with seal gaskets
7. Working pressure of at least 350 psi for sizes 24 inches and smaller and 250 psi for sizes larger than 24 inches
8. NSF 61 certification

The seismic expansion assembly must be factory set at 1/2 the extension capacity.

20-2.14C(2)(h) Lateral Restraint Assemblies

Lateral restraint assemblies must be (1) constructed from commercial quality steel components complying with section 75-1.02, (2) adjustable, and (3) able to resist a horizontal force of 10 percent of the contributory dead load.

20-2.14C(3) Construction

Each ductile iron pipe must be connected and fully extended (pulled out) after joint assembly before the next pipe section is added.

Install flange insulating gaskets on the outside flange of seismic expansion assemblies and expansion assemblies.

20-2.14C(4) Payment

Supply line on structures is paid for as supply line (bridge).

20-2.15 TEMPORARY IRRIGATION SYSTEMS

Reserved

20-2.16–20-2.19 RESERVED

20-3 PLANTING

20-3.01 GENERAL

20-3.01A General

20-3.01A(1) Summary

Section 20-3 includes specifications for performing planting work in new and existing landscapes.

20-3.01A(2) Definitions

Reserved

20-3.01A(3) Submittals

20-3.01A(3)(a) General

Submit nursery invoices showing species or variety and inspection certificates for plants.

Submit documentation of clearance from the county agricultural commissioner for plants obtained from a county outside the project limits.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

If a root stimulant is required, submit a copy of the root stimulant manufacturer's product sheet and instructions for the application of the root stimulant.

If cuttings are to be taken from outside the right-of-way, submit proof of permits and payment of associated fees. Notify the Engineer of the location at least 15 days before taking cuttings.

20-3.01A(3)(b) Vendor Statements

At least 60 days before planting the plants, submit a statement from the vendor that the order for the plants required, including sample plants used for inspection, has been received and accepted by the vendor. The statement from the vendor must include the plant names, sizes, and quantities and the anticipated delivery date.

20-3.01A(3)(c) Certificates of Compliance

Submit a certificate of compliance for:

1. Sod
2. Soil amendment

20-3.01A(4) Quality Control and Assurance

Plants must comply with federal and state laws requiring inspection for diseases and infestations. Inspection certificates required by law must accompany each shipment of plants.

Obtain clearance from the county agricultural commissioner before planting plants delivered from a county outside the project limits.

The Engineer inspects the roots of container-grown sample plants by removing earth from the rootball of not less than 2 plants, nor more than 2 percent of the total number of plants of each species or variety. If container-grown plants are purchased from several sources, the Engineer inspects the roots of not less than 2 of each sample plant species or variety from each source. The rootball of container grown plants must not show evidence of being underdeveloped, deformed, or having been restricted.

If the Engineer finds noncompliant plants, the entire lot represented by the noncompliant sample plants will be rejected.

Cuttings with mature or brown stems and cuttings that have been trimmed will be rejected.

20-3.01B Materials

20-3.01B(1) General

Notify the Engineer at least 10 days before the plants are shipped to the job site.

20-3.01B(2) Plants

20-3.01B(2)(a) General

Plants must be the variety and size shown and true to the type or name shown. Plants must be individually tagged or tagged in groups identifying the plants by species or variety. Tagging is not required for cuttings.

Plants must be healthy, well-formed, not root-bound, free from insect pests and disease, and grown in nurseries inspected by the Department of Food and Agriculture.

The plants must comply with the size and type shown in the following table:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Plant group designation	Description	Container size (cu in)
A	No. 1 container	152–251
B	No. 5 container	785–1242
C	Balled and burlapped	--
E	Bulb	--
F	In flats	--
H	Cutting	--
I	Pot	--
K	24-inch box	5775–6861
M	Liner ^a	--
O	Acorn	--
P	Plugs ^{a, b}	--
S	Seedling ^c	--
U	No. 15 container	2768–3696

^aDo not use containers made of biodegradable material.

^bGrown in individual container cells.

^cBare root.

Trucks used for transporting plants must be equipped with covers to protect plants from windburn.

Handle and pack plants in an authorized way for the species or variety.

20-3.01B(2)(b) Cuttings

20-3.01B(2)(b)(i) General

Take cuttings at random from healthy, vigorous plants. Make cuts with sharp, clean tools. Do not take more than 25 percent of an individual plant and not more than 50 percent of the plants in an area.

Keep cuttings covered and wet until planted. Do not allow cuttings to dry or wither.

Plant cuttings no more than 2 days after being cut.

20-3.01B(2)(b)(ii) *Carpobrotus* and *Delosperma* Cuttings

You may take cuttings for new *Carpobrotus* and *Delosperma* groundcover from the existing highway planting areas, but these areas may not provide enough material to complete the work. Contact the local District's encroachment permit office to obtain a permit to harvest cuttings, identify acceptable cutting harvest areas, and to determine acceptable quantities to take.

Take tip cuttings from healthy, vigorous *Carpobrotus* and *Delosperma* plants that are free of pests and disease.

Carpobrotus cuttings must be 10 inches or more in length and not have roots.

Delosperma cuttings must be 6 inches or more in length and not have roots.

20-3.01B(2)(b)(iii) Willow Cuttings

Take willow cuttings from areas shown or designated by the Engineer.

Willow cuttings must be:

1. Reasonably straight
2. 20 to 24 inches in length
3. 3/4 to 1-1/2 inch in diameter at the base of the cutting

Cut the top of each willow cutting square above a leaf bud. Cut the base below a leaf bud at approximately a 45 degree angle. Trim off leaves and branches flush with the stem of the cutting.

20-3.01B(2)(b)(iv) Cottonwood Cuttings

Cottonwood cuttings must comply with the requirements for willow cuttings in section 20-3.01B(2)(b)(iii).

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

20-3.01B(2)(b)(v)–20-3.01B(2)(b)(viii) Reserved

20-3.01B(2)(c) Sod

Sod must:

1. Be grown to comply with the Food & Agri Code
2. Be free from weeds and undesirable types of grasses and clovers
3. Be field-grown on soil containing less than 50 percent silt and clay
3. Have less than 1/2-inch-thick thatch
4. Not be less than 8 months or more than 16 months old
5. Be machine-cut to a uniform soil thickness of $5/8 \pm 1/4$ inch, not including top growth and thatch

Protect sod with tarps or other protective covers during delivery. Do not allow sod to dry out during delivery or before placement.

20-3.01B(3) Soil Amendment

Soil amendment must comply with the requirements in the Food & Agri Code. Soil amendment must be one or a combination of the following:

1. Sphagnum peat moss
2. Nitrolized fir bark
3. Vermiculite
4. Perlite

20-3.01B(4) Fertilizers

20-3.01B(4)(a) General

Deliver fertilizer in labeled containers showing weight, chemical analysis, and manufacturer's name.

Fertilizer must comply with the requirements of the Food & Agri Code.

20-3.01B(4)(b) Slow-release Fertilizers

Slow-release fertilizer must be a pelleted or granular form with a nutrient release over an 8 to 12 month period and must comply with the chemical analysis ranges shown in the following table:

Ingredient	Content (percent)
Nitrogen (N)	16–21
Phosphoric acid (P)	6–8
Water soluble potash (K)	4–10

20-3.01B(4)(c) Packet Fertilizers

Packet fertilizer must be a biodegradable packet with a nutrient release over a 12 month period. Each packet must have a weight of 10 ± 1 grams and must comply with the chemical analysis shown in the following table:

Ingredient	Content (percent)
Nitrogen(N)	20
Phosphoric acid (P)	10
Water soluble potash (K)	5

20-3.01B(4)(d) Organic Fertilizers

Organic fertilizer must be pelleted or granular with a cumulative nitrogen release rate of no more than 70 percent for the first 70 days after incubation at 86 degrees F with 100 percent at 350 days or more.

Organic fertilizer must comply with the chemical analysis shown in the following table:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Ingredient	Content (percent)
Nitrogen (N)	5–7
Phosphoric acid (P)	1–5
Water soluble potash (K)	1–10

20-3.01B(5) Root Stimulants

Root stimulant must be a commercial quality product.

20-3.01B(6) Plaster Sand

Backfill material for the transplant palm tree planting holes must be 100 percent commercial quality washed plaster sand.

20-3.01B(7) Root Barrier

Root barrier must be an injection molded or extruded modular panel made of high-density polypropylene or polyethylene plastic.

Each panel must:

1. Be at least 1/16-inch thick
2. Have at least 4 molded root-deflecting vertical ribs 0.5- to 0.8-inch wide, 6 to 8 inches apart
3. Have a locking strip or an integral male-female sliding lock designed to resist slippage between panels
4. Be at least 2 feet wide and 2 feet in depth

20-3.01B(8) Root Protectors

Each root protector must be:

1. Fabricated from 1-inch, hexagonal pattern, 20-gauge mesh wire
2. Closed bottom design with a height and diameter that provides a minimum of 6 inches of clearance between the root ball and the sides and bottom of the wire cylinder

Wire edges at the top of the cylinder must be the uncut manufactured finished edge free of sharp points.

20-3.01B(9) Foliage Protectors

Each foliage protector must be:

1. Fabricated from 1-inch, hexagonal pattern, 20-gauge mesh wire
2. Approximately 4 feet high and 2 feet in diameter

Wire edges at the top of the cylinder must be the uncut manufactured finished edge free of sharp points. Other wire edges that are cut must be free of sharp points.

Support stakes must be one of the following:

1. 3/4-inch reinforcing steel bar a minimum of 5 feet long with an orange or red plastic safety cap that fits snugly onto the top of the reinforcing steel bar
2. 2 inch nominal diameter or 2 by 2 inch nominal size wood stakes a minimum of 5 feet long. Wood stakes must be straight

The jute mesh cover must comply with section 21-1.02O(2). Twine required to hold the jute mesh cover in place must be 1/8-inch diameter manila hemp twine.

20-3.01B(10) Wood Plant Stakes

Each plant stake must be nominal 2 by 2 inch or nominal 2-inch diameter and of sufficient length to keep the plant in an upright position.

Plant stakes for vines must be nominal 1 by 1 inch, 18 inches long.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

20-3.01B(11) Plant Ties

Plant ties must be extruded vinyl-based tape, 1 inch wide and at least 10 mils thick.

20-3.01C Construction

20-3.01C(1) General

Apply a root stimulant under the manufacturer's instructions to the plants specified in the special provisions.

Before transporting the plants to the planting area, thoroughly wet the root ball.

20-3.01C(2) Pruning

Prune plants under the latest edition of ANSI A300 part 1, *Pruning*, published by the Tree Care Industry Association.

Do not use tree seal compounds to cover pruning cuts.

20-3.01C(3) Watering

Water existing plants to be maintained, transplanted trees, and new plants as needed to keep the plants in a healthy growing condition.

20-3.01C(4) Replacement Plants

Plants that show signs of failure to grow at any time or are so injured or damaged as to render them unsuitable for the purpose intended, must be removed, replaced, and replanted. Replace unsuitable plants within 2 weeks after the Engineer marks or indicates that the plants must be replaced.

Replacement planting must comply with the original planting requirements, spacing, and size provisions described for the plants being replaced.

Replacement planting for transplanted trees must comply with the work plan and be planted in the same planting hole.

Replacement ground cover plants must be the same species specified for the ground cover being replaced. Other replacement plants must be the same species as the plants being replaced.

Place orders for replacement plants with the vendor at the appropriate time so that the replacement plants are not in a root-bound condition.

The Department does not pay for replacement plants or the planting of replacement plants.

20-3.01C(5) Maintain Plants

Maintain plants from the time of planting until Contract acceptance if no plant establishment period is specified or until the start of the plant establishment period.

20-3.01D Payment

Reserved

20-3.02 EXISTING PLANTING

20-3.02A General

20-3.02A(1) Summary

Section 20-3.02 includes specifications for pruning existing plants, transplanting trees, and maintaining existing planted areas.

Transplant palm trees between March 15 and October 15.

20-3.02A(2) Definitions

Reserved

20-3.02A(3) Submittals

Submit a work plan for:

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

1. Transplanting trees. The work plan must include methods for lifting, transporting, storing, planting, guying, and maintaining each tree to be transplanted. Include root ball size, method of root ball containment, and a maintenance program for each tree.
2. Maintaining existing planted areas. The work plan must include weed control, fertilization, mowing and trimming of turf areas, watering, and controlling rodents and pests.

Submit a copy of the manufacturer's product sheet for root stimulant including application instructions.

20-3.02A(4) Quality Control and Assurance

Inspect for deficiencies of existing planted areas in the presence of the Engineer. Complete the inspection within 15 days after the start of job site activities.

Deficiencies requiring corrective action include:

1. Weeds
2. Dead, diseased, or unhealthy plants
3. Missing plant stakes and tree ties
4. Inadequate plant basins and basin mulch
5. Other deficiencies needing corrective action to promote healthy plant life
6. Rodents and pests

20-3.02B Materials

Not Used

20-3.02C Construction

20-3.02C(1) General

Correct deficiencies of existing planted areas as ordered within 15 days of the order. Correction of deficiencies is change order work.

After deficiencies are corrected, perform work to maintain existing planted areas in a neat and presentable condition and to promote healthy plant growth through Contract acceptance.

20-3.02C(2) Prune Existing Plants

Prune existing plants as shown.

If no bid item for prune existing plants is included, prune existing plants as ordered. Pruning existing plants is change order work.

20-3.02C(3) Transplant Trees

Prune each tree to be transplanted immediately before lifting.

If the tree to be transplanted is a palm, prune by removing dead fronds and frond stubs from the trunk. Remove green fronds up to 2 rows of fronds away from the center of growth. Tie the remaining 2 rows of fronds in an upright position with light hemp or manila rope. Remove fronds and frond stubs at the trunk in a manner that will not injure the trunk. Remove fronds and frond stubs for *Phoenix dactylifera* (Date Palm) approximately 4 inches from the trunk.

Prepare each hole in the new location before lifting the tree to be transplanted.

Lift tree to be transplanted as described in the work plan.

Comply with section 20-3.03C(3) for handling and planting each tree to be transplanted.

Until replanted, cover exposed root ball with wet burlap or canvas and cover the crown with 90 percent shade cloth.

Replant each tree on the same day it is lifted if possible. If the transplant location is not ready to receive the tree, store and maintain the tree to be transplanted until the transplant location is authorized. Store tree in an upright position.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

Replace damaged transplanted tree under 20-3.01C(4) and with the number of trees specified in the special provisions.

The replacement trees must be planted in individual plant holes at the location determined by the Engineer within the area of the tree being replaced. Comply with section 20-3.03C(2) for the planting of the replacement trees.

20-3.02C(4) Maintain Existing Planted Areas

If a bid item for maintain existing planted areas is included, the existing plant basins must be kept well-formed and free of sediment. If the existing plant basins need repairs, and the basins contain mulch, replace the mulch after the repairs are done.

Control weeds within the existing planted area and:

1. From the existing planted area limit to the adjacent edges of paving and fences if less than or equal to 12 feet
2. From the existing planted area limit to 6 feet beyond the outer limit of the existing planted area if the adjacent edge of paving or fence is more than 12 feet away
3. Within a 3-foot radius from each existing tree and shrub

If no bid item for maintain existing planted areas is included, maintain existing planted areas as ordered. Maintain existing planted areas is change order work.

20-3.02D Payment

Not Used

20-3.03 PLANTING WORK

20-3.03A General

Section 20-3.03 includes specifications for planting plants.

20-3.03B Materials

Not Used

20-3.03C Construction

20-3.03C(1) General

Do not begin planting until authorized.

If an irrigation system is required, do not begin planting in an area until the functional test has been completed and authorized for the irrigation system serving that area.

20-3.03C(2) Preparing Planting Areas

The location of each plant is as shown unless the Engineer designates otherwise. If the Engineer designates the location, it will be marked by a stake, flag, or other marker.

Conduct work so the existing flow line in drainage ditches is maintained. Material displaced by your operations that interferes with drainage must be removed.

Where a minimum distance to a drainage ditch is shown, locate the plant so that the outer edge of its basin wall is at least the minimum distance shown for each plant involved.

Excavate each planting hole by hand digging or by drilling. The bottom of each planting hole must be flat. Do not use water for excavating the hole.

Unless a larger planting hole is specified, the planting hole must be large enough to receive the root ball or the total length and width of roots, backfill, amendments, and fertilizer. Where rock or other hard material prohibits the hole from being excavated, a new hole must be excavated and the abandoned hole backfilled.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

20-3.03C(3) Planting Plants

20-3.03C(3)(a) General

Do not plant plants in soil that is too wet, too dry, not properly conditioned as specified, or in an unsatisfactory condition for planting.

Do not distribute more plants than can be planted and watered on that day.

Water plants immediately after planting. Apply water until the backfill soil around and below the roots or ball of earth around the roots of each plant is thoroughly saturated. When watering with a hose, use a nozzle, water disbursement device, or pressure reducing device. Do not allow the full force of the water from the open end of the hose to fall within the basin around any plant. Groundcover plants in areas with an irrigation system must be watered by sprinklers. Several consecutive watering cycles may be necessary to thoroughly saturate the soil.

If shown, install root barriers between trees and concrete sidewalk or curb. Install panels flush with finished grade and join with locking strips or integral male-female sliding locks. Install barriers with root deflectors facing inward.

If a tree grate is shown, install root barrier panels 0.5 inch above finish grade or as shown.

Adjust planting locations so that each tree or shrub is at least 8 feet away from any sprinkler.

Where a tree, shrub, or vine is to be planted within a groundcover area or cutting planting area, plant it before planting groundcover or cuttings.

Where shrubs and groundcovers are shown to be planted in groups, the outer rows directly adjacent to the nearest roadway or highway fence must be parallel to the nearest roadway or highway fence. Stagger shrubs and groundcovers in adjacent rows. Adjust the alignment of the plants within the outer rows.

Core holes in concrete masonry block wall as shown.

Where a vine is to be planted against a wall or fence, plant it as close as possible to the wall or fence. If a vine planted next to a wall is to be staked, stake and tie the vine at the time of planting. A vine planted next to a fence must be tied to the fence at the time of planting.

Protect tree trunks from injury. Do not:

1. Drag tree
2. Use chains to move a tree
3. Lay tree on the ground

20-3.03C(3)(b) Trees, Shrubs, and Vines

After preparing holes, thoroughly mix soil amendment and granular fertilizer at the rate shown with native soil to be used as backfill material. Remove containers from plants in such a manner that the ball of earth surrounding the roots is not broken. Do not cut plant containers before delivery of the plants to the planting area. Plant and water plants immediately after removal from their containers.

Place packet fertilizer in the backfill within 6 to 8 inches of the ground surface and approximately 1 inch from the root ball. If more than 1 packet is required per plant, distribute the packets evenly around the root ball.

If a root stimulant is to be used, apply it according to the manufacturer's instructions.

If required, install root protectors in the plant holes as shown.

Ensure roots are not restricted or distorted.

Distribute backfill uniformly throughout the entire depth of the plant hole without clods or lumps. After the planting holes have been backfilled, jet water into the backfill with a pipe or tube inserted into the bottom of the hole until the backfill material is saturated for the full depth. If the backfill material settles below this level, add additional backfill to the required level. If a plant settles deeper than shown, replant it at the required level.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

Remove nursery stakes after planting.

Install 2 plant stakes for each plant to be staked at the time of planting as shown. Ensure the rootball is not damaged.

Tie the plant to the stakes with 2 plant ties, 1 tie to each stake. Each tie must form a figure 8 by crossing the tie between the plant and the stake as shown. Install ties at the lowest position that will support the plant in an upright position. Ties must provide trunk flexibility but not allow the trunk to rub against the stakes. Wrap each end of the tie 1-1/2 turns around the stake and securely tie.

Construct a watering basin around each plant as shown.

If required, install a foliage protector:

1. Over the plant within 2 days after planting.
2. Vertically and centered over the plant as shown

If foliage protectors are required:

1. Cut the bottom of the wire cylinder to match the slope of the ground. Do not leave sharp points of wire after cutting. Sharp points must be bent over or blunted.
2. Install 2 support stakes for foliage protectors vertically and embed in the soil on opposite sides of the plant as shown and in a transverse direction to the prevailing wind.
3. Either weave the support stakes through the wire cylinder mesh at 6 inch maximum centers or fasten the wire cylinder to the support stakes at 6 inch maximum centers.
4. Wire cylinder must be snug against the support stakes but loose enough to be raised for pesticide application or to perform weeding within the plant basin.
5. Install jute mesh cover over the foliage protector and secure with twine as shown.

20-3.03C(3)(c) Groundcover Plants

Each groundcover planting area irrigated by a single control valve must be completely planted and watered before planting other groundcover planting areas.

Plant groundcover plants in moist soil, and in neat, straight rows, spaced as shown.

Apply fertilizer to groundcover plants and water into the soil immediately after planting.

20-3.03C(3)(d) Cuttings, Liners, Plugs, and Seedling Plants

20-3.03C(3)(d)(i) General

Apply fertilizer to cuttings, liners, plugs, and seedling plants and water immediately after planting.

Ensure the soil is moist to a minimum depth of 8 inches before planting cuttings.

If a root stimulant is to be used, apply it according to the manufacturer's instructions.

20-3.03C(3)(d)(ii) Willow Cuttings

Unless otherwise shown, for willow cuttings excavate planting holes perpendicular to the ground line by using a steel bar, auger, post hole digger, or similar tools. Holes must be large enough to receive the cuttings and fertilizer packet. Plant willow cuttings to the specified depths without damaging the bark.

Where rock or other hard material prohibits the excavation of the planting holes, excavate new holes and backfill the unused holes.

Plant willow cuttings during the period specified in the special provisions.

Apply root stimulant according to the manufacturer's instructions.

Plant the base of the cutting 10 to 12 inches deep with 3 to 5 bud scars exposed above the ground. If more than 5 bud scars are exposed, trim off the excess willow cutting length.

Place 1 fertilizer packet in the backfill of each cutting, 6 to 8 inches below the ground surface and approximately 1 inch from the cutting.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

Backfill the plant holes with excavated material after planting. Distribute the excavated material evenly within the hole without clods, lumps, or air pockets. Compact the backfill so that the cutting cannot be easily removed from the soil. Do not damage the cutting's bark.

Dispose of trimmings and unused cuttings.

20-3.03C(3)(d)(iii) Cottonwood Cuttings

Reserved

20-3.03C(3)(d)(iv) *Carpobrotus* and *Delosperma* Cuttings

Plant *Carpobrotus* cuttings to a depth so that not less than 2 nodes are covered with soil. The basal end of *Delosperma* cuttings must not be less than 2 inches below the surface of the soil and the basal end of *Carpobrotus* cuttings must not be less than 4 inches below the surface of the soil.

Apply root stimulant to *Delosperma* cuttings before planting.

Do not plant *Carpobrotus* or *Delosperma* cuttings in soil that does not contain sufficient moisture at an average depth of 2 inches below the surface.

20-3.03C(3)(d)(v) Liner Plants

Plant liner plants during the period specified in the special provisions.

If a foliage protector is required, install under section 20-3.03C(3)(b).

20-3.03C(3)(d)(vi) Plug Plants

Plant plug plants during the period specified in the special provisions.

20-3.03C(3)(d)(vii) Seedling Plants

Plant seedling plants during the period specified in the special provisions.

20-3.03C(3)(e) Sod

After all other planting is performed, grade sod areas to drain and to a smooth and uniform surface. Fine grade and roll sod areas before placing sod.

Areas adjacent to sidewalks, edging, and other paved borders and surfaced areas must be 1 inch below the finished surface elevation of the facilities, after fine grading, rolling, and settlement of the soil.

Place sod such that the end of each adjacent strip is staggered a minimum of 2 feet. Place the edge and end of sod firmly against adjacent sod and against sidewalks, edging, and other paved borders and surfaced areas.

Lightly roll the entire sodded area to eliminate air pockets and ensure close contact with the soil after placement of sod. Water the sodded areas so that the soil is moist to a minimum depth of 4 inches after rolling. Do not allow the sod to dry out.

If irregular or uneven areas appear in the sodded areas, restore to a smooth and even appearance.

Trim sod to a uniform edge at sidewalks, edging, and other paved borders and surfaced areas. Trimming must be repeated whenever the edge of sod extends 1 inch beyond the edge of the edging, sidewalks, and other paved borders and surfaced areas. Remove and dispose of trimmed sod.

Mow sod when it has reached a height of 4 inches. Mow sod to a height of 2.5 inches.

20-3.03D Payment

Soil amendment is measured in the vehicle at the point of delivery.

Measurement for slow-release fertilizer, organic fertilizer, or iron sulfate is determined from marked weight or sack count.

Various sizes and types of plants are measured by either the product of the average plant density and the total area planted or by actual count of the living plants in place, determined by the Engineer. The average plant density is the number of living plants per sq yd determined from actual count of test areas

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

chosen representing the total planted area. The size and location of the test areas is determined by you and the Engineer, except that the total area tested must be equal to not less than 3 percent nor more than 5 percent of the planted area being determined. The Engineer makes the final determination of the areas to be tested.

20-3.04–20-3.08 RESERVED

20-4 PLANT ESTABLISHMENT WORK

20-4.01 GENERAL

20-4.01A Summary

Section 20-4 includes specifications for performing plant establishment work.

Plant establishment consists of caring for the plants, including watering, fertilizing, pruning, replacing damaged plants, pest control, and operating and repairing of all existing irrigation facilities used and irrigation facilities installed as part of the new irrigation system.

Working days on which no work is required, as determined by the Engineer, will be credited as a plant establishment working day, regardless of whether or not you perform plant establishment work.

Working days whenever you fail to adequately perform plant establishment work will not be credited toward the plant establishment working days.

20-4.01B Definitions

Type 1 plant establishment: Plant establishment period with the number of working days specified for plant establishment beginning after all work has been completed except for plant establishment work and other bid items specified to be performed until Contract acceptance.

Type 2 plant establishment: Plant establishment period with the number of working days specified for plant establishment beginning after all planting work has been completed except for plant establishment work and other bid items specified to be performed until Contract acceptance, provided that the Contract must not be accepted unless the plant establishment work has been satisfactorily performed for at least the number of working days specified for plant establishment.

If maintenance and protection relief is granted for a completed portion of the work under section 5-1.38, Type 2 plant establishment period for the completed portion of the work is the time between completion of all planting work except for plant establishment work, and the granting of maintenance and protection relief, provided that the relief must not be granted unless the plant establishment work in the completed portion of the work has been satisfactorily performed for at least the number of working days specified for the plant establishment period.

20-4.01C Submittals

20-4.01C(1) General

Submit seasonal watering schedules for use during the plant establishment period within 10 days after the start of the plant establishment period. Remote irrigation control system watering schedule must utilize the remote irrigation control system software program.

Submit updated watering schedules within 5 business days after any changes have been made to the authorized schedules.

Submit a revised watering schedule for each irrigation controller not less than 30 days before completion of the plant establishment period.

20-4.01C(2) Notification

The Engineer will notify you in writing when the plant establishment period begins and will furnish statements regarding the number of working days credited to the plant establishment period after the notification.

Notify the Engineer at least 5 business days before applying each application of fertilizer.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

20-4.01D Quality Control and Assurance

Provide training by a qualified person on the use and adjustment of the irrigation controllers installed, 30 days before completion of the plant establishment period.

Perform a final inspection of the plant establishment work in the presence of the Engineer between 20 and 30 days before Contract acceptance.

20-4.02 MATERIALS

20-4.02A General

Reserved

20-4.02B Fertilizers

Fertilizer must comply with section 20-3.01B(5).

20-4.03 CONSTRUCTION

20-4.03A General

Remove trash and debris.

Surplus earth accumulated in roadside clearing and planting areas must be removed.

Trim and mow turf areas as specified for sod in section 20-3.03C(3)(e). Dispose of trimmed and mowed material.

If irregular or uneven areas appear within turf areas, restore to a smooth and even appearance. Reseed turf seed areas.

Remove the tops of foliage protectors if plants become restricted.

Remove foliage protectors, including support stakes, within 30 days before the completion of the plant establishment period.

Keep plant basin walls well formed.

Clean new wye strainers and existing wye strainers that are a part of the new irrigation system annually until the completion of the plant establishment period. The last cleaning must be done within 15 days before the completion of the plant establishment period.

Remove, clean, and reinstall new filters and existing filters that are a part of the new irrigation system annually until the completion of the plant establishment period. The last cleaning must be done within 15 days before the completion of the plant establishment period.

20-4.03B Plant Growth Control

Prune plants planted as part of the Contract as authorized.

Remove plant growth that extends within 2 feet of sidewalks, curbs, dikes, shoulders, walls or fences.

Remove proposed and existing ground cover from within the plant basins, including basin walls, turf areas, and planting areas within edging.

Vines next to walls and fences must be kept staked and tied. Train vines on fences and walls or through cored holes in walls.

20-4.03C Fertilizers

Apply fertilizer to the plants as specified and water into the soil after each application.

Apply fertilizer at the rates shown and spread with a mechanical spreader, whenever possible.

20-4.03D Weed Control

Control weeds under section 20-1.03C(3).

20-4.03E Plant Staking

Replace the plant stakes that are inadequate to support plants with larger stakes.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

Remove plant stakes when the Engineer determines they are no longer needed.

20-4.03F Replacement Plants

Replacement plants must comply with section 20-3.01C(4).

Replacement of plants up to and including the 125th plant establishment working day must be with a plant of the same size as originally specified. Plants of a larger container size than those originally specified for replacement plants may be used during the first 125 working days of the plant establishment period.

Replacement of plants after the 125th plant establishment working day must comply with the following size requirements:

Plant size (Original)	Plant size (Replacement)
Pot/liner/plug/ seedling	No. 1 container
No. 1 container	No. 5 container
No. 5 container	No. 15 container

Other replacement plants must be the same size as originally specified.

Replacement ground cover plants must comply with the following spacing requirements:

Original spacing (inches)	On center spacing of replacement ground cover plants (inches)		
	Number of completed plant establishment working days		
	1–125	126–190	191–End of plant establishment period
9	9	6	6
12	12	9	6
18	18	12	9
24	24	18	12
36	36	24	18

20-4.03G Watering

Operate the electric automatic irrigation systems in the automatic mode unless authorized.

If any component of the electric automatic irrigation system is operated manually, the day will not be credited as a plant establishment working day unless the manual operation is authorized.

Water plants utilizing the remote irrigation control system software program unless authorized.

Implement the watering schedule at least 10 days before completion of the plant establishment period.

20-4.04 PAYMENT

Not Used

20-5 LANDSCAPE ELEMENTS

20-5.01 GENERAL

20-5.01A General

Section 20-5 includes specifications for constructing and installing landscape elements.

20-5.01B Materials

Not Used

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

20-5.01C Construction

Earthwork must comply with section 19.

20-5.01D Payment

Not Used

20-5.02 EDGING

20-5.02A General

Section 20-5.02 includes specifications for constructing landscape edging.

20-5.02B Materials

20-5.02B(1) General

Reserved

20-5.02B(2) Header Board Edging

Lumber for header board edging must be one of the following types:

1. Construction grade cedar
2. Pressure-treated Douglas fir
3. Construction heart grade redwood complying with section 57-2.01B(2)

Lumber must be:

1. Rough cut from sound timber.
2. Straight. Sweep must not exceed 1 inch in 6 feet.
3. Free from loose or unsound knots. Knots must be sound, tight, well spaced, and not to exceed 2 inches in size on any face.
4. Free of shakes in excess of 1/3 the thickness of the lumber.
5. Free of splits longer than the thickness of the lumber.
6. Free of other defects that would render the lumber unfit structurally for the purpose intended.

Edging anchors for header board edging must be stakes of the size and shape shown.

20-5.02B(3) Metal Edging

Metal edging must be commercial quality, made of aluminum or steel, and have an L-shaped design. Edging must be a minimum of 4 inches in height. The thickness must be as recommended by the manufacturer for the use intended.

Edging anchors must be from the same manufacturer as the metal edging.

20-5.02B(4) High Density Polyethylene Edging

HDPE edging must be commercial quality and a minimum of 4 inches in height. The thickness must be as recommended by the manufacturer for commercial installation for the use intended.

Edging anchors must be from the same manufacturer as HDPE edging.

20-5.02B(5) Concrete Edging

Concrete for edging must be minor concrete.

20-5.02B(6)–20-5.02B(10) Reserved

20-5.02C Construction

20-5.02C(1) General

Where edging is used to delineate the limits of inert ground cover or mulch areas, install edging before installing inert ground cover or mulch areas.

Saw cut surfaces where (1) asphalt concrete or concrete surfacing must be removed to permit the installation of edging and (2) no joint exists between the surfacing to be removed and the surfacing to remain in place. The surfacing must be cut in a straight line to a minimum depth of 2 inches with a power-

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

driven saw before the surfacing is removed. Spike or stake spacing must comply with the manufacturer's instructions for use and site conditions.

20-5.02C(2) Header Board Edging

Each stake must be driven flush with the top edge of the header board edging and the stake top must be beveled away from the header board at a 45 degree angle. Attach stake to header board with a minimum of two 12-penny hot dipped galvanized nails per stake.

20-5.02C(3) Metal and High Density Polyethylene Edging

Spike or stake spacing must comply with the manufacturer's instructions for use and site conditions.

20-5.02C(4) Concrete Edging

Construct and finish minor concrete edging under section 73-2.

20-5.02C(5)–20-5.02C(9) Reserved

20-5.02D Payment

Edging is measured parallel to the ground surface.

20-5.03 INERT GROUND COVERS AND MULCHES

20-5.03A General

20-5.03A(1) General

20-5.03A(1)(a) Summary

Section 20-5.03 includes specifications for installing inert ground covers and mulches.

20-5.03A(1)(b) Definitions

Reserved

20-5.03A(1)(c) Submittals

Submit:

1. Filter fabric product data including the manufacturer's product sheet and installation instructions
2. Certificate of compliance for filter fabric at least 5 business days before delivery of the material to the job site

20-5.03A(1)(d) Quality Control and Assurance

Reserved

20-5.03A(2) Materials

Soil sterilant must be oxadiazon granular preemergent and must comply with section 20-1.02C.

Filter fabric must be Class A. Staples for filter fabric must comply with section 21-1.02R.

20-5.03A(3) Construction

20-5.03A(3)(a) General

Before performing inert ground cover and mulch work, remove plants and weeds to ground level.

20-5.03A(3)(b) Earthwork

Excavate areas to receive inert ground cover or mulch to the depth shown. Maintain the planned flow lines, slope gradients, and contours of the job site. Grade subgrade to a smooth and uniform surface and compact to not less than 90 percent relative compaction.

20-5.03A(3)(c) Treatment of Soil

After compaction, apply soil sterilant at the maximum label rate. Do not apply soil sterilant more than 12 inches beyond the inert ground cover or mulch limits. The soil sterilant application and inert ground cover or mulch placement must be completed within the same work day.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

20-5.03A(3)(d) Filter Fabric

Immediately before placing filter fabric, surfaces to receive filter fabric must be free of loose or extraneous material and sharp objects that may damage the filter fabric during installation.

Align fabric and place in a wrinkle-free manner.

Overlap adjacent rolls of the fabric from 12 to 18 inches. Spread each overlapping roll in the same direction. Fasten fabric with staples flush with the adjacent fabric to prevent movement of fabric by placement of inert ground cover or mulch.

Repair or replace fabric damaged during placement of inert ground cover or mulch with sufficient fabric to comply with overlap requirements.

20-5.03A(4) Payment

Not Used

20-5.03B Rock Blanket

20-5.03B(1) General

20-5.03B(1)(a) Summary

Section 20-5.03B includes specifications for placing rock blanket.

20-5.03B(1)(b) Definitions

Reserved

20-5.03B(1)(c) Submittals

Submit a 1 sq yd sample of the various rock sizes.

20-5.03B(1)(d) Quality Control and Assurance

Reserved

20-5.03B(2) Materials

20-5.03B(2)(a) General

Do not use filter fabric.

20-5.03B(2)(b) Concrete

Concrete must be minor concrete.

20-5.03B(2)(c) Rock

Rock must be clean, smooth, and obtained from a single source and must comply with the following grading requirements:

Grading Requirements

Screen size (inches)	Percentage passing
8	100
6	50-85
4	0-50

20-5.03B(2)(d) Mortar

Mortar must comply with section 51-1.02F.

20-5.03B(3) Construction

Place concrete as shown.

Rock must be placed while concrete is still plastic. Remove concrete adhering to the exposed surfaces of the rock.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CTA Contract No. XXX

Loose rocks or rocks with a gap greater than 3/8 inch must be reset by an authorized method. The rock gap is measured from the edge of the rock to the surrounding concrete bedding.

Place mortar as shown.

20-5.03B(4) Payment

Rock blanket is measured parallel to the rock blanket surface.

20-5.03C Gravel Mulch

20-5.03C(1) General

20-5.03C(1)(a) Summary

Section 20-5.03C includes specifications for placing gravel mulch.

20-5.03C(1)(b) Definitions

Reserved

20-5.03C(1)(c) Submittals

Submit a 5-lb sample of the gravel mulch.

20-5.03C(1)(d) Quality Control and Assurance

Reserved

20-5.03C(2) Materials

Gravel mulch must be:

1. Uniform gray color
2. From a single source only
3. Crushed rock that complies with the following grading requirements:

Grading Requirements

Sieve size	Percent passing
1-1/4 inch	100
3/4 inch	60-80
1/2 inch	45-65
No. 40	5-20

20-5.03C(3) Construction

Place gravel and compact by rolling.

The finished gravel mulch surface must be smooth and uniform, maintaining original flow lines, slope gradients, and contours of the job site.

20-5.03C(4) Payment

Gravel mulch is measured parallel to the gravel mulch surface.

20-5.03D Decomposed Granite

20-5.03D(1) General

20-5.03D(1)(a) Summary

Section 20-5.03D includes specifications for placing decomposed granite.

20-5.03D(1)(b) Definitions

Reserved

20-5.03D(1)(c) Submittals

Five business days before delivery of the materials to the job site, submit:

1. Solidifying emulsion product data including the manufacturers' product sheets and installation instructions

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

2. Certificate of compliance for solidifying emulsion
3. 5-lb sample of the decomposed granite

20-5.03D(1)(d) Quality Control and Assurance

Test plot must be:

1. Constructed at an authorized location
2. At least 3 by 12 feet
3. Constructed using the materials, equipment, and methods to be used in the work
4. Authorized before starting work

Notify the Engineer not less than 7 days before constructing the test plot.

The Engineer uses the authorized test plot to determine acceptability of the work.

If ordered, prepare additional test plots. Additional test plots are change order work.

If the test plot is not incorporated into the work, the Engineer may order you to remove it.

20-5.03D(2) Materials

20-5.03D(2)(a) General

Decomposed granite must be:

1. Uniform gray or tan color
2. From one source only
3. Crushed granite rock that complies with grading requirements shown in the following table:

Grading Requirements

Sieve size	Percent passing
3/8 inch	100
No. 4	95–100
No. 8	75–80
No. 16	55–65
No. 30	40–50
No. 50	25–35
No. 100	20–25
No. 200	5–15

Note:

Grading based upon AASHTO T11-82 and T27-82

20-5.03D(2)(b) Solidifying Emulsion

Solidifying emulsion must be either a water-based polymer or nontoxic organic powdered binder specifically manufactured to harden decomposed granite. The solidifying emulsion must not alter the decomposed granite color.

20-5.03D(3) Construction

Do not place decomposed granite during rainy conditions.

Mix solidifying emulsion thoroughly and uniformly throughout the decomposed granite and under the manufacturer's instructions. Mix the material in the field using portable mixing equipment, or delivered in mixer trucks from a local ready-mixed plant.

Place decomposed granite uniformly in layers no more than 1-1/2 inch thick. Compact each layer of decomposed granite to a relative compaction of not less than 90 percent. Begin compaction within 6 to 48 hours of placement.

If the material was mixed in the field, apply an application of solidifying emulsion after compaction as recommended by the manufacturer. Prevent runoff or overspray of solidifying emulsion onto adjacent paved or planting areas.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

The finished decomposed granite surface must be smooth and uniform, compacted to a relative compaction of not less than 90 percent, maintaining original flow lines, slope gradients, and contours of the job site.

20-5.03D(4) Payment

Not Used

20-5.03E Wood Mulch

20-5.03E(1) General

20-5.03E(1)(a) Summary

Section 20-5.03E includes specifications for placing wood mulch.

20-5.03E(1)(b) Definitions

Reserved

20-5.03E(1)(c) Submittals

Submit a certificate of compliance for mulch.

Submit a 2 cu ft mulch sample with the mulch source listed on the bag and obtain approval before delivery of mulch to the job site.

20-5.03E(1)(d) Quality Control and Assurance

Reserved

20-5.03E(2) Materials

20-5.03E(2)(a) General

Mulch must not contain more than 0.1 percent of deleterious materials such as rocks, glass, plastics, metals, clods, weeds, weed seeds, coarse objects, sticks larger than the specified particle size, salts, paint, petroleum products, pesticides or other chemical residues harmful to plant or animal life.

Do not use filter fabric.

20-5.03E(2)(b) Tree Bark Mulch

Tree bark mulch must be derived from cedar, Douglas fir, or redwood species.

Tree bark mulch must be ground so that at least 95 percent of the material by volume is less than 2 inches and no more than 30 percent by volume is less than 1 inch.

20-5.03E(2)(c) Wood Chip Mulch

Wood chip mulch must:

1. Be derived from clean wood
2. Not contain leaves or small twigs
3. Contain at least 95 percent wood chips by volume with average thickness of 1/16 to 3/8 inch in any direction and 1/2 to 3 inches in length

20-5.03E(2)(d) Shredded Bark Mulch

Shredded bark mulch must:

1. Be derived from trees
2. Be a blend of loose, long, thin wood, or bark pieces
3. Contain at least 95 percent wood strands by volume with average thickness of 1/8 to 1-1/2 inches in any direction and 2 to 8 inches in length

20-5.03E(2)(e) Tree Trimming Mulch

Tree trimming mulch must:

1. Be derived from chipped trees and may contain leaves and small twigs.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CTA Contract No. XXX**

2. Contain at least 95 percent material by volume less than 3 inches and no more than 30 percent by volume less than 1 inch

20-5.03E(2)(f)–20-5.03E(2)(j) Reserved

20-5.03E(3) Construction

Spread mulch placed in areas outside of plant basins to a uniform thickness as shown.

Mulch must be placed at the rate described and placed in the plant basins or spread in areas as shown after the plants have been planted. Mulch placed in plant basins must not come in contact with the plant crown and stem.

Spread mulch from the outside edge of the proposed plant basin or plant without basin to the adjacent edges of shoulders, paving, retaining walls, dikes, edging, curbs, sidewalks, walls, fences, and existing plantings. If the proposed plant or plant without basin is 12 feet or more from the adjacent edges of shoulders, paving, retaining walls, dikes, edging, curbs, sidewalks, walls, fences, and existing plantings, spread the mulch 6 feet beyond the outside edge of the proposed plant basin or plant without basin.

Do not place mulch within 4 feet of:

1. Flow line of earthen drainage ditches
2. Edge of paved ditches
3. Drainage flow lines

20-5.03E(4) Payment

Mulch is measured in the vehicle at the point of delivery.

20-5.03F–20-5.03J Reserved

20-5.04 RESERVED

Reserved

20-5.05 SITE FURNISHINGS

20-5.05A General

Section 20-5.05 includes specifications for installing site furnishings.

20-5.05B–20-5.05Z Reserved

20-5.06–20-5.10 RESERVED

AA

21 EROSION CONTROL

07-19-13

Replace ", bonded fiber matrix, and polymer-stabilized fiber matrix" in the 1st paragraph of section 21-1.01B with:

and bonded fiber matrix

04-20-12

Delete the last paragraph of section 21-1.02E.

04-20-12

Replace section 21-1.02F(2) with:

21-1.02F(2) Reserved

04-20-12

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Replace "20-7.02D(1)" in the 1st paragraph of section 21-1.02H with:

20-3.01B(4)

07-19-13

Replace section 21-1.02J with:

04-20-12

21-1.02J Reserved

Replace the row for organic matter content in the table in the 4th paragraph of section 21-1.02M with:

01-18-13

Organic matter content	TMECC 05.07-A Loss-on-ignition organic matter method (LOI) % dry weight basis	30–100
------------------------	---	--------

Replace the paragraph in section 21-1.02P with:

10-19-12

Fiber roll must be a premanufactured roll filled with rice or wheat straw, wood excelsior, or coconut fiber. Fiber roll must be covered with biodegradable jute, sisal, or coir fiber netting secured tightly at each end and must be one of the following:

1. 8 to 10 inches in diameter and at least 1.1 lb/ft
2. 10 to 12 inches in diameter and at least 3 lb/ft

Fiber roll must have a minimum functional longevity of 1 year.

Add between the 1st and 2nd paragraphs of section 21-1.03A:

01-18-13

Remove and dispose of trash, debris, and weeds in areas to receive erosion control materials.

Remove and dispose of loose rocks larger than 2-1/2 inches in maximum dimension unless otherwise authorized.

Protect the traveled way, sidewalks, lined drainage channels, and existing vegetation from overspray of hydraulically-applied material.

Replace section 21-1.03B with:

01-18-13

21-1.03B Reserved

Replace "3 passes" in item 2 in the list in the 2nd paragraph of section 21-1.03G with:

04-19-13

2 passes

Replace section 21-1.03I with:

04-20-12

21-1.03I Reserved

10-19-12

01-18-13

11-15-13

07-19-13

07-19-13

11-15-13

07-19-13

Revised Standard Specifications

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

2. Mixing equipment and procedures used
3. Batch volume in cu yd, the minimum is 5 cu yd
4. Type and source of ingredients used
5. Age and strength from compression strength results

Field qualification test reports must be signed by the official in responsible charge of the laboratory performing the tests.

28-2.01D Quality Control and Assurance

28-2.01D(1) General

Stop LCB activities and immediately notify the Engineer whenever:

1. Any quality control or acceptance test result does not comply with the specifications
2. Visual inspection shows noncompliant LCB

If LCB activities are stopped, before resuming activities:

1. Inform the Engineer of the adjustments you will make
2. Remedy or replace the noncompliant LCB
3. Obtain authorization

Molds for compressive strength testing under ASTM C 31 or ASTM C 192 must be 6 by 12 inches.

Quality control and assurance for cementitious materials and admixtures must comply with section 90-1.01D(1)

28-2.01D(2) Aggregate Qualification Testing

Qualify the aggregate for each proposed aggregate source and gradation. Qualification tests include (1) sand equivalent and (2) average 7-day compressive strength under ASTM C 39 on 3 specimens manufactured under ASTM C 192. The cement content for this test must be 300 lb/cu yd, and the 7-day average compressive strength must be at least 610 psi. Cement must be Type II portland cement under section 90-1.02B(2).

LCB must have from 3 to 4 percent air content during aggregate qualification testing.

28-2.01D(3) Field Qualification Testing

Before placing LCB, you must perform field qualification testing and obtain authorization for each mix design. Retest and obtain authorization for changes to authorized mixed designs.

Proposed mix designs must be field qualified before you place the LCB represented by those mix designs. Use an American Concrete Institute (ACI) certified "Concrete Laboratory Technician, Grade I" to perform field qualification tests and calculations.

Notify the Engineer at least 5 days before field qualification. Perform field qualification within the job site or a location authorized by the Engineer.

Field qualification testing includes compressive strength, air content, and penetration or slump in compliance with the table titled "Quality Control Requirements."

Field qualification testing for compressive strength must comply with the following:

1. Manufacture 12 cylinders under ASTM C 31 from a single batch
2. Perform 3 tests; each test consists of determining the average compressive strength of 2 cylinders at 7 days under ASTM C 39
3. The average compressive strength for each test must be at least 530 psi

If you submitted a notice to produce LCB qualifying for a transverse contraction joint waiver, manufacture additional specimens and test LCB for compressive strength at 3 days. Prepare compressive strength cylinders under ASTM C 31 at the same time using the same material and procedures as the 7-day compressive strength cylinders except do not submit 6 additional test cylinders. The average 3-day compressive strength for each test must be not more than 500 psi.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

28-2.01D(4) Quality Control Testing

Provide a testing laboratory to perform quality control tests. Maintain sampling and testing equipment in proper working condition. Perform sampling under California Test 125.

Testing laboratories and testing equipment must comply with the Department's Independent Assurance Program.

Perform quality control sampling, testing, and inspection throughout LCB production and placement. LCB must comply with the requirements for the quality characteristics shown in the following table:

Quality Control Requirements			
Quality characteristic	Test method	Minimum sampling and testing frequency	Requirement
Sand equivalent (min)	ASTM D 2419	1 per 500 cubic yards but at least 1 per day of production	18
Aggregate gradation	ASTM C 136		Note a
Air content (max, percent) ^b	ASTM C 231		4
Penetration (inches)	ASTM C 360		0 to 1-1/2 nominal ^{c, d}
Slump (inches)	ASTM C 143		0–3 nominal ^{c, d}
Compressive strength (min, psi at 7 days)	ASTM C 39 ^e		530
Compressive strength (max, psi at 3 days) ^f	ASTM C 39 ^e		500

^a Comply with the table titled "Aggregate Grading" in section 28-2.02C.

^b If no single test in the first 5 air content tests exceeds 1-1/2 percent, no further air content tests are required.

^c Maximum penetration must not exceed 2 inches and maximum slump must not exceed 4 inches

^d Test for either penetration or slump

^e Prepare cylinders under ASTM C 31

^f Only applicable if you (1) submitted a notice stating intent to produce LCB qualifying for a transverse contraction joint waiver and (2) successfully field qualified the LCB for 3-day compressive strength. Make cylinders at the same time using the same material and procedures as QC testing for 7-day compressive strength.

28-2.01D(5) Acceptance Criteria

For acceptance, properties of LCB must comply with values shown in the following table:

Acceptance Criteria Testing		
Property	Test method	Value
Compressive strength (min, psi at 7 days)	ASTM C 39 ^a	530 ^b

^a Cylinders prepared under ASTM C 31

^b A compressive strength test represents up to (1) 1,000 cu yd or (2) 1 day's production if less than 1,000 cu yd.

28-2.02 MATERIALS

28-2.02A General

Water must comply with section 90-1.02D.

The air content in LCB must not exceed 4 percent. If the aggregate used for LCB is produced from processed reclaimed asphalt concrete or other material that may cause the air content to exceed 4 percent, reduce the air content with an admixture.

A water-reducing chemical admixture may be used. Water-reducing chemical admixture must comply with ASTM C 494, Type A or Type F.

Air-entraining admixtures must comply with section 90-1.02E.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

28-2.02B Cementitious Material

Portland cement must comply with section 90-1.02B. Portland cement content must not exceed 300 lb/cu yd.

SCM must comply with section 90-1.02B except the equations for SCM content under 90-1.02B(3) do not apply.

For aggregate qualification testing, use Type II portland cement under section 90-1.02B(2) without SCM.

28-2.02C Aggregate

Aggregate must be clean and free from decomposed material, organic material, and other deleterious substances. Aggregate samples must not be treated with lime, cement, or chemicals before testing for sand equivalent.

Use either 1-1/2 inch or 1 inch grading. Do not change your selected aggregate grading without authorization.

When tested under ASTM C 136, the percentage composition by weight of the aggregate must comply with the grading requirements for the sieve sizes shown in the following table:

Sieve sizes	Aggregate Grading			
	Percentage passing			
	1-1/2" maximum		1" maximum	
	Operating range	Contract compliance	Operating range	Contract compliance
2"	100	100	--	--
1-1/2"	90-100	87-100	100	100
1"	--	--	90-100	87-100
3/4"	50-85	45-90	50-100	45-100
3/8"	40-75	35-80	40-75	35-80
No. 4	25-60	20-65	35-60	30-65
No. 30	10-30	6-34	10-30	6-34
No. 200	0-12	0-15	0-12	0-15

Aggregate must comply with the quality requirements shown in the following table:

Aggregate Quality			
Property	Test Method	Operating range	Contract compliance
Sand equivalent (min)	ASTM D 2419	21	18
Compressive strength (min, psi at 7 days)	ASTM C 192 ASTM C 39	--	610 at 300 lb/cu yd cement content

Note: Cement must be Type II portland cement under section 90-1.02B(2).

If the aggregate grading or the sand equivalent test results, or both comply with contract compliance requirements but not operating range requirements, you may continue placing LCB for the remainder of the work day. Do not place additional LCB until you demonstrate the LCB to be placed complies with the operating range requirements.

28-2.03 CONSTRUCTION

28-2.03A General

Do not allow traffic or equipment on the LCB for at least 72 hours after the 1st application of the curing compound and completion of contraction joints. Limit traffic and equipment on the LCB to that is required for placing additional layers of LCB or paving.

28-2.03B Subgrade

Immediately before spreading LCB, the subgrade must:

1. Comply with the specified compaction and elevation tolerance for the material involved

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

2. Be free from loose or extraneous material
3. Be uniformly moist

Areas of subgrade lower than the grade established by the Engineer must be filled with LCB. The Department does not pay for filling low areas of subgrade.

28-2.03C Proportioning, Mixing, and Transporting

Proportion LCB under section 90-1.02F except aggregate does not have to be separated into sizes.

Mix and transport LCB under section 90-1.02G except the 5th and 7th paragraphs in section 90-1.02G(6) do not apply.

28-2.03D Placing

Place LCB under section 40-1.03H(1) except the 3rd paragraph does not apply.

Unless otherwise described, construct LCB in minimum widths of 12 feet separated by construction joints. For LCB constructed monolithically in widths greater than 26 feet, construct a longitudinal contraction joint offset no more than 3 feet from the centerline of the width being constructed.

Contraction joints must comply with section 40-1.03D(3).

Construct transverse contraction joints in intervals that result in LCB areas where the lengths and widths are within 20 percent of each other. Measure the widths from any longitudinal construction or longitudinal contraction joints.

The Engineer waives the requirement for transverse contraction joints if you:

1. Submitted a notice under 28-2.01C(1)
2. Successfully field qualified LCB for 3-day compressive strength testing
3. Submit QC test results for 3-day compressive strength under section 28-2.01D(4).

If concrete pavement will be placed on LCB, construct longitudinal construction and longitudinal contraction joints in the LCB. Provide at least 1 foot horizontal clearance from planned longitudinal construction and longitudinal contraction joints in the concrete pavement.

Do not mix or place LCB when the atmospheric temperature is below 35 degrees F. Do not place LCB on frozen ground.

28-2.03E Finishing

Place LCB under section 40-1.03H(4) or under section 40-1.03H(5) except where there are confined work areas and when authorized:

1. Spread and shape LCB using suitable powered finishing machines and supplement with hand work as necessary
2. Consolidate LCB using high-frequency internal vibrators within 15 minutes after LCB is deposited on the subgrade
3. Vibrate with care such that adequate consolidation occurs across the full paving width and do not use vibrators for extensive weight shifting of the LCB

For LCB to be paved with HMA, before curing operation texture the LCB finished surface by dragging a broom, burlap, or a spring steel tine device. If using a spring steel tine device, the device must produce a scored surface with scores parallel or transverse to the pavement centerline. Texture at a time and in a manner that produces the coarsest texture for the method used.

For LCB to be paved with HMA, the finished surface must not vary more than 0.05 foot from the grade established by the Engineer.

Do not texture LCB that will be covered with concrete pavement. Before applying curing compound, finish LCB to a smooth surface free from mortar ridges and other projections.

For LCB to be paved with concrete pavement, the finished surface must not be above the grade, or more than 0.05 foot below the grade established by the Engineer.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

The finished surface must be free from porous areas.

28-2.03F Curing

After finishing LCB, cure LCB with pigmented curing compound under section 90-1.03B(3) and 40-1.03K except for LCB to be paved with concrete pavement, comply with section 36-2. Apply curing compound to the area to be paved with concrete pavement:

1. In 2 separate applications
2. Before the atmospheric temperature falls below 40 degrees F
3. At a rate of 1 gal/150 sq ft for the first application
4. At a rate of 1 gal/200 sq ft for the second application. Within 4 days after the first application, clean the surface and apply the second application.

Immediately repair damage to the curing compound or LCB.

28-2.03G Surfaces Not Within Tolerance

Where LCB will be paved with concrete pavement, remove the base wherever the surface is higher than the grade established by the Engineer and replace it with LCB. Where LCB will not be paved with concrete pavement, remove the base wherever the surface is higher than 0.05 foot above the grade established by the Engineer and replace it with LCB. If authorized, grind the surface with either a diamond or carborundum blade to within tolerance. After grinding LCB to be paved with concrete pavement and after all free water has left the surface, clean foreign material and grinding residue from the surface. Apply curing compound to the ground area at a rate of approximately 1 gal/150 sq ft.

Where the surface of LCB is lower than 0.05 foot from the grade established by the Engineer, remove the base and replace it with LCB or, if authorized, fill low areas according to the pavement material as follows:

1. For HMA pavement, fill low areas with HMA that complies with the specifications for the lowest layer of pavement. Do not fill low areas concurrently with the paving operation.
2. For concrete pavement, fill low areas with pavement concrete concurrent with the paving operation.

28-2.04 PAYMENT

LCB is measured from the dimensions shown.

Replace section 28-3 with:

28-3 RAPID STRENGTH CONCRETE BASE

07-19-13

Reserved

Replace section 28-4 with:

28-4 LEAN CONCRETE BASE RAPID SETTING

07-19-13

Reserved

Replace section 28-5 with:

28-5 CONCRETE BASE

07-19-13

Reserved

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Add to section 28:

**28-6-28-14 RESERVED
28-15 REPLACE BASE**

07-19-13

Reserved

^

**DIVISION IV SUBBASES AND BASES
29 TREATED PERMEABLE BASES**

04-18-14

Replace "section 68-4.02C" in the 6th paragraph of section 29-1.03A with:

04-20-12

section 64-4.03

Replace the 1st paragraph of section 29-1.03B with:

04-18-14

Produce ATPB under section 39-1.02H, except a JMF is not required. Do not use RAP.

The temperature of the aggregate before adding the asphalt binder must be from 275 to 325 degrees F.

Do not store ATPB longer than 2 hours.

Combine aggregate with 2.5 percent asphalt binder by weight of dry aggregate. An increase or decrease in the asphalt content may be ordered after your proposed aggregate supply has been tested. If an ordered increase or decrease exceeds the specified amount of asphalt content by more than 0.1 percent by weight of dry aggregate, compensation for ATPB is determined by the total increase or decrease in asphalt.

The Engineer determines the asphalt content of the asphalt mixture under California Test 382. The bitumen ratio (pounds of asphalt per 100 lb of dry aggregate) must not vary more than 0.5 lb of asphalt above or below the amount designated by the Engineer. Samples used to determine the bitumen ratio are obtained from trucks at the plant or from the mat behind the paver before rolling. If the sample is taken from the mat behind the paver, the bitumen ratio must not be less than the amount designated by the Engineer, less 0.7 lb of asphalt per 100 lb of dry aggregate.

Replace the introductory clause of the 2nd paragraph of section 29-1.03B with:

04-18-14

Equipment for spreading and compacting ATPB must comply with section 39-1.03B. Compact ATPB in 1 layer using one of the following methods:

Replace "3rd" in the 4th paragraph of section 29-1.03C with:

07-19-13

4th

^

04-20-12

04-20-12

30-1.01 GENERAL

30-2 FULL DEPTH RECLAIMED—FOAMED ASPHALT

30-3-30-6 RESERVED

[illegible]

Replace section 36 with:

07-19-13

07-19-13

Section 36 includes general specifications for constructing surfacings and pavements.

Reserved

AA

03-21-14

01-18-13

37-1.01A Summary

Section 37-1 includes general specifications for applying bituminous seals.

37-1.01B Definitions

Reserved

37-1.01C Submittals

Reserved

37-1.01D Quality Control and Assurance

37-1.01D(1) General

Reserved

37-1.01D(2) Prepaving Conference

For seal coats and micro-surfacing, schedule a prepaving conference at a mutually agreed upon time and place to meet with the Engineer.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

Prepaving conference attendees must sign an attendance sheet provided by the Engineer. The prepaving conference must be attended by your:

1. Project superintendent
2. Paving construction foreman
3. Traffic control foreman

Be prepared to discuss:

1. Quality control
2. Acceptance testing
3. Placement
4. Training on placement methods
5. Checklist of items for proper placement
6. Unique issues specific to the project, including:
 - 6.1. Weather
 - 6.2. Alignment and geometrics
 - 6.3. Traffic control issues
 - 6.4. Haul distances
 - 6.5. Presence and absence of shaded areas
 - 6.6. Any other local issues

37-1.02 MATERIALS

Not Used

37-1.03 CONSTRUCTION

Not Used

37-1.04 PAYMENT

Not Used

Replace section 37-2 with:

07-19-13

37-2 SEAL COATS

37-2.01 GENERAL

37-2.01A General

37-2.01A(1) Summary

Section 37-2 includes specifications for applying seal coats.

37-2.01A(2) Definitions

Reserved

37-2.01A(3) Submittals

Reserved

37-2.01A(4) Quality Control and Assurance

The following personnel must attend the prepaving conference:

1. Aggregate suppliers
2. Chip spreader operators
3. Emulsion and binder distributor
4. Coated chips producer if coated chips are used

37-2.01B Materials

Screenings must be broken stone, crushed gravel, or both. At least 90 percent of screenings by weight must be crushed particles as determined under California Test 205.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

Screenings for seal coats must have the properties specified in the following table:

Seal Coat Screenings		
Properties	Test method	Specification
Los Angeles Rattler, %, max Loss at 100 revolutions. Loss at 500 revolutions.	California Test 211	10 40
Film stripping, %, max	California Test 302	25

37-2.01C Construction

37-2.01C(1) General

Wherever final sweeping or brooming of the seal coat surface is complete, place permanent traffic stripes and pavement markings within 10 days.

If you fail to place the permanent traffic stripes and pavement markings within the specified time, the Department withholds 50 percent of the estimated value of the seal coat work completed that has not received permanent traffic stripes and pavement markings.

37-2.01C(2) Equipment

Equipment for seal coats must include and comply with the following:

1. Screenings haul trucks. Haul trucks must have:
 - 1.1. Tailgates that discharge screenings
 - 1.2. Devices to lock onto the rear screenings spreader hitch
 - 1.3. Dump beds that will not push down on the spreader when fully raised
 - 1.4. Dump beds that will not spill screenings on the roadway when transferred to the spreader hopper
 - 1.5. Tarpaulins to cover precoated screenings when haul distance exceeds 30 minutes or ambient temperature is less than 65 degrees F
2. Self-propelled screenings spreader. The spreader must have:
 - 2.1. Screenings hopper in the rear
 - 2.2. Belt conveyors that carry the screenings to the front
 - 2.3. Spreading hopper capable of providing a uniform screening spread rate over the entire width of the traffic lane in 1 application.
3. Self-propelled power brooms. Do not use gutter brooms or steel-tined brooms. Brooms must be capable of removing loose screenings adjacent to barriers that prevent screenings from being swept off the roadway, including curbs, gutters, dikes, berms, and railings.
4. Pneumatic-tired rollers. Pneumatic-tired rollers must be an oscillating type at least 4 feet wide. Each roller must be self-propelled and reversible. Pneumatic tires must be of equal size, diameter, type, and ply. The roller must carry at least 3,000 lb of load on each wheel and each tire must have an air pressure of 100 ± 5 psi.

37-2.01C(3) Surface Preparation

Before applying seal coat, cover manholes, valve and monument covers, grates, or other exposed facilities located within the area of application, using a plastic or oil resistant construction paper secured by tape or adhesive to the facility being covered. Reference the covered facilities with a sufficient number of control points to relocate the facilities after the application of the seal coat.

After completion of the seal coat operation, remove covers from the facilities.

Immediately before applying seal coat, clean the surface to receive seal coat by removing extraneous material and drying. Cleaning the existing pavement includes the use of brooms.

37-2.01C(4) Applying Emulsion and Asphalt Binder

Prevent spray on existing pavement not intended for seal coat or on previously applied seal coat using a material such as building paper. Remove the material after use.

Align longitudinal joints between seal coat applications with designated traffic lanes.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

For emulsion, overlap longitudinal joints by not more than 4 inches. You may overlap longitudinal joints up to 8 inches if authorized.

For areas not accessible to a truck distributor bar, apply the emulsion with a squeegee or other authorized means. For asphalt binder, hand spray nonaccessible areas. You may overlap the emulsion or asphalt binder applications before the application of screenings at longitudinal joints.

Do not apply the emulsion or asphalt binder unless there are sufficient screenings at the job site to cover the emulsion or asphalt binder.

Discontinue application of emulsion or asphalt binder early enough to comply with lane closure specifications and darkness. Apply to 1 lane at a time and cover the lane entirely in 1 operation.

37-2.01C(5) Spreading Screenings

Prevent vehicles from driving on asphaltic emulsion or asphalt binder before spreading screenings.

Spread screenings at a uniform rate over the full lane width in 1 application.

Broom excess screenings at joints before spreading adjacent screenings.

Operate the spreader at speeds slow enough to prevent screenings from rolling over after dropping.

If the spreader is not moving, screenings must not drop. If you stop spreading and screenings drop, remove the excess screenings before resuming activities.

37-2.01C(6) Finishing

Remove piles, ridges, or unevenly distributed screenings. Repair permanent ridges, bumps, or depressions in the finished surface. Spread additional screenings and roll if screenings are picked up by rollers or vehicles.

Seal coat joints between adjacent applications of seal coat must be smooth, straight, uniform, and completely covered. Longitudinal joints must be at lane lines and not overlap by more than 4 inches. Blend the adjacent applications by brooming.

A coverage is the number of passes a roller needs to cover the width. A pass is 1 roller movement parallel to the seal coat application in either direction. Overlapping passes are part of the coverage being made and are not part of a subsequent coverage. Do not start a coverage until completing the previous coverage.

Before opening to traffic, finish seal coat in the following sequence:

1. Perform initial rolling consisting of 1 coverage with a pneumatic-tired roller
2. Perform final rolling consisting of 3 coverages with a pneumatic-tired roller
3. Broom excess screenings from the roadway and adjacent abutting areas
4. Apply flush coat if specified

The Engineer may order salvaging of excess screenings.

Dispose of excess screenings the Engineer determines are not salvageable. Dispose of screenings in any of the following ways or locations:

1. Under section 14-10
2. On embankment slopes
3. In authorized areas

Salvaging and stockpiling excess screenings is change order work.

37-2.01C(7) Seal Coat Maintenance

Seals coat surfaces must be maintained for 4 consecutive days from the day screenings are applied. Maintenance must include brooming to maintain a surface free of loose screenings, to distribute screenings over the surface so as to absorb any free asphaltic material, to cover any areas deficient in cover coat material, and to prevent formation of corrugations.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

After 4 consecutive days, excess screenings must be removed from the paved areas. Brooming must not displace screenings set in asphaltic material.

The exact time of brooming will be determined by the Engineer. As a minimum, brooming will be required at the following times:

1. On 2-lane 2-way roadways, from 2 to 4 hours after traffic, controlled with pilot cars, has been routed on the seal coat
2. On multilane roadways, from 2 to 4 hours after screenings have been placed
3. In addition to previous brooming, immediately before opening any lane to public traffic, not controlled with pilot cars
4. On the morning following the application of screenings on any lane that has been open to public traffic not controlled with pilot cars and before starting any other activities

For 2-lane 2-way roadways under 1-way traffic control, upon completion of secondary rolling, public traffic must be controlled with pilot cars and routed over the new seal coat for a period of 2 to 4 hours. The Engineer will determine the exact period of time.

Schedule the operations so that seal coat is placed on both lanes of the traveled way each work shift and so that 1-way traffic control is discontinued 1 hour before darkness. At the end of the work shift, the end of the seal coat on both lanes must generally match.

On multilane roadways, initial brooming must begin after the screenings have been in place for a period of 2 to 4 hours. If the initial brooming is not completed during the work shift in which the screenings were placed, the initial brooming must be completed at the beginning of the next work shift.

Public traffic must be controlled with pilot cars and be routed on the new seal coat surface of the lane for a minimum of 2 hours after completion of the initial brooming and before opening the lane to traffic not controlled with pilot cars. When traffic is controlled with pilot cars, a maximum of 1 lane in the direction of travel must be open to public traffic. Once traffic controlled with pilot cars is routed over the seal coat at a particular location, continuous control must be maintained at that location until the seal coat placement and brooming on adjacent lanes to receive seal coat is completed.

37-2.01D Payment

If there is no bid item for a traffic control system, furnishing and using a pilot car is included in the various items of the work involved in applying the seal coat.

If test results for the screenings grading do not comply with specifications, you may remove the seal coat represented by these tests or request that it remain in place with a payment deduction. The deduction is \$1.75 per ton for the screenings represented by the test results.

37-2.02 FOG SEAL

37-2.02A General

37-2.02A(1) Summary

Fog seal coat includes applying a slow-setting asphaltic emulsion.

37-2.02A(2) Definitions

Reserved

37-2.02A(3) Submittals

Submit a 1/2-gallon sample of the asphaltic emulsion in a plastic container. Take the sample from the distributor truck spray bar at mid-load.

37-2.02A(4) Quality Control and Assurance

Reserved

37-2.02B Material

The Engineer selects the grade of slow-setting asphaltic emulsion to be used.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CTA Contract No. XXX

If additional water is added to the asphaltic emulsion, the resultant mixture must not be more than 1 part asphaltic emulsion to 1 part water. The Engineer determines the exact amount of additional water.

37-2.02C Construction

Apply asphaltic emulsion for fog seal coat at a residual asphalt rate from 0.02 to 0.06 gal/sq yd. The Engineer determines the exact rate.

Apply fog seal coat when the ambient air temperature is above 40 degrees F.

Sprinkle water on fog seal coat that becomes tacky in an amount determined by the Engineer.

If fog seal coat and seal coat with screenings are specified on the same project, apply fog seal coat at least 4 days before applying the adjoining seal coat with screenings. The joint between the seal coats must be neat and uniform.

37-2.02D Payment

The Department does not adjust the unit price for an increase or decrease in the asphaltic emulsion (fog seal coat) quantity.

37-2.03 FLUSH COATS

37-2.03A General

Flush coat includes applying a fog seal coat to the surface, followed by sand.

03-21-14

07-19-13

37-2.03B Material

The Engineer selects the grade of slow-setting or quick-setting asphaltic emulsion to be used.

Sand for flush coat must comply with the material specifications for fine aggregate grading in section 90-1.02C(3). Sand must not include organic material or clay.

37-2.03C Construction

Apply asphaltic emulsion for flush coat at a residual asphalt rate from 0.02 to 0.06 gal/sq yd. The Engineer determines the exact rate.

During flush coat activities, close adjacent lanes to traffic. Do not track asphaltic emulsion on existing pavement surfaces.

Apply sand immediately after the asphaltic emulsion application.

Spread sand with a self-propelled screenings spreader equipped with a mechanical device that spreads sand at a uniform rate over the full width of a traffic lane in a single application. Spread sand at a rate from 2 to 6 lb/sq yd. The Engineer determines the exact rate.

37-2.03D Payment

The Department does not adjust the unit price for an increase or decrease in the sand cover for the flush coat quantity.

37-2.04 ASPHALTIC EMULSION SEAL COAT

37-2.04A General

37-2.04A(1) General

37-2.04A(1)(a) Summary

Section 37-2.04 includes specifications for applying asphaltic emulsion seal coat. Asphaltic emulsion seal coat includes applying asphaltic emulsion, followed by screenings, and then a flush coat.

Asphaltic emulsion seal coat includes one or more of the following types:

1. Nonpolymer asphaltic emulsion seal coat
2. Polymer asphaltic emulsion seal coat

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

A double asphaltic emulsion seal coat is the application of asphaltic emulsion, followed by screenings applied twice in sequence.

37-2.04A(1)(b) Definitions

Reserved

37-2.04A(1)(c) Submittals

At least 10 days before starting asphaltic emulsion seal coat application, submit the name of an authorized laboratory that will be performing asphaltic emulsion QC testing.

03-21-14

Submit a sample of asphaltic emulsion in a 1/2-gallon plastic container to the Engineer and to the authorized laboratory. Each sample must be submitted in an insulated shipping container within 24 hours of sampling.

07-19-13

Within 7 days after taking samples, submit the authorized laboratory's test results for asphaltic emulsion.

37-2.04A(1)(d) Quality Control and Assurance

Samples for the screenings grading and cleanness value must be taken from the spreader conveyor belt.

03-21-14

Within 3 business days of sampling, the authorized laboratory must test the asphaltic emulsion for:

1. Viscosity under AASHTO T 59
2. Sieve test under AASHTO T 59
3. Demulsibility under AASHTO T 59
4. Torsional recovery under California Test 332 for polymer asphaltic emulsion
5. Elastic recovery under AASHTO T 301 for polymer asphaltic emulsion

Circulate asphaltic emulsion in the distributor truck before sampling. Take samples from the distributor truck at mid load or from a sampling tap or thief. Before taking samples, draw and dispose of 1 gallon. In the presence of the Engineer take two 1/2-gallon samples every 55 tons or at least 1 day's production.

07-19-13

37-2.04A(2) Materials

Not Used

37-2.04A(3) Construction

The Engineer determines the exact application rate.

At the time of application, the temperature of the asphaltic emulsion must be from 130 to 180 degrees F.

When tested under California Test 339, the application rate for asphaltic emulsion must not vary from the average by more than:

1. 15 percent in the transverse direction
2. 10 percent in the longitudinal direction

37-2.04A(4) Payment

Not Used

37-2.04B Nonpolymer Asphaltic Emulsion Seal Coat

37-2.04B(1) General

37-2.04B(1)(a) Summary

Section 37-2.04B includes specifications for applying a nonpolymer asphaltic emulsion seal coat.

37-2.04B(1)(b) Definitions

Reserved

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

37-2.04B(1)(c) Submittals

Reserved

37-2.04B(1)(d) Quality Control and Assurance

For nonpolymer asphaltic emulsion seal coat, if a test result for the screenings cleanness value is from 75 to 80, you may request that the asphaltic emulsion seal coat represented by the test remain in place. A payment deduction is made as specified in section 37-2.04D. If the screenings cleanness value is less than 75, remove the asphaltic emulsion seal coat.

37-2.04B(2) Materials

Screenings for nonpolymer asphaltic emulsion seal coat must have the gradation as determined under California Test 202 in the following table.

**Nonpolymer Asphaltic Emulsion Seal Coat Screenings
Gradation**

Sieve sizes	Percentage passing			
	Coarse 1/2" max	Medium 3/8" max	Medium fine 5/16" max	Fine 1/4" max
3/4"	100	--	--	--
1/2"	95–100	100	--	--
3/8"	50–80	90–100	100	100
No. 4	0–15	5–30	30–60	60–85
No. 8	0–5	0–10	0–15	0–25
No. 16	--	0–5	0–5	0–5
No. 30	--	--	0–3	0–3
No. 200	0–2	0–2	0–2	0–2

The cleanness value determined under California Test 227 must be 80 or greater.

03-21-14

37-2.04B(3) Construction

Asphaltic emulsion must be applied within the application rate ranges shown in the following table:

07-19-13

Asphaltic Emulsion Application Rates

Screenings	Application rate range(gallons per square yard)
Fine	0.15–0.30
Medium fine	0.25–0.35
Medium	0.25–0.40
Coarse	0.30–0.40

Apply asphaltic emulsion when the ambient air temperature is from 65 to 110 degrees F and the pavement surface temperature is at least 80 degrees F.

Do not apply asphaltic emulsion when weather forecasts predict the ambient air temperature will fall below 39 degrees F within 24 hours after application.

For double asphaltic emulsion seal coat, the asphaltic emulsion must be applied within the application rates shown in the following table:

Asphaltic Emulsion Application Rates

Screenings	Application rate range (gal/sq yd)
Double	
1st application	0.20–0.35
2nd application	0.20–0.30

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

You may stockpile screenings for asphaltic emulsion seal coat if you prevent contamination. Screenings must have damp surfaces at spreading. If water visibly separates from the screenings, do not spread. You may redampen them in the delivery vehicle.

Spread screenings before the asphaltic emulsion sets or breaks.

Spread screenings within 10 percent of the rate determined by the Engineer. Screenings must have a spread rate within the ranges shown in the following table:

Screening Spread Rates	
Seal coat type	Range (lb/sq yd)
Fine	12–20
Medium fine	16–25
Medium	20–30
Coarse	23–30

Do not spread screenings more than 2,500 feet ahead of the completed initial rolling.

For double asphaltic emulsion seal coat, screenings must have a spread rate within the ranges shown in the following table:

Screening Spread Rates	
Seal coat type	Range (lb/sq yd)
Double	
1st application	23–30
2nd application	12–20

Remove excess screenings on the 1st application before the 2nd application of asphaltic emulsion.

37-2.04B(4) Payment

If asphaltic emulsion seal coat with screenings does not comply with the cleanness value specifications, you may request that the seal coat remain in place with a pay deduction corresponding to the cleanness value shown in the following table:

Asphaltic Emulsion Seal Coat Cleanness Value Deductions	
Cleanness value	Deduction
80 or over	None
79	\$2.00 /ton
77–78	\$4.00 /ton
75–76	\$6.00 /ton

37-2.04C Polymer Asphaltic Emulsion Seal Coat

37-2.04C(1) General

37-2.04C(1)(a) Summary

Section 37-2.04C includes specifications for applying a polymer asphaltic emulsion seal coat.

37-2.04C(1)(b) Definitions

Reserved

37-2.04C(1)(c) Submittals

At least 10 days before starting polymer asphaltic emulsion seal coat application, submit a signed copy of the test result report of the Vialit test method for aggregate retention in chip seals (french chip) to the Engineer and to:

DEPARTMENT OF TRANSPORTATION
Division of Maintenance, Roadway Maintenance Office
1120 N Street, MS 31

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

Sacramento, CA 95814

37-2.04C(1)(d) Quality Control and Assurance

The authorized laboratory must test screenings for retention under the Vialit test method for aggregate in chip seals (french chip). The Vialit test results are not used for acceptance. The Vialit test is available at the METS Web site.

If the test results for polymer asphaltic emulsion do not comply with the specifications, the Engineer assesses a pay factor value for the following properties and increments:

03-21-14

Polymer Asphaltic Emulsion Pay Factor Table

Test method and property	Increment	Pay factor
Test on polymer asphaltic emulsion		
AASHTO T 59 (Viscosity, sec Saybolt Furol, at 50 °C)	Each 10 seconds above max or below min	1
AASHTO T 59 (settlement, 5 days, percent)	Each 1.5 percent above max	1
AASHTO T 59 (sieve test, percent max)	Each 0.2 percent above max	1
AASHTO T 59 (demulsibility percent)	Each 2 percent below min	1
Test on residue from evaporation test		
AASHTO T 49 (penetration, 25 °C)	Each 2 dm above max or below min	1
ASTM D 36 (field softening point °C)	2 °C below min	1
California Test 332 (torsional recovery ^a)	For each 1 increment below the min value of 18	1
	For each 2 increments below the min value of 18	3
	For each 3 or more increments below the min value of 18	10
ASTM T 301 (elastic recovery ^a)	For each 1 increment below the min value of 60	1
	For each 2 increment below the min value of 60	3
	For each 3 increment below the min value of 60	10

^a The highest pay factor applies

07-19-13

The Engineer assesses a pay factor of 1 for sampling not performed in compliance with the specifications, including shipping and sampling containers.

For polymer asphaltic emulsion seal coat, if a test result for the screenings cleanness value is from 75 to 86, you may request that the asphaltic emulsion seal coat represented by the test remain in place. A payment deduction is made as specified in section 37-2.04D. If the screenings cleanness value is less than 75, remove the asphaltic emulsion seal coat.

37-2.04C(2) Materials

Polymer asphaltic emulsion must include elastomeric polymer.

03-21-14

Polymer asphaltic emulsion must comply with section 94, Table 3, under the test on residue from evaporation test for Grades PMRS2, PMRS2h, PMCRS2, and PMCRS2h and the following:

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

1. The penetration at 39.2 degrees F (200g for 60 seconds) determined under AASHTO T 49 must be at least 6.
2. Elastic recovery determined under AASHTO T 301 must be at least 60 percent.
3. Polymer content in percent by weight does not apply.
4. The ring and ball softening point temperature determined under AASHTO T 53 for Test on Residue from Evaporation Test must comply with the following minimum temperature requirement:
 - 4.1. 126 degrees F for a geographical ambient temperature from 32 to 104 degrees F
 - 4.2. 129 degrees F for a geographical ambient temperature from 18 to 104 degrees F
 - 4.3. 135 degrees F for a geographical ambient temperature from 18 to greater than 104 degrees F

07-19-13

Screenings for polymer asphaltic emulsion seal coat must have the gradation as determined under California Test 202 in the following table:

Polymer Asphaltic Emulsion Seal Coat Screenings Gradation

Sieve sizes	Percentage passing			
	Coarse 1/2" max	Medium 3/8" max	Medium fine 5/16" max	Fine 1/4" max
3/4"	100	--	--	--
1/2"	85-100	100	--	--
3/8"	0-30	85-100	100	100
No. 4	0-5	0-15	0-50	60-85
No. 8	--	0-5	0-15	0-25
No. 16	--	--	0-5	0-5
No. 30	--	--	0-3	0-3
No. 200	0-2	0-2	0-2	0-2

03-21-14

The cleanness value determined under California Test 227 must be 86 or greater.

07-19-13

37-2.04C(3) Construction

Polymer asphaltic emulsion must be applied within the application rate ranges shown in the following table:

Polymer Asphaltic Emulsion Application Rates

Screenings	Application rate range(gallons per square yard)
Fine	0.15-0.30
Medium fine	0.25-0.35
Medium	0.25-0.40
Coarse	0.30-0.40

Apply polymer asphaltic emulsion when the ambient air temperature is from 60 to 105 degrees F and the pavement surface temperature is at least 55 degrees F.

Do not apply polymer asphaltic emulsion when weather forecasts predict the ambient air temperature will fall below 39 degrees F within 24 hours after application.

For double asphaltic emulsion seal coat, polymer asphaltic emulsion must be applied within the application rates shown in the following table:

Polymer Asphaltic Emulsion Application Rates

Screenings	Application rate range (gal/sq yd)
Double	
1st application	0.20-0.35
2nd application	0.20-0.30

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

You may stockpile screenings for polymer emulsion seal coat if you prevent contamination. Screenings must have damp surfaces at spreading. If water visibly separates from the screenings, do not spread. You may redampen them in the delivery vehicle.

Spread screenings before the polymer emulsion sets or breaks.

Spread screenings within 10 percent of the rate determined by the Engineer. Screenings must have a spread rate within the ranges shown in the following table:

Screening Spread Rates	
Seal coat type	Range (lb/sq yd)
Fine	12–20
Medium fine	16–25
Medium	20–30
Coarse	23–30

Do not spread screenings more than 2,500 feet ahead of the completed initial rolling.

For double seal coat, screenings must have a spread rate within the ranges shown in the following table:

Screening Spread Rates	
Seal coat type	Range (lb/sq yd)
Double	
1st application	23–30
2nd application	12–20

Remove excess screenings on the 1st application before the 2nd application of asphaltic emulsion.

37-2.04C(4) Payment

If polymer asphaltic emulsion seal coat with screenings does not comply with the specifications for cleanness value you may request that the seal coat remain in place with a pay deduction corresponding by the cleanness value shown in the following table:

Polymer Asphaltic Emulsion Seal Coat Cleanness Value Deductions	
Cleanness value	Deduction
86 or over	None
81–85	\$2.20/ton
77–80	\$4.40/ton
75–76	\$6.60/ton

If test results for polymer asphaltic emulsion aggregate grading and cleanness value test results do not comply with the specifications, all deductions are made. A test for polymer asphaltic emulsion represents the smaller of 55 tons or 1 day's production. A test for the screenings grading or cleanness value represents the smaller of 300 tons or 1 day's production.

The payment deduction for noncompliant polymer asphaltic emulsion is based on the total pay factor value determined from the table titled, "Polymer Asphaltic Emulsion Pay Factor Deduction." You must remove polymer asphaltic emulsion seal coat with a pay factor value greater than 20. You may request seal coat with noncompliant polymer asphaltic emulsion to remain in place with a pay deduction for the total pay factor value shown in the following table:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

**Polymer Asphaltic Emulsion Pay Factor
Deductions**

Total pay factor value	Deduction
0	none
1–2	\$5.00/ton
3–5	\$10.00/ton
6–9	\$15.00/ton
10–14	\$25.00/ton
15–20	\$50.00/ton

37-2.05 ASPHALT BINDER SEAL COATS

37-2.05A General

Reserved

37-2.05B Asphalt Rubber Binder Seal Coats

37-2.05B(1) General

37-2.05B(1)(a) Summary

Section 37-2.05B includes specifications for applying asphalt rubber binder seal coat. Asphalt rubber seal coat includes applying heated asphalt rubber binder, followed by heated screenings precoated with asphalt binder, followed by a flush coat.

37-2.05B(1)(b) Definitions

crumb rubber modifier: Ground or granulated high natural crumb rubber or scrap tire crumb rubber.

descending viscosity reading: Subsequent viscosity reading at least 5 percent lower than the previous viscosity reading.

high natural crumb rubber: Material containing 40 to 48 percent natural rubber.

scrap tire crumb rubber: Any combination of:

1. Automobile tires
2. Truck tires
3. Tire buffing

37-2.05B(1)(c) Submittals

For each delivery of asphalt rubber binder ingredients and asphalt rubber binder to the job site, submit a certificate of compliance and a copy of the specified test results.

Submit MSDS for each asphalt rubber binder ingredient and the asphalt rubber binder.

At least 15 days before use, submit:

1. Four 1-quart cans of mixed asphalt rubber binder
2. Samples of each asphalt rubber binder ingredient
3. Asphalt rubber binder formulation and data as follows:
 - 3.1. For asphalt binder and asphalt modifier submit:
 - 3.1.1. Source and grade of asphalt binder
 - 3.1.2. Source and type of asphalt modifier
 - 3.1.3. Percentage of asphalt modifier by weight of asphalt binder
 - 3.1.4. Percentage of combined asphalt binder and asphalt modifier by weight of asphalt rubber binder
 - 3.1.5. Test results for the specified quality characteristics
 - 3.2. For crumb rubber modifier submit:
 - 3.2.1. Each source and type of scrap tire crumb rubber and high natural rubber
 - 3.2.2. Percentage of scrap tire crumb rubber and high natural rubber by total weight of asphalt rubber binder

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

- 3.2.3. Test results for the specified quality characteristics
- 3.3. For asphalt rubber binder submit:
 - 3.3.1. Test results for the specified quality characteristics
 - 3.3.2. Minimum reaction time and temperature

At least 5 business days before use, submit the permit issued by the local air quality agency for asphalt rubber binder:

- 1. Field blending equipment
- 2. Application equipment

If an air quality permit is not required by the local air quality agency for producing asphalt rubber binder or spray applying asphalt rubber binder, submit verification from the local air quality agency that an air quality permit is not required for this Contract.

Submit a certified volume or weight slip for each delivery of asphalt rubber binder ingredients and asphalt rubber binder.

Submit a certificate of compliance and accuracy verification of test results for viscometers.

When determined by the Engineer, submit notification 15 minutes before each viscosity test or submit a schedule of testing times.

Submit the log of asphalt rubber binder viscosity test results each day of asphalt rubber seal coat work.

37-2.05B(1)(d) Quality Control and Assurance

Equipment used in producing asphalt rubber binder must be permitted for use by the local air quality agency. Equipment used in spreading asphalt rubber binder must be permitted for use by the local air quality agency.

Each asphalt rubber binder ingredient must be sampled and tested for compliance with the specifications by the manufacturer.

Test and submit results at least once per project or the following, whichever frequency is greater:

- 1. For crumb rubber modifier except for grading, at least once per 250 tons. Samples of scrap tire crumb rubber and high natural crumb rubber must be sampled and tested separately. Test each delivery of crumb rubber modifier for grading.
- 2. For asphalt binder, test and submit at least once per 200 tons of asphalt binder production.
- 3. For asphalt modifier, test and submit at least once per 25 tons of asphalt modifier production.

Scrap tire crumb rubber and high natural crumb rubber must be delivered to the asphalt rubber production site in separate bags.

Take viscosity readings of asphalt rubber binder under ASTM D7741 during asphalt rubber binder production. Start taking viscosity readings of samples taken from the reaction vessel at least 45 minutes after adding crumb rubber modifier and continue taking viscosity readings every 30 minutes until 2 consecutive descending viscosity readings have been obtained and the final viscosity meets the specification requirement. After meeting the 2 descending viscosity readings requirement, continue to take viscosity readings hourly and within 15 minutes before use. Log the test results, including time of testing and temperature of the asphalt rubber binder.

37-2.05B(2) Material

37-2.05B(2)(a) General

Reserved

37-2.05B(2)(b) Asphalt Binder

Asphalt binder must comply with the specifications for asphalt binder. Do not modify asphalt binder with polymer.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

37-2.05B(2)(c) Asphalt Modifier

Asphalt modifier must be a resinous, high flash point, and aromatic hydrocarbon. Asphalt modifier must have the values for the quality characteristics shown in the following table:

Asphalt Modifier for Asphalt Rubber Binder		
Quality characteristic	Test method	Value
Viscosity, m ² /s (x 10 ⁻⁶) at 100 °C	ASTM D 445	X ± 3 ^a
Flash point, CL.O.C., °C	ASTM D 92	207 min
Molecular analysis		
Asphaltenes, percent by mass	ASTM D 2007	0.1 max
Aromatics, percent by mass	ASTM D 2007	55 min

^a "X" denotes the proposed asphalt modifier viscosity from 19 to 36. A change in "X" requires a new asphalt rubber binder submittal.

37-2.05B(2)(d) Crumb Rubber Modifier

Crumb rubber modifier must be ground or granulated at ambient temperature.

Scrap tire crumb rubber and high natural crumb rubber must be delivered to the asphalt rubber binder production site in separate bags.

Steel and fiber must be separated. If steel and fiber are cryogenically separated, it must occur before grinding and granulating. Cryogenically-produced crumb rubber modifier particles must be large enough to be ground or granulated.

Wire must not be more than 0.01 percent by weight of crumb rubber modifier. Crumb rubber modifier must be free of contaminants except fabric, which must not exceed 0.05 percent by weight of crumb rubber modifier. Method for determining the percent weight of wire and fabric is available under Laboratory Procedure 10 at the following METS Web site:

<http://www.dot.ca.gov/hq/esc/Translab/ofpm/fpmlab.htm>

The length of an individual crumb rubber modifier particle must not exceed 3/16 inch.

Crumb rubber modifier must be dry, free-flowing particles that do not stick together. A maximum of 3 percent calcium carbonate or talc by weight of crumb rubber modifier may be added. Crumb rubber modifier must not cause foaming when combined with the asphalt binder and asphalt modifier.

Specific gravity of crumb rubber modifier must be from 1.1 to 1.2 determined under California Test 208.

When tested under ASTM D 297, crumb rubber modifier must comply with the requirements shown in the following table:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Crumb Rubber Modifier

Quality characteristic	Scrap tire crumb rubber (percent)		High natural rubber (percent)	
	Min	Max	Min	Max
Acetone extract	6.0	16.0	4.0	16.0
Rubber hydrocarbon	42.0	65.0	50.0	--
Natural rubber content	22.0	39.0	40.0	48.0
Carbon black content	28.0	38.0	--	--
Ash content	--	8.0	--	--

Scrap tire crumb rubber must have the gradation shown in the following table:

Scrap Tire Crumb Rubber Gradation

Percentage passing

Sieve size	Gradation limit	Operating range	Contract compliance
No. 8	100	100	100
No. 10	98–100	95–100	90–100
No. 16	45–75	35–85	32–88
No. 30	2–20	2–25	1–30
No. 50	0–6	0–10	0–15
No. 100	0–2	0–5	0–10
No. 200	0	0–2	0–5

High natural crumb rubber must have the gradation shown in the following table:

High Natural Crumb Rubber Gradation

Percentage passing

Sieve size	Gradation limit	Operating range	Contract compliance
No. 10	100	100	100
No. 16	95–100	92–100	85–100
No. 30	35–85	25–95	20–98
No. 50	10–30	6–35	2–40
No. 100	0–4	0–7	0–10
No. 200	0–1	0–3	0–5

Test the crumb rubber modifier gradation under ASTM C 136 except

- Split or quarter 100 ± 5 g from the crumb rubber modifier sample and dry to a constant mass at a temperature from 57 to 63 degrees C and record the dry sample mass. Place the crumb rubber modifier sample and 5 g of talc in a 1/2-liter jar. Seal the jar, then shake the jar by hand for at least 1 minute to mix the crumb rubber modifier and the talc. Continue shaking or open the jar and stir until the particle agglomerates and clumps are broken and the talc is uniformly mixed.
- Place 1 rubber ball on each sieve. Each ball must weigh 8.5 ± 0.5 g, measure 24.5 ± 0.5 mm in diameter, and have a Shore Durometer "A" hardness of 50 ± 5 determined under ASTM D 2240. After sieving the combined material for 10 ± 1 minutes, disassemble the sieves. Brush material adhering to the bottom of a sieve into the next finer sieve. Weigh and record the mass of the material retained on the 2.36-millimeter sieve and leave this material (do not discard) on the scale or balance. Fabric balls must remain on the scale or balance and be placed together on the side to prevent them from being covered or disturbed when the material from finer sieves is placed onto the scale or balance. The material retained on the 2.00-millimeter sieve must be added to the scale or balance. Weigh and

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

record that mass as the accumulative mass retained on the 2.00-milimeter sieve. Continue weighing and recording the accumulated masses retained on the remaining sieves until the accumulated mass retained in the pan has been determined. Before discarding the crumb rubber modifier sample, separately weigh and record the total mass of fabric balls in the sample.

3. Determine the mass of material passing the 75-micrometer sieve by subtracting the accumulated mass retained on the 75-micrometer sieve from the accumulated mass retained in the pan. If the material passing the 75-micrometer sieve has a mass of 5 g or less, cross out the recorded number for the accumulated mass retained in the pan and copy the number recorded for the accumulated mass retained on the 75-micrometer sieve and record that number, next to the crossed out number, as the accumulated mass retained in the pan. If the material passing the 75-micrometer sieve has a mass greater than 5 g, cross out the recorded number for the accumulated mass retained in the pan, subtract 5 g from that number and record the difference next to the crossed out number. The adjustment to the accumulated mass retained in the pan accounts for the 5 g of talc added to the sample. For calculation purposes, the adjusted total sample mass is the same as the adjusted accumulated mass retained in the pan. Determine the percent passing based on the adjusted total sample mass and record to the nearest 0.1 percent.

37-2.05B(2)(e) Asphalt Rubber Binder

Asphalt rubber binder must be a combination of:

1. Asphalt binder
2. Asphalt modifier
3. Crumb rubber modifier

Asphalt rubber binder blending equipment must be authorized under the Department's material plant quality program.

The blending equipment must allow the determination of weight percentages of each asphalt rubber binder ingredient.

Asphalt rubber binder must be 79 ± 1 percent by weight asphalt binder and 21 ± 1 percent by weight of crumb rubber modifier. The minimum percentage of crumb rubber modifier must be 20.0 percent and lower values may not be rounded up.

Crumb rubber modifier must be 76 ± 2 percent by weight scrap tire crumb rubber and 24 ± 2 percent by weight high natural rubber.

Asphalt modifier and asphalt binder must be blended at the production site. Asphalt modifier must be from 2.5 to 6.0 percent by weight of the asphalt binder in the asphalt rubber binder. The asphalt rubber binder supplier determines the exact percentage.

If blended, the asphalt binder must be from 375 to 440 degrees F when asphalt modifier is added and the mixture must circulate for at least 20 minutes. Asphalt binder, asphalt modifier, and crumb rubber modifier may be proportioned and combined simultaneously.

The blend of asphalt binder and asphalt modifier must be combined with crumb rubber modifier at the asphalt rubber binder production site. The asphalt binder and asphalt modifier blend must be from 375 to 440 degrees F when crumb rubber modifier is added. Combined ingredients must be allowed to react at least 45 minutes at temperatures from 375 to 425 degrees F except the temperature must be at least 10 degrees F below the flash point of the asphalt rubber binder.

After reacting, the asphalt rubber binder must have the values for the quality characteristics shown in the following table:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Asphalt Rubber Binder

Quality characteristic	Test method	Requirement	
		Min	Max
Cone penetration @ 25 °C, 1/10 mm	ASTM D 217	25	60
Resilience @ 25 °C, percent rebound	ASTM D 5329	18	50
Field softening point, °C	ASTM D 36	55	88
Viscosity @190 °C, Pa • s (x10 ⁻³)	ASTM D 7741	1500	2500

Maintain asphalt rubber binder at a temperature from 375 to 415 degrees F.

Stop heating unused asphalt rubber binder 4 hours after the 45-minute reaction period. Reheating asphalt rubber binder that cools below 375 degrees F is a reheat cycle. Do not exceed 2 reheat cycles. If reheating, asphalt rubber binder must be from 375 to 415 degrees F before use.

During reheating, you may add scrap tire crumb rubber. Scrap tire crumb rubber must not exceed 10 percent by weight of the asphalt rubber binder. Allow added scrap tire crumb rubber to react for at least 45 minutes. Reheated asphalt rubber binder must comply with the specifications for asphalt rubber binder.

37-2.05B(2)(f) Screenings

Before precoating with asphalt binder and when tested under California Test 202, screenings for asphalt rubber seal coat must have the gradation shown in the following table:

Asphalt Rubber Seal Coat Screenings Gradation

Sieve sizes	Percentage passing by weight		
	Coarse 1/2" max	Medium 1/2" max	Fine 3/8" max
3/4"	100	100	100
1/2"	75–90	85–90	95–100
3/8"	0–20	0–30	70–85
No. 4	0–2	0–5	0–15
No. 8	--	--	0–5
No. 200	0–1	0–1	0–1

Screenings must have the values for the properties shown in the following table:

Seal Coat Screenings

Properties	Test method	Value
Cleanness value, min	California Test 227	80
Durability, min	California Test 229	52

37-2.05B(3) Construction

37-2.05B(3)(a) General

Reserved

37-2.05B(3)(b) Equipment

Self-propelled distributor truck for applying asphalt rubber binder must have the following features:

1. Heating unit
2. Internal mixing unit
3. Pumps that spray asphalt rubber binder within 0.05 gal/sq yd of the specified rate
4. Fully circulating spray bar that applies asphalt rubber binder uniformly

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

5. Tachometer
6. Pressure gages
7. Volume measuring devices
8. Thermometer
9. Observation platform on the rear of the truck for an observer on the platform to see the nozzles and unplug them if needed

37-2.05B(3)(c) Precoating Screenings

For asphalt rubber seal coat, do not recombine fine materials collected in dust control systems except cyclone collectors or knock-out boxes with any other aggregate used in the production of screenings.

For asphalt rubber seal coat, screenings must be preheated from 260 to 325 degrees F. Coat with any of the asphalts specified in the table titled "Performance Graded Asphalt Binder" in section 92. Coat at a central mixing plant. The asphalt must be from 0.5 to 1.0 percent by weight of dry screenings. The Engineer determines the exact rate.

Plant must be authorized under the Department's material plant quality program.

Do not stockpile preheated or precoated screenings.

37-2.05B(3)(d) Asphalt Rubber Binder Application

Apply asphalt rubber binder immediately after the reaction period. At the time of application, the temperature of asphalt rubber binder must be from 385 to 415 degrees F.

Apply asphalt rubber binder at a rate from 0.55 to 0.65 gal/sq yd. The Engineer determines the exact rate.

Apply asphalt rubber binder when the atmospheric temperature is from 60 to 105 degrees F and the pavement surface temperature is at least 55 degrees F.

Do not apply asphalt rubber binder unless there are sufficient screenings available to cover the asphalt rubber binder within 2 minutes. Intersections, turn lanes, gore points, and irregular areas must be covered within 15 minutes.

Do not apply asphalt rubber binder when weather or road conditions are unsuitable, including high wind or when the pavement is damp. In windy conditions you may adjust the distributor bar height and distribution speed, and use shielding equipment, if the Engineer authorizes your request.

37-2.05B(3)(e) Screenings Application

During transit, cover precoated screenings for asphalt rubber seal coat with tarpaulins if the ambient air temperature is below 65 degrees F or the haul time exceeds 30 minutes.

At the time of application, screenings for asphalt rubber seal coat must be from 225 to 325 degrees F.

Spread screenings at a rate from 28 to 40 lb/sq yd. The exact rate is determined by the Engineer. Spread to within 10 percent of the determined rate.

37-2.05B(3)(f) Rolling and Sweeping

Perform initial rolling within 90 seconds of spreading screenings. Do not spread screenings more than 200 feet ahead of the initial rolling.

For final rolling, you may request use of a steel-wheeled roller weighing from 8 to 10 tons, static mode only.

Perform a final sweeping before Contract acceptance. The final sweeping must not dislodge screenings.

Dispose of swept screenings at least 150 feet from any waterway.

37-2.05B(4) Payment

Screenings for asphalt rubber seal coat are measured by coated weight after they are preheated and precoated with asphalt binder. The weight of screenings must be the coated weight.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

If recorded batch weights are printed automatically, the bid item for screenings for asphalt-rubber seal coat are measured using the printed batch weights, provided:

1. Total aggregate weight for screenings per batch is printed
2. Total asphalt binder weight per batch is printed
3. Each truckload's zero tolerance weight is printed before weighing the first batch and after weighing the last batch
4. Time, date, mix number, load number and truck identification are correlated with a load slip
5. A copy of the recorded batch weights is certified by a licensed weighmaster and submitted to the Engineer

Screenings for asphalt rubber seal coat is paid for as precoated screenings.

Asphalt-rubber binder is measured under the specifications for asphalts.

If test results for gradation tests do not comply with the specifications, deductions are taken.

Each gradation test for scrap tire crumb rubber represents 10,000 lbs or the amount used in that day's production, whichever is less.

Each gradation test for high natural rubber represents 3,400 lbs or the amount used in that day's production, whichever is less.

For each gradation test, the following pay deductions will be taken from the asphalt rubber bid item:

Gradation Test

Material	Test result ^a	Deduction
Scrap tire crumb rubber	Operating range < TR < Contract compliance	\$250
Scrap tire crumb rubber	TR > Contract compliance	\$1,100
High natural crumb rubber	Operating range < TR < Contract compliance	\$250
High natural crumb rubber	TR > Contract compliance	\$600

^a Test Result = TR

37-2.05C Modified Asphalt Binder Seal Coat

Reserved

03-21-14

37-2.06 STRESS ABSORBING MEMBRANE INTERLAYER

37-2.06A General

Section 37-2.06 applies where a stress absorbing membrane interlayer (SAMI) is shown.

Comply with section 37-2.05B except a flush coat is not required.

37-2.06B Materials

For SAMI, screenings must comply with the 3/8-inch maximum gradation.

37-2.06C Construction

For SAMI, section 37-2.01C(7) does not apply.

Final rolling and sweeping are not required for SAMI.

37-2.06D Payment

Not Used

37-2.07–37-2.10 RESERVED

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Add to section 37-3.01D(1):

01-18-13

Micro-surfacing spreader operators must attend the prepaving conference.

AA

39 HOT MIX ASPHALT

04-18-14

Replace the headings and paragraphs in section 39 with:

04-18-14

39-1 GENERAL

39-1.01 GENERAL

39-1.01A Summary

Section 39-1 includes general specifications for producing and placing hot mix asphalt.

HMA includes one or more of the following types:

1. Type A HMA
2. RHMA-G
3. OGFC
4. BWC
5. Minor HMA

If a warm mix asphalt technology is specified, the warm mix asphalt technology to be used must be authorized. For Department-authorized warm mix asphalt technologies, go to the METS website.

39-1.01B Definitions

binder replacement: Binder from RAP expressed as a percent of the total binder in the mix.

coarse aggregate: Aggregate retained on a no. 4 sieve.

fine aggregate: Aggregate passing the no. 4 sieve.

leveling course: Thin layer of HMA used to correct minor variations in the longitudinal and transverse profile of the pavement before placement of other pavement layers.

lower course: Layer of HMA below 0.2 feet from finished grade exclusive of OGFC.

miscellaneous areas: Areas outside the traveled way such as:

1. Median areas not including inside shoulders
2. Island areas
3. Sidewalks
4. Gutters
5. Ditches
6. Overside drains
7. Aprons at ends of drainage structures

processed RAP: RAP that has been fractionated.

substitution rate: Percent of RAP by dry weight of aggregate substituted for virgin aggregate.

supplemental fine aggregate: Aggregate passing the no. 30 sieve, including hydrated lime, portland cement, and fines from dust collectors.

surface course: Upper 0.2 feet of HMA exclusive of OGFC.

top layer: Final riding surface.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

39-1.01C Submittals

39-1.01C(1) General

Reserved

39-1.01C(2) Job Mix Formula

39-1.01C(2)(a) General

Except for the HMA to be used in miscellaneous areas and dikes, submit your proposed JMF for each type of HMA to be used. The JMF must be submitted on the Contractor Job Mix Formula Proposal form along with:

1. Mix design documentation on Contractor Hot Mix Asphalt Design Data form dated within 12 months of submittal
2. JMF verification on a Caltrans Hot Mix Asphalt Verification form, if applicable
3. JMF renewal on a Caltrans Job Mix Formula Renewal form, if applicable
4. MSDS for:
 - 4.1. Asphalt binder
 - 4.2. Supplemental fine aggregate except fines from dust collectors
 - 4.3. Antistrip additives

The Contractor Hot Mix Asphalt Design Data form must show documentation on aggregate quality.

If you cannot submit a Department-verified JMF on a Caltrans Hot Mix Asphalt Verification form dated within 12 months before HMA production, the Engineer verifies the JMF.

Submit a new JMF if you change any of the following:

1. Target asphalt binder percentage greater than ± 0.2 percent
2. Asphalt binder supplier
3. Combined aggregate gradation
4. Aggregate sources
5. Liquid antistrip producer or dosage
6. Average binder content in a new fractionated RAP stockpile by more than ± 2.0 percent from the average RAP binder content reported on page 4 of your Contractor Hot Mix Asphalt Design Data form
7. Average maximum specific gravity in a new fractionated RAP stockpile by more than ± 0.060 from the average maximum specific gravity value reported on page 4 of your Contractor Hot Mix Asphalt Design Data form
8. Any material in the JMF

Allow the Engineer 5 business days from a complete JMF submittal for document review of the aggregate qualities, mix design, and JMF. The Engineer notifies you if the proposed JMF submittal is accepted.

If your JMF fails verification testing, submit an adjusted JMF based on your testing. An adjusted JMF requires a new Contractor Job Mix Formula Proposal form and Contractor Hot Mix Asphalt Design Data form and verification of a plant-produced sample.

You may submit an adjusted aggregate gradation TV on a Contractor Job Mix Formula Proposal form before verification testing. Aggregate gradation TV must be within the TV limits specified.

39-1.01C(2)(b) Job Mix Formula Renewal

You may request a JMF renewal by submitting:

1. Proposed JMF on a Contractor Job Mix Formula Proposal form
2. Previously verified JMF documented on a Caltrans Hot Mix Asphalt Verification form dated within 12 months
3. Mix design documentation on a Contractor Hot Mix Asphalt Design Data form used for the previously verified JMF

39-1.01C(2)(c) Job Mix Formula Modification

For an authorized JMF, submit a modified JMF if you change any of the following:

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

1. Asphalt binder supplier
2. Liquid antistrip producer
3. Liquid antistrip dosage

You may change any of the above items only once during the Contract.

Submit your modified JMF request a minimum of 15 days before production. Each modified JMF submittal must consist of:

1. Proposed modified JMF on Contractor Job Mix Formula Proposal form, marked *Modified*.
2. Mix design records on Contractor Hot Mix Asphalt Design Data form for the authorized JMF to be modified.
3. JMF verification on Hot Mix Asphalt Verification form for the authorized JMF to be modified.
4. Test results for the modified JMF in compliance with the mix design specifications. Perform tests at the mix design OBC as shown on the Contractor Asphalt Mix Design Data form.

With an accepted modified JMF submittal, the Engineer verifies each modified JMF within 10 days of receiving all verification samples.

39-1.01C(3) Quality Control Plan

With your proposed JMF submittal, submit a QC plan for HMA.

The QC plan must describe the organization and procedures for:

1. Controlling HMA quality characteristics
2. Taking samples, including sampling locations
3. Establishing, implementing, and maintaining QC
4. Determining when corrective actions are needed
5. Implementing corrective actions
6. Methods and materials for backfilling core locations

The QC plan must address the elements affecting HMA quality including:

1. Aggregate
2. Asphalt binder
3. Additives
4. Production
5. Paving

The QC plan must include aggregate QC sampling and testing during lime treatment.

The Engineer reviews the QC plan within 5 business days from the submittal. Do not start HMA production until the Engineer authorizes the plan.

If QC procedures, personnel, tester qualifications, sample testing locations, or lab accreditation status change, submit a QC plan supplement at least 3 business days before implementing the proposed change. Do not implement the change without authorization.

39-1.01C(4) Test Results

For mix design, JMF verification, production start-up, and each 10,000 tons, submit AASHTO T 283 and AASHTO T 324 (Modified) test results to the Engineer and electronically to:

Moisture_Tests@dot.ca.gov

Submit all QC test results, except AASHTO T 283 and AASHTO T 324 (Modified), within 3 business days of a request. Submit AASHTO T 283 QC tests within 15 days of sampling.

For tests performed under AASHTO T 324 (Modified), submit test data and 1 tested sample set within 5 business days of sampling.

If coarse and fine durability index tests are required, submit test results within 2 business days of testing.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

If tapered notched wedge is used, submit test result values within 24 hours of testing.

39-1.01C(5) Reserved

39-1.01C(6) Liquid Antistrip Treatment

If liquid antistrip treatment is used, submit the following with your proposed JMF submittal:

1. One 1-pint sample
2. Infrared analysis including copy of absorption spectra
3. Certified copy of test results
4. Certificate of compliance for each liquid antistrip shipment. On each certificate of compliance, include:
 - 4.1. Your signature and printed name
 - 4.2. Shipment number
 - 4.3. Material type
 - 4.4. Material specific gravity
 - 4.5. Refinery
 - 4.6. Consignee
 - 4.7. Destination
 - 4.8. Quantity
 - 4.9. Contact or purchase order number
 - 4.10. Shipment date
6. Proposed proportions for liquid antistrip

For each delivery of liquid antistrip to the HMA production plant, submit a 1-pint sample to METS. Submit shipping documents. Label each liquid antistrip sampling container with:

1. Liquid antistrip type
2. Application rate
3. Sample date
4. Contract number

At the end of each day's production shift, submit production data in electronic and printed media. Present data on electronic media in tab delimited format. Use line feed carriage return with 1 separate record per line for each production data set. Allow sufficient fields for the specified data. Include data titles at least once per report. For each HMA mixing plant type, submit the following information in the order specified:

1. For batch plant mixing:
 - 1.1. Production date
 - 1.2. Time of batch completion
 - 1.3. Mix size and type
 - 1.4. Each ingredient's weight
 - 1.5. Asphalt binder content as a percentage of the total weight of mix
 - 1.6. Liquid antistrip content as a percentage of the asphalt binder weight
2. For continuous mixing plant:
 - 2.1. Production date
 - 2.2. Data capture time
 - 2.3. Mix size and type
 - 2.4. Flow rate of wet aggregate collected directly from the aggregate weigh belt
 - 2.5. Aggregate moisture content as percentage of the dry aggregate weight
 - 2.6. Flow rate of asphalt binder collected from the asphalt binder meter
 - 2.7. Flow rate of liquid antistrip collected from the liquid antistrip meter
 - 2.8. Asphalt binder content as percentage of the total weight of mix calculated from:
 - 2.8.1. Aggregate weigh belt output
 - 2.8.2. Aggregate moisture input
 - 2.8.3. Asphalt binder meter output
 - 2.9. Liquid antistrip content as percentage of the asphalt binder weight calculated from:
 - 2.9.1. Asphalt binder meter output
 - 2.9.2. Liquid antistrip meter output

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

39-1.01C(7) Lime Treatment

If aggregate lime treatment is used, submit the following with your proposed JMF submittal and each time you produce lime-treated aggregate:

1. Exact lime proportions for fine and coarse virgin aggregate
2. If marination is required, the averaged aggregate quality test results within 24 hours of sampling
3. For dry lime aggregate treatment, a treatment data log from the dry lime and aggregate proportioning device in the following order:
 - 3.1. Treatment date
 - 3.2. Time of day the data is captured
 - 3.3. Aggregate size being treated
 - 3.4. HMA type and mix aggregate size
 - 3.5. Wet aggregate flow rate collected directly from the aggregate weigh belt
 - 3.6. Aggregate moisture content, expressed as a percent of the dry aggregate weight
 - 3.7. Flow rate of dry aggregate calculated from the flow rate of wet aggregate
 - 3.8. Dry lime flow rate
 - 3.9. Lime ratio from the authorized JMF for each aggregate size being treated
 - 3.10. Lime ratio from the authorized JMF for the combined aggregate
 - 3.11. Actual lime ratio calculated from the aggregate weigh belt output, the aggregate moisture input, and the dry lime meter output, expressed as a percent of the dry aggregate weight
 - 3.12. Calculated difference between the authorized lime ratio and the actual lime ratio
4. For lime slurry aggregate treatment, a treatment data log from the slurry proportioning device in the following order:
 - 4.1. Treatment date
 - 4.2. Time of day the data is captured
 - 4.3. Aggregate size being treated
 - 4.4. Wet aggregate flow rate collected directly from the aggregate weigh belt
 - 4.5. Moisture content of the aggregate just before treatment, expressed as a percent of the dry aggregate weight
 - 4.6. Dry aggregate flow rate calculated from the wet aggregate flow rate
 - 4.7. Lime slurry flow rate measured by the slurry meter
 - 4.8. Dry lime flow rate calculated from the slurry meter output
 - 4.9. Authorized lime ratio for each aggregate size being treated
 - 4.10. Actual lime ratio calculated from the aggregate weigh belt and the slurry meter output, expressed as a percent of the dry aggregate weight
 - 4.11. Calculated difference between the authorized lime ratio and the actual lime ratio
 - 4.12. Dry lime and water proportions at the slurry treatment time

Each day during lime treatment, submit the treatment data log on electronic media in tab delimited format on a removable CD-ROM storage disk. Each continuous treatment data set must be a separate record using a line feed carriage return to present the specified data on 1 line. The reported data must include data titles at least once per report.

39-1.01C(8) Warm Mix Asphalt Technology

If a warm mix asphalt technology is used, submit the following with your proposed JMF submittal:

1. MSDS for warm mix asphalt technology
2. For warm mix asphalt water injection foam technology:
 - 2.1. Name of technology
 - 2.2. California Test 386 test result for foamed bitumen expansion ratio dated within 12 months of submittal
 - 2.3. California Test 386 test result for foamed bitumen half-life dated within 12 months of submittal
 - 2.4. Optimum foaming water content
 - 2.5. Proposed HMA production temperature range
3. For warm mix asphalt additive technology:
 - 3.1. Name of technology
 - 3.2. Percent admixture by weight of binder and percent admixture by total weight of HMA as recommended by the manufacturer
 - 3.3. Methodology for inclusion of admixture in laboratory-produced HMA

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

3.4. Proposed HMA production temperature range

Collect and hold data for the duration of the contract and submit the electronic media, daily and upon request. The snapshot of production data must include the following:

1. Date of production
2. Production location
3. Time of day the data is captured
4. HMA mix type being produced and target binder rate
5. HMA additive type, brand, and target rate
6. Temperature of the binder and HMA mixture
7. For a continuous mixing plant, the rate of flow of the dry aggregate calculated from the wet aggregate flow rate as determined by the conveyor scale
8. For a continuous mixing plant, the rate of flow of the asphalt meter
9. For a continuous mixing plant, the rate of flow of HMA additive meter
10. For batch plant mixing, actual batch weights of all ingredients
11. Dry aggregate to binder ratio calculated from metered ingredient output
12. Dry aggregate to HMA additive ratio calculated from metered output

At the end of each day's production shift, submit electronic and printed media from the HMA plant process controller. Present data on electronic media in comma-separated values or tab-separated values format. The captured data for the ingredients represented by production snapshot must have allowances for sufficient fields to satisfy the amount of data required by these specifications and include data titles at least once per report.

39-1.01C(9) Samples

For the samples taken for JMF verification, submit 3 parts to the Engineer and use 1 part for your testing.

At production start-up and within 1000 tons of the halfway point of production of HMA, submit samples split from your HMA production sample for AASHTO T 283 and AASHTO T 324 (Modified) tests to the Engineer.

For production samples taken, submit 3 parts to the Engineer and use 1 part for your testing.

39-1.01C(10)–39-1.01C(11) Reserved

39-1.01C(12) Data Cores

Section 39-1.01C(12) applies if a bid item for data core is shown on the Bid Item List.

Submit a summary of data cores taken and a photograph of each data core to the Engineer and to:

Coring@dot.ca.gov

For each data core, the summary must include:

1. Project identification number
2. Date cored
3. Core identification number
4. Type of materials recovered
5. Type and approximate thickness of unstabilized material not recovered
6. Total core thickness
7. Thickness of each individual material to within:
 - 7.1. For recovered material, 1/2 inch
 - 7.2. For unstabilized material, 1.0 inch
8. Location including:
 - 8.1. County
 - 8.2. Route
 - 8.3. Post mile
 - 8.4. Lane number
 - 8.5. Lane direction
 - 8.6. Station

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

Each data core digital photograph must include a ruler laid next to the data core. Each photograph must include:

1. Core
2. Project identification number
3. Core identification number
4. Date cored
5. County
6. Route
7. Post mile
8. Lane number
9. Lane direction

39-1.01C(13) Pavement Smoothness

39-1.01C(13)(a) General

Reserved

39-1.01C(13)(b) Straightedge Measurements

Within 2 business days of performing straightedge measurements, submit areas requiring smoothness correction. Identify locations of smoothness correction by:

1. Location Number
2. District-County-Route
3. Beginning station or post mile to the nearest 0.01 mile
4. For correction areas within a lane:
 - 4.1. Lane direction as NB, SB, EB, or WB
 - 4.2. Lane number from left to right in direction of travel
 - 4.3. Wheel path as "L" for left, "R" for right, or "B" for both
5. For correction areas not within a lane:
 - 5.1. Identify pavement area (i.e., shoulder, weight station, turnout)
 - 5.2. Direction and distance from centerline as "L" for left or "R" for right
6. Estimated size of correction area

39-1.01C(13)(c) Inertial Profiler Certification

At least 5 business days before the start of initial profiling or changing profiler or operator, submit:

1. Inertial profiler certification issued by the Department.
2. Operator certification for the inertial profiler issued by the Department.
3. List of manufacturer's recommended test procedures for the inertial profiler calibration and verification.

Within 2 business days after cross-correlation testing, submit ProVAL profiler certification analysis report for cross-correlation test results performed on test section to the Engineer and to the electronic mailbox address:

smoothness@dot.ca.gov

39-1.01C(13)(d) Inertial Profiler Data

Within 2 business days after each day of inertial profiling, submit profile data to the Engineer and to the electronic mailbox address:

smoothness@dot.ca.gov

The profiling data must include:

1. Raw profile data for each lane.
2. ProVAL ride quality analysis report for the International Roughness Index of left and right wheel paths of each lane. Submit this report in pdf file format.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

3. ProVAL ride quality analysis report for the Mean Roughness Index of each lane. Submit this report in pdf file format.
4. ProVAL smoothness assurance analysis report for the International Roughness Index of left wheel path. Submit this report in pdf file format.
5. ProVAL smoothness assurance analysis report for the International Roughness Index of right wheel path. Submit this report in pdf file format.
6. GPS data file for each lane in GPS eXchange. Submit data file in GPS eXchange file format.
7. Manufacturer's recommended inertial profiler calibration and verification test results.
8. Inertial profiler calibration and verification test results including bounce, block, and distance measurement instrument.

Submit the raw profile data in unfiltered electronic pavement profile file (PPF) format. Name the PPF file using the following naming convention:

YYYYMMDD_TTCCRRR_D_L_W_S_E_X_PT.PPF

where:

YYYY = year

MM = Month, leading zero

DD = Day of month, leading zero

TT = District, leading zero

CCC = County, 2 or 3 letter abbreviation as shown in section 1-1.08

RRR = Route number, no leading zeros

D = Traffic direction as NB, SB, WB, or EB

L = Lane number from left to right in direction of travel

W = Wheel path as "L" for left, "R" for right, or "B" for both

S = Beginning station to the nearest foot (i.e., 10+20) or beginning post mile to the nearest hundredth (i.e., 25.06) no leading zero

E = Ending station to the nearest foot (i.e., 14+20) or ending post mile to the nearest hundredth (i.e., 28.06) no leading zero

X = Profile description as "EXIST" for existing pavement, "INTER" for after prepaving smoothness correction, "PAVE" for after paving, and "CORR" for after final surface pavement correction

PT = HMA pavement type

39-1.01C(13)(e) Reserved

39-1.01C(14)–39-1.01C(15) Reserved

39-1.01D Quality Control and Assurance

39-1.01D(1) General

When testing under AASHTO T 324 (Modified), test under AASHTO T 324 with the following parameters:

1. Target air voids must equal 7 ± 1 percent
2. Specimen height must be 60 ± 1 mm
3. Number of test specimens must be 4 (2 test sets)
4. Do not average test sets
5. Test specimen must be a 150 mm gyratory compacted specimen
6. Test temperature must be set at:
 - 6.1. 113 ± 2 degrees F for PG 58
 - 6.2. 122 ± 2 degrees F for PG 64
 - 6.3. 131 ± 2 degrees F for PG 70 and above
7. Measurements for impression must be taken at every 100 passes
8. Inflection point defined as the number of wheel passes at the intersection of the creep slope and the stripping slope
9. Testing shut off must be set at 25,000 passes

Take samples under California Test 125.

HMA samples may be heated a maximum of 2 times for up to 4 hours each.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

39-1.01D(2) Job Mix Formula Verification

The Engineer verifies the JMF from samples taken from HMA produced by the plant to be used. Notify the Engineer at least 2 business days before sampling materials. Samples may be taken from a different project including a non-Department project, if you make arrangements for the Engineer to be present during sampling.

In the Engineer's presence and from the same production run, take samples of:

1. Aggregate. Coarse, fine, and supplemental fine aggregate must be taken from the combined cold feed belt, or hot bins. If lime treatment is required, samples must be taken from individual stockpiles before lime treatment. Samples must be at least 120 lb for each coarse aggregate, 80 lb for each fine aggregate, and 10 lb for each type of supplemental fines. For hot bin samples, the Department combines these aggregate samples to comply with the TV submitted on a Contractor Job Mix Formula Proposal form.
2. Asphalt binder. Take 2 samples minimum. Each sample must be in a 1-quart cylindrical-shaped can with an open top and friction lid. If the asphalt binder is modified or rubberized, the asphalt binder must be sampled with the components blended in the proportions to be used.
3. RAP. RAP samples must be at least 50 lb from each fractionated stockpile used or 100 lb from the belt.
4. Plant-produced HMA. The HMA samples must be at least 250 lb.

For aggregate, RAP, and HMA, split the samples into at least 4 parts and label their containers. Three parts are for the Department's verification testing and 1 part is for your testing.

After acceptance of the JMF submittal, the Engineer verifies each proposed JMF within 20 days of receiving all verification samples.

For JMF verification, the Engineer tests the following for compliance with the specifications:

1. Aggregate quality
2. Aggregate gradation
3. Voids in mineral aggregate on laboratory-produced HMA must comply with the mix design specifications for voids in mineral aggregate
4. HMA quality characteristics for Department acceptance

To verify the HMA for air voids, voids in mineral aggregate, and dust proportion, the Engineer uses an average of 3 briquettes. The Engineer tests plant-produced material.

If the Engineer verifies the JMF, the Engineer furnishes you a Hot Mix Asphalt Verification form.

If the Engineer's test results on plant-produced samples do not show compliance with the specifications, the Engineer notifies you. Adjust your JMF based on your testing unless the Engineer authorizes reverification without adjustments. JMF adjustments may include a change in:

1. Asphalt binder content target value up to ± 0.2 percent from the OBC value submitted on Contractor Hot Mix Asphalt Design Data form
2. Aggregate gradation target values within the target value limits specified in the aggregate gradation table

You may adjust the JMF only once due to a failed verification test.

For each HMA type and aggregate size specified, the Engineer verifies up to 2 proposed JMF submittals including a JMF adjusted after verification failure. If you submit more than 2 JMFs for each type of HMA and aggregate size, the Engineer deducts \$3,000 from payments for each verification exceeding this limit. This deduction does not apply to verifications initiated by the Engineer or if a JMF expires while HMA production is stopped longer than 30 days.

A verified JMF is valid for 12 months.

39-1.01D(3) Job Mix Formula Authorization

You may start HMA production if:

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

1. The Engineer's review of the JMF shows compliance with the specifications
2. The Department has verified the JMF within 12 months before HMA production
3. The Engineer authorizes the verified JMF

39-1.01D(4) Job Mix Formula Renewal

For a JMF renewal and upon request, in the Engineer's presence and from the same production run, take samples of:

1. Aggregate. Coarse, fine, and supplemental fine aggregate must be taken from combined cold-feed belt, or hot bins. If lime treatment is required, samples must be taken from individual stockpiles before lime treatment. Samples must be at least 120 lb for each coarse aggregate, 80 lb for each fine aggregate, and 10 lb for each type of supplemental fines. For hot bins, the Department combines these aggregate samples to comply with the TV submitted on a Contractor Job Mix Formula Proposal form.
2. Asphalt binder. Take 2 samples minimum. Each sample must be in a 1-quart cylindrical-shaped can with an open top and friction lid. If the asphalt binder is modified or rubberized, the asphalt binder must be sampled with the components blended in the proportions to be used.
3. RAP. RAP samples must be at least 50 lb from each fractionated stockpile.
4. Plant-produced HMA. The HMA samples must be at least 250 lb.

Notify the Engineer at least 2 business days before sampling materials. For aggregate, RAP, and HMA, split samples into at least 4 parts. Submit 3 parts to the Engineer and use 1 part for your testing.

Allow the Engineer 5 business days from a complete JMF reverification submittal for document review of the aggregate qualities, mix design, and JMF.

The most recent aggregate quality test results within the past 12 months may be used for verification of JMF renewal or upon request, the Engineer may perform aggregate quality tests for verification of JMF renewal.

The Engineer verifies the JMF for renewal under section 39-1.01D(2) except:

1. The Engineer keeps the samples until you provide test results for your part on a Contractor Job Mix Formula Renewal form.
2. The Department tests samples of materials obtained from the HMA production unit after you submit test results that comply with the mix design specifications.
3. After completion of the JMF verification renewal document review, the Engineer verifies each proposed JMF within 20 days of receiving the verification renewal samples and the complete Contractor Job Mix Formula Renewal form.
4. You may not adjust the JMF due to a failed verification.
5. For each HMA type and aggregate gradation specified, the Engineer verifies at no cost to you 1 proposed JMF renewal within a 12-month period.

If the Engineer verifies the JMF renewal, the Engineer furnishes you a Hot Mix Asphalt Verification form. The Hot Mix Asphalt Verification form is valid for 12 months.

39-1.01D(5) Job Mix Formula Modification

The Engineer verifies the modified JMF after the modified JMF HMA is placed on the project and verification samples are taken within the first 750 tons. The Engineer tests verification samples for compliance with:

1. Hamburg wheel track mix design specifications
2. Air void content
3. Voids in mineral aggregate on plant-produced HMA mix design specifications
4. Dust proportion mix design specifications

The Engineer may test for moisture susceptibility for compliance with the mix design specifications.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

If the modified JMF is verified, the Engineer revises your Hot Mix Asphalt Verification form to include the new asphalt binder source, new liquid antistriper producer, or new liquid antistriper dosage. Your revised form will have the same expiration date as the original form.

If a modified JMF is not verified, stop production and any HMA placed using the modified JMF is rejected.

The Engineer deducts \$2,000 from payments for each JMF modification.

39-1.01D(6) Certifications

39-1.01D(6)(a) General

Laboratories testing aggregate and HMA qualities used to prepare the mix design and JMF must be qualified under AASHTO Materials Reference Laboratory program and the Department's Independent Assurance Program.

39-1.01D(6)(b) Hot Mix Asphalt Plants

Before production, the HMA plant must have a current qualification under the Department's Material Plant Quality Program.

39-1.01D(6)(c) Inertial Profiler Certifications

The inertial profiler equipment must display a current certification decal with expiration date.

The inertial profiler operator and device certifications must be not more than 12 months old.

The operator must be certified for each different model of inertial profiler device operated.

39-1.01D(6)(d)–39-1.01D(6)(e) Reserved

39-1.01D(7) Prepaving Meeting

Meet with the Engineer at a prepaving meeting at a mutually agreed time and place. Discuss the QC plan and the methods of performing HMA production and paving work.

The following personnel must attend the prepaving meeting:

1. Project manager
2. Superintendent
3. HMA plant manager
4. HMA paving foreman

If a warm mix asphalt technology is used, a technical representative for warm mix asphalt technology must attend the prepaving meeting.

39-1.01D(8) Quality Control

39-1.01D(8)(a) General

QC test results must comply with the specifications for Department acceptance.

Prepare 3 briquettes for air voids content and voids in mineral aggregate determination. Report the average of 3 tests.

Except for smoothness, if 2 consecutive QC test results or any 3 QC test results for 1 day's production do not comply with the materials specifications:

1. Stop HMA production
2. Notify the Engineer
3. Take corrective action
4. Demonstrate compliance with the specifications before resuming production and placement

For QC tests performed under AASHTO T 27, results are considered 1 QC test regardless of number of sieves out of compliance.

Do not resume production and placement until the Engineer authorizes your corrective action proposal.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

39-1.01D(8)(b) Reserved

39-1.01D(8)(c) Aggregate

39-1.01D(8)(c)(i) General

Reserved

39-1.01D(8)(c)(ii) Aggregate Lime Treatments

If lime treatment is required, sample coarse and fine aggregate from individual stockpiles before lime treatment. Combine aggregate in the JMF proportions. Test the aggregate under the test methods and frequencies shown in the following table:

Aggregate Quality Control During Lime Treatment		
Quality characteristic	Test method	Minimum sampling and testing frequency
Sand equivalent ^{a, b}	AASHTO T 176	1 per 750 tons of untreated aggregate
Percent of crushed particles	AASHTO T 335	1 per 10,000 tons or 2 per project whichever is greater
Los Angeles Rattler	AASHTO T 96	
Fine aggregate angularity	AASHTO T 304 Method A	
Flat and elongated particles	ASTM D4791	

^aReport test results as the average of 3 tests from a single sample.

^bUse of a sand reading indicator is required as shown in AASHTO T 176, Figure 1. Sections 4.7, 4.8, 7.1.2, and 8.4.3 do not apply.

For lime slurry aggregate treatment, determine the aggregate moisture content at least once every 2 hours of treatment. Calculate moisture content under AASHTO T 329 and report it as a percent of dry aggregate weight. Use the moisture content calculations as a set point for the proportioning process controller.

The device controlling lime and aggregate proportioning must produce a treatment data log. The log consists of a series of data sets captured at 10-minute intervals throughout daily treatment. The data must be a treatment activity register and not a summation. The material represented by a data set is the quantity produced 5 minutes before and 5 minutes after the capture time. For the duration of the Contract, collected data must be stored by the controller.

If 3 consecutive sets of recorded treatment data indicate a deviation of more than 0.2 percent above or below the lime ratio in the accepted JMF, stop treatment and take corrective action.

If a set of recorded treatment data indicates a deviation of more than 0.4 percent above or below the lime ratio in the accepted JMF, stop treatment and do not use the material represented by that set of data in HMA.

If 20 percent or more of the total daily treatment indicates a deviation of more than 0.2 percent above or below the lime ratio in the accepted JMF, stop treatment and do not use that day's treated aggregate in HMA.

The Engineer may order you to stop aggregate treatment activities for any of following:

1. You fail to submit treatment data log
2. You fail to submit aggregate QC data for marinated aggregate
3. You submit incomplete, untimely, or incorrectly formatted data
4. You do not take corrective actions
5. You take late or unsuccessful corrective actions
6. You do not stop treatment when proportioning tolerances are exceeded
7. You use malfunctioning or failed proportioning devices

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

If you stop treatment for noncompliance, notify the Engineer of any corrective actions taken and conduct a successful 20-minute test run before resuming treatment.

39-1.01D(8)(d) Liquid Antistrip Treatment

For continuous mixing or batch-plant mixing, sample asphalt binder before adding liquid antistrip. For continuous mixing, sample the combined asphalt binder and liquid antistrip after the static mixer.

39-1.01D(8)(e) Production Start-up Evaluation

You and the Engineer evaluate HMA production and placement at production start-up.

Within the first 750 tons produced on the 1st day of HMA production, in the Engineer's presence, and from the same production run, take samples of:

1. Aggregate
2. Asphalt binder
3. RAP
4. HMA

Sample aggregate from the combined cold-feed belt or hot bin. Take RAP samples from the RAP system.

For aggregate, RAP, and HMA, split the samples into at least 4 parts and label their containers. Submit 3 parts to the Engineer and keep 1 part.

You and the Engineer must test the samples and report test results, except for AASHTO T 324 (Modified) and AASHTO T 283 test results, within 5 business days of sampling. For AASHTO T 324 (Modified) and AASHTO T 283 test results, report test results within 15 days of sampling. If you proceed before receipt of the test results, the Engineer may consider the HMA placed to be represented by these test results.

Take one 4- or 6-inch diameter density core for each 250 tons or portion thereof of HMA placed. For each density core, the Engineer reports the bulk specific gravity determined under AASHTO T 275, Method A, in addition to the percent of theoretical maximum density.

39-1.01D(8)(f) Hot Mix Asphalt Density

During HMA placement determine HMA density using a nuclear gauge. On the 1st day of production, develop a correlation factor between cores and nuclear gauge under California Test 375.

Test for in-place density using cores and a nuclear gauge. Test at random locations you select and include the test results in your QC production tests reports.

39-1.01D(8)(g) Tapered Notched Wedge

Perform QC testing on the completed tapered notched wedge joint as follows:

1. Perform field compaction tests at the rate of 1 test for each 750-foot section along the joint. Select random locations for testing within each 750-foot section.
2. Perform field compaction tests at the centerline of the joint, 6 inches from the upper vertical notch, after the adjacent lane is placed and before opening the pavement to traffic.
3. Determine theoretical maximum density.
4. Determine percent compaction of the longitudinal joint as the ratio of the daily average of the field compaction values and the maximum density test results.

Determine percent compaction values each day the tapered notched wedge joint is completed. If the percent compaction of 1 day's production is less than 91 percent, that day's notched wedge joint is rejected. Discontinue placement of the tapered notched wedge and notify the Engineer of changes you will make to your construction process in order to comply with the specifications.

39-1.01D(8)(h) Density Cores

To determine density, take 4- or 6-inch diameter density cores at least once every 5 business days. Take 1 density core for every 250 tons of HMA from random locations the Engineer designates. Take density cores in the Engineer's presence and backfill and compact holes with authorized material. Before submitting a density core, mark it with the density core's location and place it in a protective container.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

If a density core is damaged, replace it with a density core taken within 1 foot longitudinally from the original density core. Relocate any density core located within 1 foot of a rumble strip to 1 foot transversely away from the rumble strip.

For a tapered notched wedge joint, take 4- or 6-inch diameter density cores 6 inches from the upper vertical notch of the completed longitudinal joint for every 3,000 feet at locations designated by the Engineer. Take cores after the adjacent lane is placed and before opening the pavement to traffic. Cores must be taken in the presence of the Engineer and backfill and compact holes with authorized material. Before submitting a density core, mark it with the core's location and place it in a protective container.

39-1.01D(8)(i) Reserved

39-1.01D(8)(j) Pavement Smoothness

39-1.01D(8)(j)(i) General

Test pavement smoothness using an inertial profiler except use a 12-foot straightedge for the HMA pavement at the following locations:

1. Traffic lanes less than 1,000 feet in length including ramps, turn lanes, and acceleration and deceleration lanes
2. HMA pavement within 3 feet from and parallel to the construction joint formed between curbs, gutters, or existing pavement
3. Areas within 15 feet of manholes
4. Shoulders
5. Weigh-in-motion areas
6. Miscellaneous areas such as medians, gore areas, turnouts, and maintenance pullouts

Where inertial profiler testing is required, pavement smoothness for each lane must be determined by the International Roughness Index for the left and right wheel paths in an individual lane and then averaging the results. The average of the International Roughness Index values from the left and right wheel paths for the same lane is the Mean Roughness Index of the lane. The wheel paths are a pair of lines 3 feet from and parallel to the edge of a lane. Left and right wheel paths are based on the direction of travel.

Where inertial profiler testing is required, identify areas of localized roughness. Areas of localized roughness must be identified using the FHWA's engineering software ProVAL smoothness assurance analysis by calculating continuous International Roughness Index values for each wheel path with a 25-foot interval using a 250 mm filter.

Collect profiling data under AASHTO R 56 and analyze data using 250 mm and International Roughness Index filters.

39-1.01D(8)(j)(ii) Inertial Profiler Calibration and Verification Tests

Operate the inertial profiler according to the manufacturer's instructions and AASHTO R 57 at 1-inch recording intervals.

Notify the Engineer 2 business days before performing inertial profiler calibration and verification testing.

Conduct the following inertial profiler calibration and verification tests in the Engineer's presence each day before performing inertial profiling:

1. Block test. Verify the height sensor accuracy under California Test 387.
2. Bounce test. Verify the combined height sensor and accelerometer accuracy under California Test 387.
3. Distance measurement instrument test. Calibrate the accuracy of the testing procedure under California Test 387.
4. Manufacturer's recommended tests.

Conduct cross-correlation inertial profiler verification test in the Engineer's presence before performing initial profiling. Verify cross-correlation inertial profiler verification test at least annually. Conduct 5 repeat runs of the inertial profiler on an authorized test section. The test section must be on an existing asphalt concrete pavement surface 0.1 mile long. Calculate a cross-correlation to determine the repeatability of

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CTA Contract No. XXX

your device under California Test 387 using ProVAL profiler certification analysis with a 3 feet maximum offset. The cross-correlation must be a minimum of 0.92.

For each 0.1 mile section, your International Roughness Index values must be within 10 percent of the Department's International Roughness Index values. The Engineer may order you to recalibrate your inertial profiler equipment and reprofile. If your results are inaccurate due to operator error, the Engineer may disqualify your inertial profiler operator.

39-1.01D(8)(j)(iii) Smoothness Testing

Notify the Engineer of start location by station and start time at least 2 business days before profiling.

Remove foreign objects on the pavement surface before profiling.

Mark the beginning and ending station on the pavement shoulder before profiling. Stationing must be the same when profiling more than one surface.

While collecting the profile data to determine the International Roughness Index values, record the following locations in the raw profile data:

1. Begin and end of all bridge approach slabs
2. Begin and end of all bridges
3. Begin and end of all culverts visible on the roadway surface

Determine the Mean Roughness Index for 0.1-mile fixed sections using the ProVAL ride quality analysis with a 250 mm filter. Profile the left and right wheel paths of each lane. Calculate the Mean Roughness Index of each lane. A partial section less than 0.1 mile that is the result of an interruption to continuous pavement surface must comply with the Mean Roughness Index specifications for a full section. Adjust the Mean Roughness Index for a partial section to reflect a full section based on the proportion of a section paved.

Determine the areas of localized roughness using a continuous International Roughness Index for each wheel path with a 25-foot interval using a 250 mm filter.

Pavement smoothness must comply with the specifications in section 39-1.01D(9)(c).

39-1.01D(9) Department Acceptance

39-1.01D(9)(a) General

The Department tests treated aggregate for acceptance before lime treatment except for gradation.

The Engineer takes HMA samples for AASHTO T 283 and AASHTO T 324 (Modified) from one of the following:

1. Automatic sampling device at the plant
2. Automatic sampling device at the truck
3. Windrow

The Engineer takes HMA samples for all other tests from one of the following:

1. Automatic sampling device at the plant
2. Automatic sampling device at the truck
3. Windrow
4. Mat behind the paver

The Engineer's sampling and testing is independent of your QC sampling and testing.

If you request, the Engineer splits samples and provides you with a part.

No single test result may represent more than 750 tons or one day's production, whichever is less, excluding AASHTO T 283 and AASHTO T 324 (Modified).

Except for smoothness, if 2 consecutive Department acceptance test results or any 3 Department acceptance test results for 1 day's production do not comply with the specifications:

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

1. Stop HMA production
2. Take corrective action
3. Demonstrate compliance with the specifications before resuming production and placement

The Engineer accepts HMA based on:

1. Authorized JMF
2. Authorized QC plan
3. Asphalt binder compliance
4. Asphalt emulsion compliance
5. Visual inspection
6. Pavement smoothness

39-1.01D(9)(b) In-Place Density

The Engineer tests the density core you take from each 250 tons of HMA. The Engineer determines the percent of theoretical maximum density for each density core by determining the density core's density and dividing by the theoretical maximum density.

The Department determines the percent of maximum theoretical density from density cores if any of the following applies:

1. 1/2-inch, 3/8-inch, or no. 4 aggregate gradation is used and the specified total paved thickness is greater than 0.15 foot and any layer is less than 0.15 foot.
2. 3/4-inch aggregate gradation is used and the specified total paved thickness is greater than 0.20 foot and any layer is less than 0.20 foot.

Density cores must be taken from the final layer, cored to the specified total paved thickness.

If the percent of theoretical maximum density does not comply with the specifications, the Engineer may accept the HMA and take a payment deduction.

For acceptance of a completed tapered notched wedge joint, the Engineer determines density from cores based on:

1. Field compaction by measuring the bulk specific gravity of the cores under AASHTO T 275, Method A
2. Percent compaction as the ratio of the average of the bulk specific gravity of the core for each day's production to the maximum density test value

39-1.01D(9)(c) Pavement Smoothness

For areas that require pavement smoothness determined using an inertial profiler, the pavement surface must:

1. Have no areas of localized roughness with an International Roughness Index greater than 160 in/mi
2. Comply with the Mean Roughness Index requirements shown in the following table for a 0.1 mile section:

HMA^a Pavement Smoothness Acceptance Criteria

HMA thickness	Mean Roughness Index requirement
> 0.20 foot	60 in/mi or less
≤ 0.20 foot	75 in/mi or less

^a Except OGFC

The final surface of HMA must comply with the Mean Roughness Index requirements before placing OGFC. Correct pavement to the Mean Roughness Index specifications. Localized roughness greater than 160 in/mi must be corrected regardless of the International Roughness Index values of a 0.1-mile section.

For areas that require pavement smoothness determined using a 12-foot straightedge, the HMA pavement surface must not vary from the lower edge of the straightedge by more than:

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

1. 0.01 foot when the straightedge is laid parallel with the centerline
2. 0.02 foot when the straightedge is laid perpendicular to the centerline and extends from edge to edge of a traffic lane
3. 0.02 foot when the straightedge is laid within 24 feet of a pavement conform

Pavement smoothness may be accepted based on your testing in the absence of the Department's testing.

39-1.01D(9)(d) Dispute Resolution

You and the Engineer must work together to avoid potential conflicts and to resolve disputes regarding test result discrepancies. Notify the Engineer within 5 business days of receiving a test result if you dispute the test result.

If you or the Engineer dispute each other's test results, submit QC test results and copies of paperwork including worksheets used to determine the disputed test results. An independent third party performs referee testing. Before the third party participates in a dispute resolution, it must be qualified under AASHTO Materials Reference Laboratory program, and the Department's Independent Assurance Program. The independent third party must have no prior direct involvement on this Contract. By mutual agreement, the independent third party is chosen from:

1. Department laboratory in a district or region not in the district or region the project is located
2. Transportation Laboratory
3. Laboratory not currently employed by you or your HMA producer

If split QC or acceptance samples are not available, the independent third party uses any available material representing the disputed HMA for evaluation.

If the independent third party determines the Department's test results are valid, the Engineer deducts the independent third party's testing costs from payments. If the independent third party determines your test results are valid, the Department pays the independent third party's testing costs.

39-1.02 MATERIALS

39-1.02A General

Reserved

39-1.02B Mix Design

39-1.02B(1) General

The HMA mix design must comply with AASHTO R 35 except:

1. Notes 3, 6, and 10 do not apply
2. AASHTO M 323 does not apply on combinations of aggregate gradation and asphalt binder contents to determine the OBC and HMA mixture qualities

The Contractor Hot Mix Asphalt Design Data form must show documentation on aggregate quality.

39-1.02B(2) Hot Mix Asphalt Treatments

If the test results for AASHTO T 283 or AASHTO T 324 (Modified) for untreated plant-produced HMA are less than the minimum requirements for HMA mix design, determine the plasticity index of the aggregate blend under California Test 204.

If the plasticity index is greater than 10, do not use that aggregate blend.

If the plasticity index is from 4 to 10, treat the aggregate with dry lime with marination or lime slurry with marination.

If the plasticity index is less than 4, treat the aggregate with dry lime or lime slurry with marination, or treat the HMA with liquid antistripping.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

39-1.02B(3) Warm Mix Asphalt Technology

For HMA with warm mix asphalt additive technology, produce HMA mix samples for your mix design using your methodology for inclusion of warm mix asphalt admixture in laboratory-produced HMA. For warm mix asphalt water injection foam technology, the use of foamed asphalt for mix design is not required.

39-1.02C Asphalt Binder

Asphalt binder must comply with section 92.

For replace asphalt concrete surfacing or hot mix asphalt (leveling) the grade of asphalt binder for the HMA must be PG 64-10 or PG 64-16.

39-1.02D Aggregate

39-1.02D(1) General

Aggregate must be clean and free from deleterious substances.

The aggregate for replace asphalt concrete surfacing and hot mix asphalt (leveling) must comply with the gradation specifications for Type A HMA in section 39-2.02.

39-1.02D(2) Aggregate Gradations

Aggregate gradation must be determined before the addition of asphalt binder and must include supplemental fines. Test for aggregate gradation under AASHTO T 27. Note 4 of AASHTO T 27 and AASHTO T 11 do not apply. Use a mechanical sieve shaker. Aggregate shaking time must not exceed 10 minutes for each coarse and fine aggregate portion.

Choose a target value within the target value limits shown in the tables titled "Aggregate Gradations."

Gradations are based on nominal maximum aggregate size.

39-1.02D(3) Aggregate Lime Treatments

39-1.02D(3)(a) General

If aggregate lime treatment is required, virgin aggregate must comply with the aggregate quality specifications.

Lime for treating aggregate must comply with section 24-2.02B.

Water for lime treatment of aggregate with lime slurry must comply with section 24-2.02C.

Notify the Engineer at least 24 hours before the start of aggregate treatment.

Do not treat RAP.

The lime ratio is the pounds of dry lime per 100 lb of dry virgin aggregate expressed as a percentage. Water content of slurry or untreated aggregate must not affect the lime ratio.

Coarse and fine aggregate fractions must have the lime ratio ranges shown in the following table:

Aggregate fractions	Lime ratio percent
Coarse	0.4–1.0
Fine	1.5–2.0
Combined	0.8–1.5

The lime ratio for fine and coarse aggregate must be within ± 0.2 percent of the lime ratio in the accepted JMF. The lime ratio must be within ± 0.2 percent of the authorized lime ratio when you combine the individual aggregate sizes in the JMF proportions. The lime ratio must be determined before the addition of RAP.

If marination is required, marinate treated aggregate in stockpiles from 24 hours to 60 days before using in HMA. Do not use aggregate marinated longer than 60 days.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

Treated aggregate must not have lime balls or clods.

39-1.02D(3)(b) Dry Lime

If marination is required:

1. Treat and marinate coarse and fine aggregates separately
2. Treat the aggregate and stockpile for marination only once
3. Treat the aggregate separate from HMA production

Proportion dry lime by weight with an automatic continuous proportioning system.

If you use a batch-type proportioning system for HMA production, control proportioning in compliance with the specifications for continuous mixing plants. Use a separate dry lime aggregate treatment system for HMA batch mixing including:

1. Pugmill mixer
2. Controller
3. Weigh belt for the lime
4. Weigh belt for the aggregate

If using a continuous mixing plant for HMA production without lime marinated aggregates, use a controller that measures the blended aggregate weight after any additional water is added to the mixture. The controller must determine the quantity of lime added to the aggregate from the aggregate weigh belt input in connection with the manually input total aggregate moisture, the manually input target lime content, and the lime proportioning system output. Use a continuous aggregate weigh belt and pugmill mixer for lime treatment in addition to the weigh belt for the aggregate proportioning to asphalt binder in the HMA plant. If you use a water meter for moisture control for lime treatment, the meter must comply with Department's Material Plant Quality Program manual.

At the time of mixing dry lime with aggregate, the aggregate moisture content must ensure complete lime coating. The aggregate moisture content must not cause aggregate to be lost between the point of weighing the combined aggregate continuous stream and the dryer. Add water to the aggregate for mixing and coating before dry lime addition. Immediately before mixing lime with aggregate, water must not visibly separate from the aggregate.

Mix aggregate, water, and dry lime with a continuous pugmill mixer with twin shafts. Immediately before mixing lime with aggregate, water must not visibly separate from the aggregate. Store dry lime in a uniform and free-flowing condition. Introduce dry lime to the pugmill in a continuous process. The introduction must occur after the aggregate cold feed and before the point of proportioning across a weigh belt and the aggregate dryer. Prevent loss of dry lime.

The pugmill must be equipped with paddles arranged to provide sufficient mixing action and mixture movement. The pugmill must produce a homogeneous mixture of uniformly coated aggregates at mixer discharge.

If the aggregate treatment process is stopped longer than 1 hour, clean the equipment of partially treated aggregate and lime.

Aggregate must be completely treated before introduction into the mixing drum.

39-1.02D(3)(c) Lime Slurry

For lime slurry aggregate treatment, treat aggregate separate from HMA production. Stockpile and marinate the aggregate.

Proportion lime and water with a continuous or batch mixing system.

Add lime to the aggregate as slurry consisting of mixed dry lime and water at a ratio of 1 part lime to from 2 to 3 parts water by weight. The slurry must completely coat the aggregate.

Immediately before mixing lime slurry with the aggregate, water must not visibly separate from the aggregate.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

Proportion lime slurry and aggregate by weight in a continuous process.

39-1.02E Liquid Antistrip Treatment

Liquid antistrip must be from 0.25 to 1.0 percent by weight of asphalt binder. Do not use liquid antistrip as a substitute for asphalt binder.

Liquid antistrip total amine value must be 325 minimum when tested under ASTM D2074.

Use only 1 liquid antistrip type or brand at a time. Do not mix liquid antistrip types or brands.

Store and mix liquid antistrip under the manufacturer's instructions.

39-1.02F–39-1.02G Reserved

39-1.02H Hot Mix Asphalt Production

39-1.02H(1) General

Do not start HMA production before verification and authorization of JMF.

HMA plants must be Department-qualified. Before production, the HMA plant must have a current qualification under the Department's Materials Plant Quality Program.

For lime treated aggregate, the HMA plant must be equipped with a bag-house dust system. Material collected in the dust system must be returned to the mix.

Weighing and metering devices used for the production of HMA modified with additives must comply with the requirements of the Department's Material Plant Quality Program. If a loss-in-weight meter is used for dry HMA additive, the meter must have an automatic and integral material delivery control system for the refill cycle.

Calibrate the loss-in-weight meter by:

1. Including at least 1 complete system refill cycle during each calibration test run
2. Operating the device in a normal run mode for 10 minutes immediately before starting the calibration process
3. Isolating the scale system within the loss-in-weight feeder from surrounding vibration
4. Checking the scale system within the loss-in-weight feeder for accuracy before and after the calibration process and daily during mix production
5. Using a 15-minute or 250-pound-minimum test run size for a dry ingredient delivery rate of less than 1 ton per hour.
6. Complying with the limits of Table B, "Conveyor Scale Testing Extremes," in the Department's Material Plant Quality Program

Proportion aggregate by hot or cold-feed control. During production, you may adjust hot or cold-feed proportion controls for virgin aggregate and RAP.

Aggregate temperature must not be more than 375 degrees F when mixed with the asphalt binder. Temperature requirements do not apply to RAP.

Asphalt binder temperature must be from 275 to 375 degrees F when mixed with aggregate.

Mix HMA ingredients into a homogeneous mixture of coated aggregates.

HMA with or without RAP must not be more than 325 degrees F.

For HMA produced using warm mix asphalt technology, HMA must be at a temperature between 240 and 325 degrees F.

If method compaction is used, HMA must be produced at a temperature between 305 and 325 degrees F.

If you stop production for longer than 30 days, a production start-up evaluation is required.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

39-1.02H(2) Liquid Antistrip

If 3 consecutive sets of recorded production data show actual delivered liquid antistrip weight is more than ± 1 percent of the authorized mix design liquid antistrip weight, stop production and take corrective action.

If a set of recorded production data shows actual delivered liquid antistrip weight is more than ± 2 percent of the authorized mix design liquid antistrip weight, stop production. If the liquid antistrip weight exceeds 1.2 percent of the asphalt binder weight, do not use the HMA represented by that data.

The continuous mixing plant controller proportioning the HMA must produce a production data log. The log consists of a series of data sets captured at 10-minute intervals throughout daily production. The data must be a production activity register and not a summation. The material represented by the data is the quantity produced 5 minutes before and 5 minutes after the capture time. For the duration of the Contract, collected data must be stored by the plant controller or a computer's memory at the plant.

The Engineer orders proportioning activities stopped for any of the following:

1. You do not submit data
2. You submit incomplete, untimely, or incorrectly formatted data
3. You do not take corrective actions
4. You take late or unsuccessful corrective actions
5. You do not stop production when proportioning tolerances are exceeded
6. You use malfunctioning or failed proportioning devices

If you stop production, notify the Engineer of any corrective actions taken before resuming.

39-1.02H(3) Warm Mix Asphalt Technology

Proportion all ingredients by weight. The HMA plant process controller must be the sole source of ingredient proportioning control and be fully interfaced with all scales and meters used in the production process. The addition of the HMA additive must be controlled by the plant process controller.

Liquid ingredient additive, including a normally dry ingredient made liquid, must be proportioned with a mass flow meter at continuous mixing plants. Use a mass flow meter or a container scale to proportion liquid additives at batch mixing plants.

Continuous mixing plants using HMA additives must comply with the following:

1. Dry ingredient additives for continuous production must be proportioned with a conveyor scale or a loss-in-weight meter.
2. HMA plant process controller and ingredient measuring systems must be capable of varying all ingredient feed rates proportionate with the dry aggregate delivery at all production rates and rate changes.
3. Liquid HMA additive must enter the production stream with the binder. Dry HMA additive must enter the production stream at or before the mixing area.
4. If dry HMA additives are used at continuous mixing HMA plants, baghouse dust systems must return all captured material to the mix.
5. HMA additive must be proportioned to within ± 0.3 percent of the target additive rate.

Batch mixing plants using HMA additives must comply with the following:

1. Metered HMA additive must be placed in an intermediate holding vessel before being added to the stream of asphalt binder as it enters the pugmill.
2. If a container scale is used, weigh additive before combining with asphalt binder. Keep the container scale separate from other ingredient proportioning. The container scale capacity must be no more than twice the volume of the maximum additive batch size. The container scale's graduations must be smaller than the proportioning tolerance or 0.001 times the container scale capacity.
3. Dry HMA additive proportioning devices must be separate from metering devices for the aggregates and asphalt binder. Proportion dry HMA additive directly into the pugmill or place in an intermediate holding vessel to be added to the pugmill at the appropriate time in the batch cycle. Dry ingredients for batch production must be proportioned with a hopper scale.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CTA Contract No. XXX

4. Zero tolerance for the HMA additive batch scale is ± 0.5 percent of the target additive weight. The indicated HMA additive batch scale weight may vary from the preselected weight setting by up to ± 1.0 percent of the target additive weight.

39-1.02I Geosynthetic Pavement Interlayer

Geosynthetic pavement interlayer must comply with the specifications for pavement fabric, paving mat, paving grid, paving geocomposite grid, or geocomposite strip membrane as shown.

The asphalt binder for geosynthetic pavement interlayer must be PG 64-10, PG 64-16, or PG 70-10.

39-1.02J Tack Coat

Tack coat must comply with the specifications for asphaltic emulsion or asphalt binder. Choose the type and grade.

39-1.02K Miscellaneous Areas and Dikes

For miscellaneous areas and dikes:

1. Choose either the 3/8-inch or 1/2-inch aggregate gradation for Type A HMA.
2. Minimum asphalt binder content must be 6.8 percent for 3/8-inch aggregate and 6.0 percent for 1/2-inch aggregate. If you request and the Engineer authorizes, you may reduce the minimum asphalt binder content.
3. Choose asphalt binder Grade PG 64-10, PG 64-16 or PG 70-10.

For HMA used in miscellaneous areas and dikes, sections 39-1.01C, 39-1.01D, 39-1.02B, 39-1.02D(3), and 39-1.02E–J do not apply.

39-1.03 CONSTRUCTION

39-1.03A General

Do not place HMA on wet pavement or frozen surface.

You may deposit HMA in a windrow and load it in the paver if:

1. Paver is equipped with a hopper that automatically feeds the screed
2. Loading equipment can pick up the windrowed material and deposit it in the paver hopper without damaging base material
3. Activities for deposit, pickup, loading, and paving are continuous
4. HMA temperature in the windrow does not fall below 260 degrees F

HMA placed in a windrow on the roadway surface must not extend more than 150 feet in front of the loading equipment or material transfer vehicle.

You may place HMA in 1 or more layers on areas less than 5 feet wide and outside the traveled way, including shoulders. You may use mechanical equipment other than a paver for these areas. The equipment must produce uniform smoothness and texture.

HMA handled, spread, or windrowed must not stain the finished surface of any improvement, including pavement.

Do not use petroleum products such as kerosene or diesel fuel to release HMA from trucks, spreaders, or compactors.

HMA must be free of:

1. Segregation
2. Coarse or fine aggregate pockets
3. Hardened lumps

Where density or data core samples are taken, backfill and compact holes with authorized material.

Complete finish rolling activities before the pavement surface temperature is:

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

1. Below 150 degrees F for HMA with unmodified binder
2. Below 140 degrees F for HMA with modified binder
3. Below 130 degrees F for HMA with warm mix asphalt technology

39-1.03B Spreading and Compacting Equipment

39-1.03B(1) General

Paving equipment for spreading must be:

1. Self-propelled
2. Mechanical
3. Equipped with a screed or strike-off assembly that can distribute HMA the full width of a traffic lane
4. Equipped with a full-width compacting device
5. Equipped with automatic screed controls and sensing devices that control the thickness, longitudinal grade, and transverse screed slope

Install and maintain grade and slope references.

The screed must be heated and produce a uniform HMA surface texture without tearing, shoving, or gouging.

The paver must not leave marks such as ridges and indentations unless you can eliminate them by rolling.

Rollers must be equipped with a system that prevents HMA from sticking to the wheels. You may use a parting agent that does not damage the HMA or impede the bonding of layers.

In areas inaccessible to spreading and compacting equipment:

1. Spread the HMA by any means to obtain the specified lines, grades, and cross sections
2. Use a pneumatic tamper, plate compactor, or equivalent to achieve thorough compaction

39-1.03B(2) Material Transfer Vehicle

If a material transfer vehicle is specified, the material transfer vehicle must have sufficient capacity to prevent stopping the paver and must be capable of:

1. Either receiving HMA directly from trucks or using a windrow pickup head to load it from a windrow deposited on the roadway surface
2. Remixing the HMA with augers before transferring into the paver's receiving hopper or feed system
3. Transferring HMA directly into the paver's receiving hopper or feed system

39-1.03B(3) Method Compaction Equipment

For method compaction, each paver spreading HMA must be followed by 3 rollers:

1. One vibratory roller specifically designed to compact HMA. The roller must be capable of at least 2,500 vibrations per minute and must be equipped with amplitude and frequency controls. The roller's gross static weight must be at least 7.5 tons.
2. One oscillating type pneumatic-tired roller at least 4 feet wide. Pneumatic tires must be of equal size, diameter, type, and ply. The tires must be inflated to 60 psi minimum and maintained so that the air pressure does not vary more than 5 psi.
3. One steel-tired, 2-axle tandem roller. The roller's gross static weight must be at least 7.5 tons.

Each roller must have a separate operator. Rollers must be self-propelled and reversible.

39-1.03B(4)–39-1.03B(6) Reserved

39-1.03C Surface Preparation

39-1.03C(1) General

Before placing HMA, remove loose paving particles, dirt, and other extraneous material by any means including flushing and sweeping.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

39-1.03C(2) Subgrade

Prepare subgrade to receive HMA under the sections for the material involved. Subgrade must be free of loose and extraneous material.

39-1.03C(3) Reserved

39-1.03C(4) Prepaving Inertial Profiler

Section 39-1.03C(4) applies to existing asphalt concrete surfaces receiving an HMA overlay if a bid item for prepaving inertial profiler is shown in the Bid Item List.

Before starting paving activities, perform prepaving inertial profiler measurements. Prepaving inertial profiler includes taking profiles of the existing pavement, analyzing the data with ProVAL to determine existing pavement International Roughness Index, Mean Roughness Index, and areas of localized roughness.

If the Contract includes cold planing, perform prepaving inertial profiler measurements before cold planning.

If the Contract includes replace asphalt concrete surfacing, perform prepaving inertial profiler measurements after replacing the asphalt concrete surfacing.

39-1.03C(5) Prepaving Grinding

Section 39-1.03C(5) applies to all existing asphalt concrete surfaces that will not be cold planned or milled and that will receive an HMA overlay less than or equal to 0.20 foot exclusive of OGFC if a bid item for prepaving grinding day is shown in the Bid Item List.

After performing prepaving inertial profiling, correct areas of localized roughness greater than 180 in/mi.

Prepaving grinding day includes correcting areas of localized roughness, taking profiles of the corrected areas, and submitting profile data as specified in section 39-1.01C(13)(d).

Notify the Engineer of those areas of localized roughness that cannot be corrected by prepaving grinding. The Engineer responds to your notification within 5 business days.

For those areas of localized roughness that cannot be corrected by grinding, the Engineer may order you to either (1) not correct the areas of localized roughness or (2) correct areas of localized roughness by a different method and take profiles of the corrected areas with an inertial profiler. Corrective work performed by a different method, including taking profiles of the corrected areas and associated traffic control, is change order work.

If ordered not to correct areas of localized roughness, the smoothness specifications do not apply to the final pavement surface placed in those areas.

Correct prepaving areas of localized roughness that you predict will cause the final surface of HMA pavement to be noncompliant with the smoothness specifications. After correcting prepaving areas of localized roughness, take profiles of the corrected area and submit profile data as specified in section 39-1.01C(13)(d).

Dispose of grinding residue.

Pave within 7 days of correcting areas.

The final pavement surface must comply with section 39-1.01D(9)(c).

If the Engineer determines more time is required for prepaving grinding than the Contract allows for and if prepaving grinding is a controlling activity, the Engineer makes a time adjustment.

39-1.03C(6) Tack Coat

Apply tack coat:

1. To existing pavement including planed surfaces
2. Between HMA layers
3. To vertical surfaces of:

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

- 3.1. Curbs
- 3.2. Gutters
- 3.3. Construction joints

Before placing HMA, apply tack coat in 1 application at the minimum residual rate shown in the following table for the condition of the underlying surface:

Tack Coat Application Rates for HMA

HMA over:	Minimum Residual Rates (gal/sq yd)		
	CSS1/CSS1h, SS1/SS1h and QS1h/CQS1h Asphaltic Emulsion	CRS1/CRS2, RS1/RS2 and QS1/CQS1 Asphaltic Emulsion	Asphalt Binder and PMRS2/PMCRS2 and PMRS2h/PMCRS2h Asphaltic Emulsion
New HMA (between layers)	0.02	0.03	0.02
PCC and existing AC surfacing	0.03	0.04	0.03
Planed pavement	0.05	0.06	0.04

Notify the Engineer if you dilute asphaltic emulsion with water. The weight ratio of added water to asphaltic emulsion must not exceed 1 to 1.

Measure added water either by weight or volume under section 9-1.02 or you may use water meters from water districts, cities, or counties. If you measure water by volume, apply a conversion factor to determine the correct weight.

With each dilution, submit:

1. Weight ratio of water to bituminous material in the original asphaltic emulsion
2. Weight of asphaltic emulsion before diluting
3. Weight of added water
4. Final dilution weight ratio of water to asphaltic emulsion

Apply to vertical surfaces with a residual tack coat rate that will thoroughly coat the vertical face without running off.

If you request and the Engineer authorizes, you may:

1. Change tack coat rates
2. Omit tack coat between layers of new HMA during the same work shift if:
 - 2.1. No dust, dirt, or extraneous material is present
 - 2.2. Surface is at least 140 degrees F

Immediately in advance of placing HMA, apply additional tack coat to damaged areas or where loose or extraneous material is removed.

Close areas receiving tack coat to traffic. Do not track tack coat onto pavement surfaces beyond the job site.

Asphalt binder tack coat temperature must be from 285 to 350 degrees F when applied.

39-1.03C(7) Geosynthetic Pavement Interlayer

If specified, place geosynthetic pavement interlayer over a coat of asphalt binder. Place geosynthetic pavement interlayer in compliance with the manufacturer's instructions.

Before placing the geosynthetic pavement interlayer and asphalt binder:

1. Repair cracks 1/4 inch and wider, spalls, and holes in the pavement. Repairing cracks is change order work.
2. Clean the pavement of loose and extraneous material.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

Immediately before placing the interlayer, apply 0.25 ± 0.03 gallon of asphalt binder per square yard of interlayer or until the fabric is saturated. Apply asphalt binder the width of the geosynthetic pavement interlayer plus 3 inches on each side. At an interlayer overlap, apply asphalt binder on the lower interlayer the same overlap distance as the upper interlayer.

Align and place the interlayer with no overlapping wrinkles, except a wrinkle that overlaps may remain if it is less than 1/2 inch thick. If the overlapping wrinkle is more than 1/2 inch thick, cut the wrinkle out and overlap the interlayer no more than 2 inches.

The minimum HMA thickness over the interlayer must be 0.12 foot thick including conform tapers. Do not place the interlayer on a wet or frozen surface.

Overlap the interlayer borders between 2 to 4 inches. In the direction of paving, overlap the following roll with the preceding roll at any break.

You may use rolling equipment to correct distortions or wrinkles in the interlayer.

If asphalt binder tracked onto the interlayer or brought to the surface by construction equipment causes interlayer displacement, cover it with a small quantity of HMA.

Before placing HMA on the interlayer, do not expose the interlayer to:

1. Traffic except for crossings under traffic control and only after you place a small HMA quantity
2. Sharp turns from construction equipment
3. Damaging elements

Pave HMA on the interlayer during the same work shift.

39-1.03D Longitudinal Joints

39-1.03D(1) General

Longitudinal joints in the top layer must match lane lines. Alternate the longitudinal joint offsets in the lower layers at least 0.5 foot from each side of the lane line. You may request other longitudinal joint placement patterns.

A vertical longitudinal joint of more than 0.15 foot is not allowed at any time between adjacent lanes open to traffic.

For HMA thickness of 0.15 foot or less, the distance between the ends of the adjacent surfaced lanes at the end of each day's work must not be greater than can be completed in the following day of normal paving.

For HMA thickness greater than 0.15 foot, you must place HMA on adjacent traveled way lanes or shoulder so that at the end of each work shift the distance between the ends of HMA layers on adjacent lanes is from 5 to 10 feet. Place additional HMA along the transverse edge at each lane's end and along the exposed longitudinal edges between adjacent lanes. Hand rake and compact the additional HMA to form temporary conforms. You may place kraft paper or other authorized release agent under the conform tapers to facilitate the taper removal when paving activities resume.

If placing HMA against the edge of existing pavement, sawcut or grind the pavement straight and vertical along the joint and remove extraneous material.

39-1.03D(2) Tapered Notched Wedge

For divided highways with an HMA lift thickness greater than 0.15 foot, you may construct a 1-foot wide tapered notched wedge joint as a longitudinal joint between adjacent lanes open to traffic. A vertical notch of 0.75 inch maximum must be placed at the top and bottom of the tapered wedge.

The tapered notched wedge must retain its shape while exposed to traffic. Pave the adjacent lane within 1 day.

Construct the tapered portion of the tapered notched wedge with an authorized strike-off device. The strike-off device must provide a uniform slope and must not restrict the main screed of the paver.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

You may use a device attached to the screed to construct longitudinal joints that will form a tapered notched wedge in a single pass. The tapered notched wedge must be compacted to a minimum of 91 percent compaction.

39-1.03E Edge Treatments

Construct edge treatment on the HMA pavement as shown.

Where a safety edge is required, use the same type of HMA used for the adjacent lane or shoulder.

The edge of roadway where the safety edge treatment is to be placed must have a solid base, free of debris such as loose material, grass, weeds, or mud. Grade areas to receive the safety edge as required.

The safety edge treatment must be placed monolithic with the adjacent lane or shoulder and shaped and compacted with a device attached to the paver.

The device must be capable of shaping and compacting HMA to the required cross section as shown. Compaction must be by constraining the HMA to reduce the cross sectional area by 10 to 15 percent. The device must produce a uniform surface texture without tearing, shoving, or gouging and must not leave marks such as ridges and indentations. The device must be capable of transition to cross roads, driveways, and obstructions.

For safety edge treatment, the angle of the slope must not deviate by more than ± 5 degrees from the angle shown. Measure the angle from the plane of the adjacent finished pavement surface.

If paving is done in multiple lifts, the safety edge treatment must be placed with each lift.

Short sections of hand work are allowed to construct transitions for safety edge treatment.

39-1.03F Widening Existing Pavement

If widening existing pavement, construct new pavement structure to match the elevation of the existing pavement's edge before placing HMA over the existing pavement.

39-1.03G Shoulders, Medians, and Other Road Connections

Until the adjoining through lane's top layer has been paved, do not pave the top layer of:

1. Shoulders
2. Tapers
3. Transitions
4. Road connections
5. Driveways
6. Curve widenings
7. Chain control lanes
8. Turnouts
9. Turn pockets

If the number of lanes changes, pave each through lane's top layer before paving a tapering lane's top layer. Simultaneous to paving a through lane's top layer, you may pave an adjoining area's top layer, including shoulders. Do not operate spreading equipment on any area's top layer until completing final compaction.

If shoulders or median borders are shown, pave shoulders and median borders adjacent to the lane before opening a lane to traffic.

If shoulder conform tapers are shown, place conform tapers concurrently with the adjacent lane's paving.

If a driveway or a road connection is shown, place additional HMA along the pavement's edge to conform to road connections and driveways. Hand rake, if necessary, and compact the additional HMA to form a smooth conform taper.

39-1.03H Leveling

Section 39-1.03H applies if a bid item for hot mix asphalt (leveling), is shown on the Bid Item List.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

Fill and level irregularities and ruts with HMA before spreading HMA over the base, existing surfaces, or bridge decks. You may use mechanical equipment other than a paver for these areas. The equipment must produce uniform smoothness and texture. HMA used to change an existing surface's cross slope or profile is not paid for as hot mix asphalt (leveling).

39-1.03I Miscellaneous Areas and Dikes

Prepare the area to receive HMA for miscellaneous areas and dikes, including excavation and backfill as needed.

Spread miscellaneous areas in 1 layer and compact to the specified lines and grades.

In median areas adjacent to slotted median drains, each layer of HMA must not exceed 0.20 foot maximum compacted thickness.

The finished surface must be:

1. Textured uniformly
2. Compacted firmly
3. Without depressions, humps, and irregularities

39-1.03J Replace Asphalt Concrete Surfacing

Where replace asphalt concrete surfacing is shown, remove existing asphalt concrete surfacing and replace with HMA. The Engineer determines the exact limits of asphalt concrete surfacing to be replaced.

Replace asphalt concrete in a lane before the lane is specified to be opened to traffic.

Before removing asphalt concrete, outline the replacement area and cut neat lines with a saw or grind to full depth of the existing asphalt concrete. Do not damage asphalt concrete and base remaining in place.

If the base is excavated beyond the specified plane, replace it with HMA. The Department does not pay for this HMA.

Do not use a material transfer vehicle if replace asphalt concrete surfacing is specified.

39-1.03K–39-1.03N Reserved

39-1.03O Compaction

39-1.03O(1) General

Rolling must leave the completed surface compacted and smooth without tearing, cracking, or shoving.

If a vibratory roller is used as a finish roller, turn the vibrator off.

Do not open new HMA pavement to traffic until the surface temperature is below 130 degrees F.

If the surface to be paved is both in sunlight and shade, pavement surface temperatures are taken in the shade.

39-1.03O(2) Method Compaction

Use method compaction for any of the following conditions:

1. Specified paved thickness is less than 0.15 foot
2. Specified paved thickness is less than 0.20 foot and a 3/4-inch aggregate gradation is specified and used
3. Specified paved thickness is less than 0.25 foot and a 1-inch aggregate gradation is specified and used
4. Replace asphalt concrete surfacing
5. Leveling courses
6. Areas the Engineer determines conventional compaction and compaction measurement methods are impeded

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

HMA compaction coverage is the number of passes needed to cover the paving width. A pass is 1 roller's movement parallel to the paving in either direction. Overlapping passes are part of the coverage being made and are not a subsequent coverage. Do not start a coverage until completing the prior coverage.

Method compaction must consist of performing:

1. Breakdown compaction of each layer with 3 coverages using a vibratory roller. The speed of the vibratory roller in miles per hour must not exceed the vibrations per minute divided by 1,000. If the HMA layer thickness is less than 0.08 foot, turn the vibrator off.
2. Intermediate compaction of each layer of HMA with 3 coverages using a pneumatic-tired roller at a speed not to exceed 5 mph.
3. Finish compaction of HMA with 1 coverage using a steel-tired roller.

Start rolling at the lower edge and progress toward the highest part.

The Engineer may order fewer coverages if the layer thickness of HMA is less than 0.15 foot.

39-1.03O(3)–39-1.03O(5) Reserved

39-1.03P Smoothness Corrections

If the final surface of the pavement does not comply with the smoothness specifications, grind the pavement to within specified tolerances, remove and replace it, or place an overlay of HMA. Do not start corrective work until your method is authorized.

Do not use equipment with carbide cutting teeth to grind the pavement unless authorized.

Smoothness correction of the final pavement surface must leave at least 75 percent of the specified HMA thickness. If ordered, core the pavement at the locations determined by the Engineer. Coring, including traffic control, is change order work. Remove and replace deficient pavement areas where the overlay thickness is less than 75 percent of the thickness specified as determined by the Engineer.

Corrected HMA pavement areas must be uniform rectangles with edges:

1. Parallel to the nearest HMA pavement edge or lane line
2. Perpendicular to the pavement centerline

On ground areas not to be overlaid with OGFC, apply fog seal coat under section 37-2.

Where corrections are made within areas requiring testing with inertial profiler, reprofile the entire lane length with the inertial profiler device.

Where corrections are made within areas requiring testing with a 12-foot straightedge, retest the corrected area with the straightedge.

39-1.03Q Data Cores

Section 39-1.03Q applies if a bid item for data core is shown on the Bid Item List.

Take data cores of the completed HMA pavement, underlying base, and subbase material. Notify the Engineer 3 business days before coring.

Protect data cores and surrounding pavement from damage.

Take 4-inch or 6-inch diameter data cores:

1. At the beginning, end, and every 1/2 mile within the paving limits of each route on the project
2. After all paving is complete
3. From the center of the specified lane

On a 2-lane roadway, take data cores from either lane. On a 4-lane roadway, take data cores from each direction in the outermost lane. On a roadway with more than 4 lanes, take data cores from the median lane and the outermost lane in each direction.

Each core must include the stabilized materials encountered. You may choose not to recover unstabilized material but you must identify the material. Unstabilized material includes:

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

1. Granular material
2. Crumbled or cracked stabilized material
3. Sandy or clayey soil

After data core summary and photograph submittal, dispose of cores.

39-1.04 PAYMENT

Geosynthetic pavement interlayer is measured by the square yard for the actual pavement area covered.

If tack coat, asphalt binder, and asphaltic emulsion are paid as separate bid items, their bid items are measured under section 92 or section 94.

The Department does not adjust the unit price for an increase or decrease in the tack coat quantity.

HMA of the type shown in the Bid Item List is measured based on the combined mixture weight. If recorded batch weights are printed automatically, the bid item for HMA is measured by using the printed batch weights, provided:

1. Total aggregate and supplemental fine aggregate weight per batch is printed. If supplemental fine aggregate is weighed cumulatively with the aggregate, the total aggregate batch weight must include the supplemental fine aggregate weight.
2. Total asphalt binder weight per batch is printed.
3. Each truckload's zero tolerance weight is printed before weighing the first batch and after weighing the last batch.
4. Time, date, mix number, load number and truck identification is correlated with a load slip.
5. Copy of the recorded batch weights is certified by a licensed weigh master and submitted.

Place hot mix asphalt dike of the type shown in the Bid Item List is measured along the completed length. Payment for the HMA used to construct the dike is not included in the payment for place hot mix asphalt dike.

Place hot mix asphalt (miscellaneous areas) is measured as the in-place compacted area. Payment for the HMA used for miscellaneous areas is not included in the payment for place hot mix asphalt (miscellaneous areas).

If replace asphalt concrete surfacing is shown, the bid item for replace asphalt concrete is measured based on the specified dimensions and any adjustments ordered.

The Department does not adjust the unit price for an increase or decrease in the prepaving grinding day quantity.

The Department reduces payment for noncompliance of HMA density based on the factors shown in the following table:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Reduced Payment Factors for Percent of Maximum Theoretical Density

HMA percent of maximum theoretical density	Reduced payment factor	HMA percent of maximum theoretical density	Reduced payment factor
91.0	0.0000	97.0	0.0000
90.9	0.0125	97.1	0.0125
90.8	0.0250	97.2	0.0250
90.7	0.0375	97.3	0.0375
90.6	0.0500	97.4	0.0500
90.5	0.0625	97.5	0.0625
90.4	0.0750	97.6	0.0750
90.3	0.0875	97.7	0.0875
90.2	0.1000	97.8	0.1000
90.1	0.1125	97.9	0.1125
90.0	0.1250	98.0	0.1250
89.9	0.1375	98.1	0.1375
89.8	0.1500	98.2	0.1500
89.7	0.1625	98.3	0.1625
89.6	0.1750	98.4	0.1750
89.5	0.1875	98.5	0.1875
89.4	0.2000	98.6	0.2000
89.3	0.2125	98.7	0.2125
89.2	0.2250	98.8	0.2250
89.1	0.2375	98.9	0.2375
89.0	0.2500	99.0	0.2500
< 89.0	Remove and replace	> 99.0	Remove and replace

39-2 TYPE A HOT MIX ASPHALT

39-2.01 GENERAL

39-2.01A Summary

Section 39-2 includes specifications for producing and placing Type A hot mix asphalt.

You may produce Type A HMA using an authorized warm mix asphalt technology.

39-2.01B Definitions

Reserved

39-2.01C Submittals

39-2.01C(1) General

Reserved

39-2.01C(2) Job Mix Formula

The JMF must be based on an HMA mix design determined as described in the Superpave Mix Design SP-2 Manual by the Asphalt Institute.

39-2.01C(3) Reclaimed Asphalt Pavement

Submit QC test results for RAP gradation with the combined aggregate gradation within 2 business days of taking RAP samples during HMA production.

39-2.01C(4)–39-2.01C(6) Reserved

39-2.01D Quality Control and Assurance

39-2.01D(1) General

Reserved

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

39-2.01D(2) Quality Control

39-2.01D(2)(a) General

Reserved

39-2.01D(2)(b) Aggregate

Test the quality characteristics of aggregate under the test methods and frequencies shown in the following table:

Aggregate Testing Frequencies

Quality characteristic	Test method	Minimum testing frequency
Gradation ^a	AASHTO T 27	1 per 750 tons and any remaining part
Sand equivalent ^{b, c}	AASHTO T 176	
Moisture content ^d	AASHTO T 329	
Crushed particles	AASHTO T 335	1 per 10,000 tons or 2 per project whichever is greater
Los Angeles rattler	AASHTO T 96	
Flat and elongated particles	ASTM D4791	
Fine aggregate angularity	AASHTO T 304 Method A	

^aIf RAP is used, test the combined aggregate gradation under California Test 384.

^bReported value must be the average of 3 tests from a single sample.

^cUse of a sand reading indicator is required as shown in AASHTO T 176, Figure 1. Sections 4.7, 4.8, 7.1.2, 8.4.2 and 8.4.3 do not apply.

^dTest at continuous mixing plants only. If RAP is used, test the RAP moisture content at continuous mixing plant and batch mixing plant.

For lime treated aggregate, test aggregate before treatment and test for gradation and moisture content during HMA production.

39-2.01D(2)(c) Reclaimed Asphalt Pavement

Sample and test processed RAP at a minimum frequency of 1 sample per 1000 tons with a minimum of 6 samples per fractionated stockpile. If a fractionated RAP stockpile is augmented, sample and test processed RAP quality characteristics at a minimum frequency of 1 sample per 500 tons of augmented RAP.

The combined RAP sample when tested under AASHTO T 164 must be within ± 2.0 percent of the average asphalt binder content reported on page 4 of your Contractor Hot Mix Asphalt Design Data form. If new fractionated RAP stockpiles are required, the average binder content of the new fractionated RAP stockpile must be within ± 2.0 percent of the average binder reported on page 4 of your Contractor Hot Mix Asphalt Design Data form.

The combined RAP sample when tested under AASHTO T 209 must be within ± 0.06 of the average maximum specific gravity reported on page 4 of your Contractor Hot Mix Asphalt Design Data form.

During HMA production, sample RAP twice daily and perform QC testing for:

1. Aggregate gradation at least once a day under California Test 384
2. Moisture content at least twice a day

39-2.01D(2)(d) Hot Mix Asphalt Production

Test the quality characteristics of HMA under the test methods and frequencies shown in the following table:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Hot Mix Asphalt Testing Frequencies

Quality characteristic	Test method	Minimum testing frequency
Asphalt binder content	AASHTO T 308 Method A	1 per 750 tons and any remaining part
HMA moisture content	AASHTO T 329	1 per 2,500 tons but not less than 1 per paving day
Air voids content	AASHTO T 269	1 per 4,000 tons or 2 every 5 paving days, whichever is greater
Voids in mineral aggregate	SP-2 Asphalt Mixture Volumetrics	1 per 10,000 tons or 2 per project whichever is greater
Dust proportion	SP-2 Asphalt Mixture Volumetrics	
Density of core	California Test 375	2 per paving day
Nuclear gauge density	California Test 375	3 per 250 tons or 3 per paving day, whichever is greater
Hamburg wheel track	AASHTO T 324 (Modified)	1 per 10,000 tons or 1 per project, whichever is greater
Moisture susceptibility	AASHTO T 283	

39-2.01D(3)–39-2.01D(4) Reserved

39-2.01D(5) Department Acceptance

The Department accepts Type A HMA based on compliance with:

1. Aggregate quality requirements shown in the following table:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Aggregate Quality

Quality characteristic	Test method	Requirement
Aggregate gradation ^a	AASHTO T 27	JMF ± Tolerance
Percent of crushed particles Coarse aggregate (min, %) One-fractured face Two-fractured faces Fine aggregate (min, %) (Passing No. 4 sieve and retained on No. 8 sieve.) One fractured face	AASHTO T 335	95 90 70
Los Angeles Rattler (max, %) Loss at 100 Rev. Loss at 500 Rev.	AASHTO T 96	12 40
Sand equivalent (min.) ^{b, c}	AASHTO T 176	47
Flat and elongated particles (max, % by weight at 5:1)	ASTM D4791	10
Fine aggregate angularity (min, %) ^d	AASHTO T 304 Method A	45

^aThe Engineer determines combined aggregate gradations containing RAP under California Test 384.

^bReported value must be the average of 3 tests from a single sample.

^cUse of a sand reading indicator is required as shown in AASHTO T 176, Figure 1. Sections 4.7, 4.8, 7.1.2, 8.4.2 and 8.4.3 do not apply.

^dThe Engineer waives this specification if HMA contains 10 percent or less of nonmanufactured sand by weight of total aggregate. Manufactured sand is fine aggregate produced by crushing rock or gravel.

2. If RAP is used, RAP quality requirements shown in the following table:

Reclaimed Asphalt Pavement Quality

Quality characteristic	Test method	Requirement
Binder content (% within the average value reported)	AASHTO T 164	±2.0
Specific gravity (within the average value reported)	AASHTO T 209	±0.06

3. In-place HMA quality requirements shown in the following table:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Type A HMA Acceptance In Place

Quality characteristic	Test method	Requirement
Asphalt binder content (%)	AASHTO T 308 Method A	JMF -0.3, +0.5
HMA moisture content (max, %)	AASHTO T 329	1
Air voids content at N _{design} (%) ^{a, b}	AASHTO T 269	4 ± 1.5
Voids in mineral aggregate on plant-produced HMA (min, %) ^a Gradation: No. 4 3/8-inch 1/2-inch 3/4-inch 1-inch with NMAS ^g = 1-inch with NMAS ^g = 3/4-inch	SP-2 Asphalt Mixture Volumetrics ^c	15.5–18.5 14.5–17.5 13.5–16.5 12.5–15.5 12.5–15.5 13.5–16.5
Dust proportion	SP-2 Asphalt Mixture Volumetrics	0.6–1.3
Density of core (% of max theoretical density) ^{e, f}	California Test 375	91–97
Hamburg wheel track (min number of passes at 0.5-inch rut depth) Binder grade: PG 58 PG 64 PG 70 PG 76 or higher	AASHTO T 324 (Modified)	10,000 15,000 20,000 25,000
Hamburg wheel track (min number of passes at inflection point) Binder grade: PG 58 PG 64 PG 70 PG 76 or higher	AASHTO T 324 (Modified)	10,000 10,000 12,500 15,000
Moisture susceptibility (min, psi, dry strength)	AASHTO T 283	100
Moisture susceptibility (min, psi, wet strength)	AASHTO T 283	70

^aPrepare 3 briquettes. Report the average of 3 tests.

^bThe Engineer determines the bulk specific gravity of each lab-compacted briquette under AASHTO T 275, Method A, and theoretical maximum specific gravity under AASHTO T 209, Method A.

^cDetermine bulk specific gravity under AASHTO T 275, Method A.

^dThe Engineer determines the laboratory-prepared HMA value for mix design verification only.

^eThe Engineer determines percent of theoretical maximum density under California Test 375 except the Engineer uses:

1. AASHTO T 275 to determine in-place density of each density core
2. AASHTO T 209, Method A to determine theoretical maximum density instead of calculating test maximum density

^fThe Engineer determines theoretical maximum density under AASHTO T 209, Method A, at the frequency specified in California Test 375, Part 5. D.

^gNMAS means nominal maximum aggregate size.

39-2.02 MATERIALS

39-2.02A General

Reserved

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

39-2.02B Mix Design

The mix design must comply with the requirements shown in the following table:

Type A HMA Mix Design Requirements

Quality characteristic	Test method	Requirement
Air voids content (%)	AASHTO T 269 ^a	N _{initial} > 8.0 N _{design} = 4.0 (N _{design} = 5.0 for 1-inch aggregate) N _{max} > 2.0
Gyrations compaction (no. of gyrations)	AASHTO T 312	N _{initial} = 8 N _{design} = 85.0 N _{max} = 130
Voids in mineral aggregate (min, %) ^b Gradation: No. 4 3/8-inch 1/2-inch 3/4-inch 1-inch with NMAS ^e = 1-inch with NMAS ^e = 3/4-inch	SP-2 Asphalt Mixture Volumetrics	16.5–19.5 15.5–18.5 14.5–17.5 13.5–16.5 13.5–16.5 14.5–17.5
Dust proportion	SP-2 Asphalt Mixture Volumetrics	0.6–1.3
Hamburg wheel track (min number of passes at 0.5-inch rut depth) Binder grade: PG 58 PG 64 PG 70 PG 76 or higher	AASHTO T 324 (Modified) ^c	10,000 15,000 20,000 25,000
Hamburg wheel track (min number of passes at the inflection point) Binder grade: PG 58 PG 64 PG 70 PG 76 or higher	AASHTO T 324 (Modified) ^c	10,000 10,000 12,500 15,000
Moisture susceptibility, dry strength (min, psi)	AASHTO T 283 ^c	100
Moisture susceptibility, wet strength (min, psi)	AASHTO T 283 ^{c, d}	70

^aCalculate the air voids content of each specimen using AASHTO T 275, Method A, to determine bulk specific gravity. Use AASHTO T 209, Method A, to determine theoretical maximum specific gravity. Use a digital manometer and pycnometer when performing AASHTO T 209.

^bMeasure bulk specific gravity using AASHTO T 275, Method A.

^cTest plant produced HMA.

^dFreeze thaw required.

^eNMAS means nominal maximum aggregate size.

For HMA mixtures using RAP, the maximum binder replacement is 25.0 percent for surface course and 40.0 percent for lower courses.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

For HMA with a binder replacement percent less than or equal to 25 percent of your specified OBC, you may request that the performance graded asphalt binder grade with upper and lower temperature classifications be reduced by 6 degrees C from the specified grade.

For HMA with a binder replacement greater than 25 percent of your specified OBC and less than or equal to 40 percent of OBC, you must use a performance graded asphalt binder grade with upper and lower temperature classifications reduced by 6 degrees C from the specified grade.

39-2.02C Asphalt Binder

Reserved

39-2.02D Aggregates

39-2.02D(1) General

Before the addition of asphalt binder and lime treatment, the aggregate must comply with the requirements shown in the following table:

Aggregate Quality		
Quality characteristic	Test method	Requirement
Percent of crushed particles	AASHTO T 335	95
Coarse aggregate (min, %)		
One-fractured face		90
Two-fractured faces		
Fine aggregate (min, %)		70
(Passing No. 4 sieve and retained on No. 8 sieve.)		
One fractured face		
Los Angeles Rattler (max, %)	AASHTO T 96	12
Loss at 100 Rev.		40
Loss at 500 Rev.		
Sand equivalent (min) ^{a, b}	AASHTO T 176	47
Flat and elongated particles (max, % by weight at 5:1)	ASTM D4791	10
Fine aggregate angularity (min, %) ^c	AASHTO T 304 Method A	45

^aReported value must be the average of 3 tests from a single sample.

^bUse of a Sand Reader Indicator is required as shown in AASHTO T 176, Figure 1. Sections 4.7, 4.8, 7.1.2, 8.4.2 and 8.4.3 do not apply.

^cThe Engineer waives this specification if HMA contains 10 percent or less of nonmanufactured sand by weight of total aggregate, except if your JMF fails verification. Manufactured sand is fine aggregate produced by crushing rock or gravel.

39-2.02D(2) Aggregate Gradations

The aggregate gradations for Type A HMA must comply with the requirements shown in the following table:

Aggregate Gradation Requirements	
Type A HMA pavement thickness	Gradation
0.10 foot	3/8 inch
Greater than 0.10 to less than 0.20 foot	1/2 inch
0.20 foot and greater	3/4 inch
0.30 foot or greater	1 inch

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

Aggregate gradation must be within the target value limits for the specified sieve size shown in the following tables:

**Aggregate Gradations
(Percentage Passing)**

1-inch

Sieve size	Target value limit	Allowable tolerance
1"	100	--
3/4"	88–93	TV ± 5
1/2"	72–85	TV ± 6
3/8"	55–70	TV ± 6
No. 4	35–52	TV ± 7
No. 8	22–40	TV ± 5
No. 30	8–24	TV ± 4
No. 50	5–18	TV ± 4
No. 200	3–7	TV ± 2

3/4-inch

Sieve size	Target value limit	Allowable tolerance
1"	100	--
3/4"	90–98	TV ± 5
1/2"	70–90	TV ± 6
No. 4	42–58	TV ± 5
No. 8	29–43	TV ± 5
No. 30	10–23	TV ± 4
No. 200	2–7	TV ± 2

1/2-inch

Sieve sizes	Target value limit	Allowable tolerance
3/4"	100	--
1/2"	95–98	TV ± 5
3/8"	72–95	TV ± 5
No. 4	52–69	TV ± 5
No. 8	35–55	TV ± 5
No. 30	15–30	TV ± 4
No. 200	2–8	TV ± 2

3/8-inch

Sieve sizes	Target value limits	Allowable tolerance
1/2"	100	--
3/8"	95–98	TV ± 5
No. 4	55–75	TV ± 5
No. 8	30–50	TV ± 5
No. 30	15–35	TV ± 5
No. 200	2–9	TV ± 2

No. 4

Sieve sizes	Target value limits	Allowable tolerance
3/8"	100	--
No. 4	95–98	TV ± 5
No. 8	70–80	TV ± 6
No. 30	34–45	TV ± 5
No. 200	2–12	TV ± 4

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

39-2.02E Reclaimed Asphalt Pavement

You may substitute RAP for part of the virgin aggregate in a quantity up to a maximum of 25 percent of the aggregate blend.

Provide enough space for meeting all RAP handling requirements at your facility. Provide a clean, graded base, well drained area for stockpiles.

If RAP is from multiple sources, blend the RAP thoroughly and completely before fractionating.

For RAP substitution of 15 percent or less, fractionation is not required.

For RAP substitution greater than 15 percent, fractionate RAP stockpiles into 2 sizes, a coarse fraction RAP retained on 3/8-inch sieve, and a fine fraction RAP passing 3/8-inch sieve.

The RAP fractionation must comply with the requirements shown in the following table:

RAP Stockpile Fractionation Gradation Requirements

Quality characteristic	Test method	Requirement
Coarse (% passing the 1-inch sieve)	California Test 202 ^a	100
Fine (% passing the 3/8-inch sieve)	California Test 202 ^a	98–100

^aMaximum mechanical shaking time is 10 minutes

You may use the coarse fractionated stockpile, the fine fractionated stockpile, or a combination of the coarse and fine fractionated stockpiles.

Isolate the processed RAP stockpiles from other materials. Store processed RAP in conical or longitudinal stockpiles. Processed RAP must not be agglomerated or be allowed to congeal in large stockpiles.

39-2.02F Hot Mix Asphalt Production

If RAP is used, the asphalt binder set point target value for HMA with RAP must be:

$$\text{Asphalt Binder Set Point Target Value} = \frac{\frac{BC_{OBC}}{\left(1 - \frac{BC_{OBC}}{100}\right)} - R_{RAP} \left[\frac{BC_{RAP}}{\left(1 - \frac{BC_{RAP}}{100}\right)} \right]}{100 + \frac{BC_{OBC}}{\left(1 - \frac{BC_{OBC}}{100}\right)}} \times 100$$

Where:

BC_{OBC} = optimum asphalt binder content, percent based on total weight of mix

R_{RAP} = RAP ratio by weight of aggregate

BC_{RAP} = asphalt binder content of RAP, percent based on total weight of RAP mix

39-2.03 CONSTRUCTION

Spread Type A HMA at the atmospheric and surface temperatures shown in the following table:

Minimum Atmospheric and Surface Temperatures for Type A HMA

Compacted layer thickness, feet	Atmospheric, °F		Surface, °F	
	Unmodified asphalt binder	Modified asphalt binder	Unmodified asphalt binder	Modified asphalt binder
< 0.15	55	50	60	55
0.15 – 0.25	45	45	50	50

For Type A HMA placed under method compaction, if the asphalt binder is:

1. Unmodified, complete:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

- 1.1. 1st coverage of breakdown compaction before the surface temperature drops below 250 degrees F
- 1.2. Breakdown and intermediate compaction before the surface temperature drops below 190 degrees F
- 1.3. Finish compaction before the surface temperature drops below 150 degrees F
2. Modified, complete:
 - 2.1. 1st coverage of breakdown compaction before the surface temperature drops below 240 degrees F
 - 2.2. Breakdown and intermediate compaction before the surface temperature drops below 180 degrees F
 - 2.3. Finish compaction before the surface temperature drops below 140 degrees F

If you request and the Engineer authorizes, you may cool Type A HMA with water when rolling activities are complete. Apply water under section 17.

39-2.04 PAYMENT

Not Used

39-3 RUBBERIZED HOT MIX ASPHALT–GAP GRADED

39-3.01 GENERAL

39-3.01A Summary

Section 39-3 includes specifications for producing and placing rubberized hot mix asphalt–gap graded.

You may produce RHMA-G using a warm mix asphalt technology.

39-3.01B Definitions

Reserved

39-3.01C Submittals

39-3.01C(1) General

Reserved

39-3.01C(2) Job Mix Formula

With your proposed JMF include MSDS for:

1. Base asphalt binder
2. CRM and asphalt modifier
3. Blended asphalt rubber binder components

The JMF must be based on an HMA mix design determined as described in the Superpave Mix Design SP-2 Manual by the Asphalt Institute.

39-3.01C(3) Asphalt Rubber Binder

Submit a proposal for asphalt rubber binder design and profile. In the design, include the asphalt binder, asphalt modifier, and CRM and their proportions.

If you change asphalt rubber binder supplier or any component material used in asphalt rubber binder or its percentage, submit a new JMF.

For the asphalt rubber binder used, submit:

1. Log of production daily.
2. Certificate of compliance with test results for CRM and asphalt modifier with each truckload delivered to the HMA plant. The certificate of compliance for asphalt modifier must represent no more than 5,000 lb.
3. Submit certified weight slips for the CRM and asphalt modifier furnished.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

Submit a certificate of compliance for the asphalt rubber binder. With the certificate of compliance, submit test results for CRM and asphalt modifier with each truckload delivered to the HMA plant. A certificate of compliance for asphalt modifier must not represent more than 5,000 lb.

39-3.01D Quality Control and Assurance

39-3.01D(1) General

Reserved

39-3.01D(2) Job Mix Formula Verification

If you request, the Engineer verifies RHMA-G quality requirements within 7 days of receiving all verification samples and after the JMF document submittal has been accepted.

39-3.01D(3) Quality Control

39-3.01D(3)(a) General

Reserved

39-3.01D(3)(b) Asphalt Rubber Binder

39-3.01D(3)(b)(i) General

The asphalt rubber binder blending plant must be authorized under the Department's Material Plant Quality Program.

Take asphalt rubber binder samples from the feed line connecting the asphalt rubber binder tank to the HMA plant. Use an AASHTO-certified laboratory for testing.

39-3.01D(3)(b)(ii) Asphalt Modifier

Test asphalt modifier under the test methods and frequencies shown in the following table:

Asphalt Modifier for Asphalt Rubber Binder

Quality characteristic	Test method	Frequency
Viscosity	ASTM D445	1 per shipment
Flash point	ASTM D92	
Molecular Analysis		
Asphaltenes	ASTM D2007	1 per shipment
Aromatics	ASTM D2007	

39-3.01D(3)(b)(iii) Crumb Rubber Modifier

Sample and test scrap tire CRM and high natural CRM separately. Test CRM under the test methods and frequencies shown in the following table:

Crumb Rubber Modifier for Asphalt Rubber Binder

Quality characteristic	Test method	Frequency
Scrap tire CRM gradation	California Test 385	1 per 10,000 lb
High natural CRM gradation	California Test 385	1 per 3,400 lb
Wire in CRM	California Test 385	1 per 10,000 lb
Fabric in CRM	California Test 385	
CRM particle length	--	
CRM specific gravity	California Test 208	1 per 3,400 lb
Natural rubber content in high natural CRM	ASTM D297	

Sample and test scrap tire CRM and high natural CRM separately.

39-3.01D(3)(b)(iv) Asphalt Rubber Binder

Test asphalt rubber binder under the test methods and frequencies shown in the following table:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Quality characteristic	Test method	Frequency
Cone penetration	ASTM D217	1 per lot
Resilience	ASTM D5329	
Softening point	ASTM D36	
Viscosity	ASTM D7741	1 per hour

39-3.01D(3)(c) Aggregate

Test the quality characteristics of aggregate under the test methods and frequencies shown in the following table:

Aggregate Testing Frequencies

Quality characteristic	Test method	Minimum testing frequency
Gradation	AASHTO T 27	1 per 750 tons and any remaining part
Sand equivalent ^{a, b}	AASHTO T 176	
Moisture content ^c	AASHTO T 329	
Crushed particles	AASHTO T 335	1 per 10,000 tons or 2 per project, whichever is greater
Los Angeles rattler	AASHTO T 96	
Flat and elongated particles	ASTM D4791	
Fine aggregate angularity	AASHTO T 304 Method A	

^aReported value must be the average of 3 tests from a single sample.

^bUse of a sand reading indicator is required as shown in AASHTO T 176, Figure 1. Sections 4.7, 4.8, 7.1.2, 8.4.2 and 8.4.3 do not apply.

^cTest at continuous mixing plants only

For lime treated aggregate, test aggregate before treatment and test for gradation and moisture content during RHMA-G production.

39-3.01D(3)(d) Hot Mix Asphalt Production

Test the quality characteristics of RHMA-G under the test methods and frequencies shown in the following table:

RHMA-G Mix Asphalt Testing Frequencies

Quality characteristic	Test method	Minimum testing frequency
Asphalt binder content	AASHTO T 308 Method A	1 per 750 tons and any remaining part
HMA moisture content	AASHTO T 329	1 per 2,500 tons but not less than 1 per paving day
Air voids content	AASHTO T 269	1 per 4,000 tons or 2 every 5 paving days, whichever is greater
Voids in mineral aggregate	SP-2 Asphalt Mixture Volumetrics	1 per 10,000 tons or 2 per project whichever is greater
Dust proportion	SP-2 Asphalt Mixture Volumetrics	
Density of core	California Test 375	2 per paving day
Nuclear gauge density	California Test 375	3 per 250 tons or 3 per paving day, whichever is greater
Hamburg wheel track	AASHTO T 324 (Modified)	1 per 10,000 tons or 1 per project, whichever is greater
Moisture susceptibility	AASHTO T 283	

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

39-3.01D(4) Reserved

39-3.01D(5) Department Acceptance

39-3.01D(5)(a) General

The Department accepts RHMA-G based on compliance with:

1. Aggregate quality requirements shown in the following table:

Aggregate Quality		
Quality characteristic	Test method	Requirement
Aggregate gradation	AASHTO T 27	JMF ± Tolerance
Percent of crushed particles	AASHTO T 335	-- 90
Coarse aggregate (min, %)		
One-fractured face		
Two-fractured faces		
Fine aggregate (min, %)		
(Passing No. 4 sieve and retained on No. 8 sieve.)		
One fractured face		70
Los Angeles Rattler (max, %)	AASHTO T 96	12 40
Loss at 100 Rev.		
Loss at 500 Rev.		
Sand equivalent (min) ^{a, b}	AASHTO T 176	47
Flat and elongated particles (max, % by weight at 5:1)	ASTM D4791	Report only
Fine aggregate angularity (min, %) ^c	AASHTO T 304 Method A	45

^aReported value must be the average of 3 tests from a single sample.

^bUse of a sand reading Indicator is required as shown in AASHTO T 176, Figure 1. Sections 4.7, 4.8, 7.1.2, 8.4.2 and 8.4.3 do not apply.

^cThe Engineer waives this specification if RHMA-G contains 10 percent or less of nonmanufactured sand by weight of total aggregate. Manufactured sand is fine aggregate produced by crushing rock or gravel.

2. In-place RHMA-G quality requirements shown in the following table:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

RHMA-G In-Place Acceptance

Quality characteristic	Test method	Requirement
Asphalt binder content (%)	AASHTO T 308 Method A	JMF -0.4, +0.5
HMA moisture content (max, %)	AASHTO T 329	1
Air voids content @ N _{design} (%) ^{a, b}	AASHTO T 269	4.0 ± 1.5
Voids in mineral aggregate on laboratory-produced HMA ^d (min, %) Gradation: 1/2-inch and 3/4-inch	SP-2 Asphalt Mixture Volumetrics ^c	18.0–23.0
Voids in mineral aggregate on plant-produced HMA (min, %) ^a Gradation: 1/2-inch and 3/4-inch	SP-2 Asphalt Mixture Volumetrics ^c	18.0–23.0
Dust proportion ^a	SP-2 Asphalt Mixture Volumetrics	Report only
Density of core (% of max theoretical density) ^{e, f}	California Test 375	91–97
Hamburg wheel track (min number of passes at 0.5-inch rut depth) Binder grade: PG 58 PG 64 PG 70	AASHTO T 324 (Modified)	15,000 20,000 25,000
Hamburg wheel track (min number of passes at inflection point) Binder grade: PG 58 PG 64 PG 70	AASHTO T 324 (Modified)	10,000 12,500 15,000
Moisture susceptibility (min, psi, dry strength)	AASHTO T 283	100
Moisture susceptibility (min, psi, wet strength)	AASHTO T 283	70

^aPrepare 3 briquettes. Report the average of 3 tests.

^bThe Engineer determines the bulk specific gravity of each lab-compacted briquette under AASHTO T 275, Method A, and theoretical maximum specific gravity under AASHTO T 209, Method A.

^cDetermine bulk specific gravity under AASHTO T 275, Method A.

^dThe Engineer determines the laboratory-prepared RHMA-G value for mix design verification only.

^eThe Engineer determines percent of theoretical maximum density under California Test 375 except the Engineer uses:

1. AASHTO T 275, Method A, to determine in-place density of each density core instead of using the nuclear gauge
2. AASHTO T 209, Method A to determine theoretical maximum density instead of calculating test maximum density.

^fThe Engineer determines theoretical maximum density under AASHTO T 209, Method A, at the frequency specified in California Test 375, Part 5. D.

39-3.01D(5)(b) Asphalt Rubber Binder

39-3.01D(5)(b)(i) General

The Department does not use asphalt rubber binder design profile for production acceptance.

39-3.01D(5)(b)(ii) Asphalt Modifier

The Department accepts asphalt modifier based on compliance with the requirements shown in the following table:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Asphalt Modifier for Asphalt Rubber Binder

Quality characteristic	Test method	Requirement
Viscosity at 100 °C (m ² /s x 10 ⁻⁶)	ASTM D445	X ± 3 ^a
Flash point (min, °C)	ASTM D92	207
Molecular Analysis		
Asphaltenes (max, % by mass (max))	ASTM D2007	0.1
Aromatics (min % by mass)	ASTM D2007	55

^aThe symbol "X" is the asphalt modifier viscosity.

39-3.01D(5)(b)(iii) Crumb Rubber Modifier

The Department accepts scrap tire CRM and high natural CRM based on compliance with the requirements shown in the following table:

Crumb Rubber Modifier for Asphalt Rubber Binder

Quality characteristic	Test method	Requirement
Scrap tire CRM gradation (% passing No. 8 sieve)	California Test 385	100
High natural CRM gradation (% passing No. 10 sieve)	California Test 385	100
Wire in CRM (max, %)	California Test 385	0.01
Fabric in CRM (max, %)	California Test 385	0.05
CRM particle length (max, in)	--	3/16
CRM specific gravity	California Test 208	1.1–1.2

Scrap tire CRM and high natural CRM are sampled and tested separately.

39-3.01D(5)(b)(iv) Asphalt Rubber Binder

The Department accepts asphalt rubber binder based on compliance with the requirements shown in the following table:

Quality characteristic	Test method	Requirement
Cone penetration at 25 °C (0.10 mm)	ASTM D217	25–70
Resilience at 25 °C (min, % rebound)	ASTM D5329	18
Softening point (°C)	ASTM D36	52–74
Viscosity at 190 °C (centipoises)	ASTM D7741	1,500–4,000

39-3.01D(5)(c)–39-3.01D(5)(f) Reserved

39-3.02 MATERIALS

39-3.02A General

Reserved

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

39-3.02B Mix Design

For RHMA-G, the mix design must comply with the requirements shown in the following table:

RHMA-G Mix Design Requirements

Quality characteristic	Test method	Requirement
Air voids content (%)	AASHTO T 269 ^a	$N_{\text{design}} = 4.0$
Gyrations compaction (no. of gyrations)	AASHTO T 312	$N_{\text{design}} = 50\text{--}150^b$
Voids in mineral aggregate (min, %)	SP-2 Asphalt Mixture Volumetrics ^c	18.0–23.0
Dust proportion	SP-2 Asphalt Mixture Volumetrics	Report only
Hamburg wheel track (min number of passes at 0.5-inch rut depth) Binder grade: PG 58 PG 64 PG 70	AASHTO T 324 (Modified) ^d	15,000 20,000 25,000
Hamburg wheel track (min number of passes at the inflection point) Binder grade: PG 58 PG 64 PG 70	AASHTO T 324 (Modified) ^d	10,000 10,000 12,500
Moisture susceptibility, dry strength (min, psi)	AASHTO T 283 ^d	100
Moisture susceptibility, wet strength (min, psi)	AASHTO T 283 ^{d, e}	70

^aCalculate the air voids content of each specimen using AASHTO T 275, Method A, to determine bulk specific gravity and AASHTO T 209, Method A, to determine theoretical maximum specific gravity. Under AASHTO T 209 use a digital manometer and pycnometer when performing AASHTO T 209.

^bSuperpave gyratory compactor ram pressure may be increased to a maximum of 825kPa, and specimens may be held at a constant height for a maximum of 90 minutes.

^cMeasure bulk specific gravity using AASHTO T 275, Method A.

^dTest plant produced HMA.

^eFreeze thaw required.

Determine the amount of asphalt rubber binder to be mixed with the aggregate for RHMA-G as follows:

1. Base the calculations on the average of 3 briquettes produced at each asphalt rubber binder content.
2. Plot asphalt rubber binder content versus average air voids content for each set of 3 specimens and connect adjacent points with a best-fit curve.
3. Calculate voids in mineral aggregate for each specimen, average each set, and plot the average versus asphalt rubber binder content.
4. Calculate the dust proportion and plot versus asphalt rubber binder content.
5. From the curve plotted, select the theoretical asphalt rubber binder content at 4 percent air voids.
6. At the selected asphalt rubber binder content, calculate dust proportion.
7. Record the asphalt rubber binder content in the Contractor Hot Mix Asphalt Design Data Form as the OBC.

The OBC must not fall below 7.5 percent by total weight of the mix.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

Laboratory mixing and compaction must comply with AASHTO R 35, except the mixing temperature of the aggregate must be between 300 and 325 degrees F. The mixing temperature of the asphalt rubber binder must be between 375 and 425 degrees F. The compaction temperature of the combined mixture must be between 290 and 320 degrees F.

39-3.02C Asphalt Rubber Binder

39-3.02C(1) General

Asphalt rubber binder must be a combination of:

1. Asphalt binder
2. Asphalt modifier
3. CRM

The combined asphalt binder and asphalt modifier must be 80.0 ± 2.0 percent by weight of the asphalt rubber binder.

39-3.02C(2) Asphalt Modifier

Asphalt modifier must be a resinous, high flash point, and aromatic hydrocarbon, and must comply with the requirements shown in the following table:

Asphalt Modifier for Asphalt Rubber Binder

Quality characteristic	Test method	Requirement
Viscosity at 100 °C ($\text{m}^2/\text{s} \times 10^{-6}$)	ASTM D445	$X \pm 3^a$
Flash point (min, °C)	ASTM D92	207
Molecular Analysis		
Asphaltenes (max, % by mass)	ASTM D2007	0.1
Aromatics (min, % by mass)	ASTM D2007	55

^aThe symbol "X" is the proposed asphalt modifier viscosity. "X" must be between 19 and 36. A change in "X" requires a new asphalt rubber binder design.

Asphalt modifier must be from 2.0 to 6.0 percent by weight of the asphalt binder in the asphalt rubber binder.

39-3.02C(3) Crumb Rubber Modifier

CRM must be a ground or granulated combination of scrap tire CRM and high natural CRM. CRM must be 75.0 ± 2.0 percent scrap tire CRM and 25.0 ± 2.0 percent high natural CRM by total weight of CRM. Scrap tire CRM must be from any combination of automobile tires, truck tires, or tire buffings.

The CRM must comply with the requirements shown in the following table:

Crumb Rubber Modifier for Asphalt Rubber Binder

Quality characteristic	Test method	Requirement
Scrap tire CRM gradation (% passing No. 8 sieve)	California Test 385	100
High natural CRM gradation (% passing No. 10 sieve)	California Test 385	100
Wire in CRM (max, %)	California Test 385	0.01
Fabric in CRM (max, %)	California Test 385	0.05
CRM particle length (max, in) ^a	--	3/16
CRM specific gravity	California Test 208	1.1–1.2
Natural rubber content in high natural CRM (%)	ASTM D297	40.0–48.0

^aTest at mix design and for certificate of compliance.

CRM must be ground or granulated at ambient temperature. If steel and fiber are cryogenically separated, separation must occur before grinding or granulating. Cryogenically produced CRM particles must be ground or granulated and not pass through the grinder or granulator.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

CRM must be dry, free-flowing particles that do not stick together. CRM must not cause foaming when combined with the asphalt binder and asphalt modifier. You may add calcium carbonate or talc up to 3 percent by weight of CRM.

39-3.02C(4) Design and Profile

Design the asphalt rubber binder from testing you perform for each quality characteristic and for the reaction temperatures expected during production. The profile must include the same component sources for the asphalt rubber binder used. The 24-hour (1,440-minute) interaction period determines the design profile. At a minimum, mix asphalt rubber binder components, take samples, and perform and record the tests shown in the following table:

Asphalt Rubber Binder Reaction Design Profile

Quality characteristic	Test Method	Minutes of reaction ^a							Limits
		45	60	90	120	240	360	1440	
Cone penetration at 25 °C (0.10 mm)	ASTM D217	X ^b				X		X	25–70
Resilience at 25 °C (min, % rebound)	ASTM D5329	X				X		X	18
Field softening point (°C)	ASTM D36	X				X		X	52–74
Viscosity (centipoises)	ASTM D7741	X	X	X	X	X	X	X	1,500–4,000

^aSix hours (360 minutes) after CRM addition, reduce the oven temperature to 275 °F for 16 hours. After the 16-hour (960 minutes) cool down after CRM addition, reheat the binder to the reaction temperature expected during production for sampling and testing at 24 hours (1,440 minutes).

^b"X" denotes required testing

39-3.02C(5) Asphalt Rubber Binder Production

39-3.02C(5)(a) General

Deliver scrap tire CRM and high natural CRM in separate bags.

39-3.02C(5)(b) Mixing

Proportion and mix asphalt binder, asphalt modifier, and CRM simultaneously or premix the asphalt binder and asphalt modifier before adding CRM. If you premix asphalt binder and asphalt modifier, mix them for at least 20 minutes. When you add CRM, the asphalt binder and asphalt modifier must be from 375 to 440 degrees F.

After interacting for at least 45 minutes, the quality characteristics of asphalt rubber binder must comply with the requirements shown in the following table:

Quality characteristic	Test method	Requirement
Cone penetration at 25 °C (0.10 mm)	ASTM D217	25–70
Resilience at 25 °C (min, % rebound)	ASTM D5329	18
Softening point (°C)	ASTM D36	52–74
Viscosity at 190 °C (centipoises)	ASTM D7741	1,500–4,000

Do not use asphalt rubber binder during the first 45 minutes of the reaction period. During this period, the asphalt rubber binder mixture must be between 375 degrees F and the lower of 425 or 25 degrees F below the asphalt binder's flash point indicated in the MSDS.

If any asphalt rubber binder is not used within 4 hours after the reaction period, discontinue heating. If the asphalt rubber binder drops below 375 degrees F, reheat before use. If you add more scrap tire CRM to the reheated asphalt rubber binder, the binder must undergo a 45-minute reaction period. The added scrap tire CRM must not exceed 10 percent of the total asphalt rubber binder weight. Reheated and reacted asphalt rubber binder must comply with the viscosity specifications. Do not reheat asphalt rubber binder more than twice.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

39-3.02D Aggregates

39-3.02D(1) General

For RHMA-G, before the addition of asphalt binder and lime treatment, the aggregate must comply with the requirements shown in the following table:

Aggregate Quality

Quality characteristic	Test method	Requirement
Percent of crushed particles Coarse aggregate (min, %) One-fractured face Two-fractured faces Fine aggregate (min, %) (Passing No. 4 sieve and retained on No. 8 sieve.) One fractured face	AASHTO T 335	-- 90 70
Los Angeles Rattler (max, %) Loss at 100 Rev. Loss at 500 Rev.	AASHTO T 96	12 40
Sand equivalent (min) ^{a, b}	AASHTO T 176	47
Flat and elongated particles (max, % by weight at 5:1)	ASTM D4791	Report only
Fine aggregate angularity (min, %) ^c	AASHTO T 304 Method A	45

^aReported value must be the average of 3 tests from a single sample.

^bUse of a sand reading indicator is required as shown in AASHTO T 176, Figure 1. Sections 4.7, 4.8, 7.1.2, 8.4.2 and 8.4.3 do not apply.

^cThe Engineer waives this specification if HMA contains 10 percent or less of nonmanufactured sand by weight of total aggregate, except if your JMF fails verification. Manufactured sand is fine aggregate produced by crushing rock or gravel.

39-3.02D(2) Aggregate Gradations

The aggregate gradations for RHMA-G must comply with the requirements shown in the following table:

Aggregate Gradation Requirements

Type A HMA pavement thickness	Gradation
0.10 to less than 0.20 foot	1/2 inch
0.20 foot and greater	3/4 inch

For RHMA-G, the aggregate gradations must be within the target value limits for the specified sieve size shown in the following tables:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

**Aggregate Gradation
(Percentage Passing)
Rubberized Hot Mix Asphalt - Gap Graded (RHMA-G)**

3/4-inch RHMA-G

Sieve Sizes	Target Value Limits	Allowable Tolerance
1"	100	--
3/4"	95–98	TV \pm 5
1/2"	83–87	TV \pm 6
3/8"	65–70	TV \pm 5
No. 4	28–42	TV \pm 6
No. 8	14–22	TV \pm 5
No. 200	0–6	TV \pm 2

1/2-inch RHMA-G

Sieve Sizes	Target Value Limits	Allowable Tolerance
3/4"	100	--
1/2"	90–98	TV \pm 6
3/8"	83–87	TV \pm 5
No. 4	28–42	TV \pm 6
No. 8	14–22	TV \pm 5
No. 200	0–6	TV \pm 2

39-3.02E Rubberized Hot Mix Asphalt Production

Asphalt rubber binder must be from 375 to 425 degrees F when mixed with aggregate.

If the dry and wet moisture susceptibility test result for treated plant-produced RHMA-G is less than the RHMA-G mix design requirement for dry and wet moisture susceptibility strength, the minimum dry and wet strength requirement is waived, but you must use one of the following treatments:

1. Aggregate lime treatment using the slurry method
2. Aggregate lime treatment using the dry lime method
3. Liquid antistrip treatment of HMA

39-3.03 CONSTRUCTION

Use a material transfer vehicle when placing RHMA-G.

Do not use a pneumatic tired roller to compact RHMA-G.

For RHMA-G placed under method compaction:

1. Only spread and compact if the atmospheric temperature is at least 55 degrees F and the surface temperature is at least 60 degrees F.
2. Complete the 1st coverage of breakdown compaction before the surface temperature drops below 285 degrees F.
3. Complete breakdown and intermediate compaction before the surface temperature drops below 250 degrees F.
4. Complete finish compaction before the surface temperature drops below 200 degrees F.
5. If the atmospheric temperature is below 70 degrees F, cover loads in trucks with tarps. The tarps must completely cover the exposed load until you transfer the mixture to the paver's hopper or to the pavement surface. Tarps are not required if the time from discharge to truck until transfer to the paver's hopper or the pavement surface is less than 30 minutes.

Spread sand at a rate between 1 and 2 lb/sq yd on new RHMA-G pavement when finish rolling is complete. Sand must be free of clay or organic matter. Sand must comply with section 90-1.02C(3). Keep traffic off the pavement until spreading sand is complete.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

39-3.04 PAYMENT

Not Used

39-4 OPEN GRADED FRICTION COURSES

39-4.01 GENERAL

39-4.01A Summary

Section 39-4 includes specifications for producing and placing open graded friction courses. Open graded friction courses include HMA-O, RHMA-O, and RHMA-O-HB.

You may produce OGFC using a warm mix asphalt technology.

39-4.01B Definitions

Reserved

39-4.01C Submittals

Submit a complete JMF, except do not specify an asphalt binder content.

39-4.01D Quality Control and Assurance

39-4.01D(1) General

Reserved

39-4.01D(2) Quality Control

39-4.01D(2)(a) General

Reserved

39-4.01D(2)(b) Asphalt Rubber Binder

For RHMA-O and RHMA-O-HB, the asphalt rubber binder must comply with the specifications in 39-3.01D(2)(b).

39-4.01D(2)(c) Aggregate

Test the quality characteristics of aggregate under the test methods and frequencies shown in the following table:

Aggregate Testing Frequencies

Quality characteristic	Test method	Minimum testing frequency
Gradation	AASHTO T 27	1 per 750 tons and any remaining part
Moisture content ^a	AASHTO T 329	1 per 1500 tons and any remaining part
Crushed particles	AASHTO T 335	1 per 10,000 tons or 2 per project, whichever is greater
Los Angeles rattler	AASHTO T 96	
Flat and elongated particles	ASTM D4791	

^aTest at continuous mixing plants only

For lime treated aggregate, test aggregate before treatment and test for gradation and moisture content during OGFC production.

39-4.01D(2)(d) Hot Mix Asphalt Production

Test the quality characteristics of OGFC under the test methods and frequencies shown in the following table:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

OGFC Testing Frequencies

Quality characteristic	Test method	Minimum testing frequency
Asphalt binder content	AASHTO T 308 Method A	1 per 750 tons and any remaining part
HMA moisture content	AASHTO T 329	1 per 2,500 tons but not less than 1 per paving day

39-4.01D(3) Department Acceptance

39-4.01D(3)(a) General

The Department accepts OGFC based on compliance with:

1. Aggregate quality requirements shown in the following table:

Aggregate Quality

Quality characteristic	Test method	Requirement
Aggregate gradation	AASHTO T 27	JMF ± Tolerance
Percent of crushed particles Coarse aggregate (min, %) One-fractured face Two-fractured faces Fine aggregate (min, %) (Passing No. 4 sieve and retained on No. 8 sieve.) One fractured face	AASHTO T 335	90 90 90
Los Angeles Rattler (max, %) Loss at 100 Rev. Loss at 500 Rev.	AASHTO T 96	12 40
Flat and elongated particles (max, % by weight @ 5:1)	ASTM D4791	Report only

2. In-place OGFC quality requirements shown in the following table:

OGFC Acceptance In Place

Quality characteristic	Test method	Requirement
Asphalt binder content (%)	AASHTO T 308 Method A	JMF -0.4, +0.5
HMA moisture content (max, %)	AASHTO T 329	1

39-4.01D(3)(b) Asphalt Rubber Binder

The Department accepts asphalt rubber binder in RHMA-O and RHMA-O-HB under 39-3.01D(5)(b).

39-4.01D(3)(c) Pavement Smoothness

Pavement smoothness of OGFC must comply with the Mean Roughness Index requirements shown in the following table for a 0.1 mile section:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

OGFC Pavement Smoothness Acceptance Criteria

OGFC placement on	Mean Roughness Index requirement
New construction or HMA overlay	60 in/mi or less
Existing pavement	75 in/mi or less
Milled surface	75 in/mi or less

39-4.01D(3)(d)–39-4.01D(3)(f) Reserved

39-4.02 MATERIALS

39-4.02A General

When mixed with asphalt binder, aggregate must not be more than 325 degrees F except aggregate for OGFC with unmodified asphalt binder must be not more than 275 degrees F.

39-4.02B Mix Design

The Department determines the asphalt binder content under California Test 368 within 20 days of your complete JMF submittal and provides you a Caltrans Hot Mix Asphalt Verification form.

For OGFC, the 1st paragraph of section 39-1.02B(1) does not apply.

39-4.02C Asphalt Binder

Asphalt rubber binder in RHMA-O and RHMA-O-HB must comply with section 39-3.02B.

39-4.02D Aggregate

39-4.02D(1) General

Aggregate must comply with the requirements shown in the following table:

Aggregate Quality

Quality characteristic	Test method	Requirement
Percent of crushed particles Coarse aggregate (min, %) One-fractured face Two-fractured faces Fine aggregate (min, %) (Passing No. 4 sieve and retained on No. 8 sieve.) One fractured face	AASHTO T 335	-- 90 90
Los Angeles Rattler (max, %) Loss at 100 Rev. Loss at 500 Rev.	AASHTO T 96	12 40
Flat and elongated particles (max, % by weight at 5:1)	ASTM D4791	Report only

39-4.02D(2) Aggregate Gradations

The aggregate gradations for HMA-O must comply with the requirements shown in the following table:

Aggregate Gradation Requirements

HMA-O pavement thickness	Gradation
Greater than 0.10 to less than 0.15 foot	1/2 inch
0.15 foot and greater	1 inch

The aggregate gradations for RHMA-O and RHMA-O-HB must comply with the requirements shown in the following table:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Aggregate Gradation Requirements

RHMA-O and RHMA-O-HB pavement thickness	Gradation
Greater than 0.10 foot	1/2 inch

For RHMA-O and RHMA-O-HB, the 1-inch aggregate gradation is not allowed.

For OGFC, the aggregate gradations must be within the target value limits for the specified sieve size shown in the following tables:

**Aggregate Gradations
(Percentage Passing)
Open Graded Friction Course (OGFC)**

1-inch OGFC

Sieve size	Target value limit	Allowable tolerance
1 1/2"	100	--
1"	99–100	TV ± 5
3/4"	85–96	TV ± 5
1/2"	55–71	TV ± 6
No. 4	10–25	TV ± 7
No. 8	6–16	TV ± 5
No. 200	0–6	TV ± 2

1/2-inch OGFC

Sieve size	Target value limit	Allowable tolerance
3/4"	100	--
1/2"	95–100	TV ± 6
3/8"	78–89	TV ± 6
No. 4	28–37	TV ± 7
No. 8	7–18	TV ± 5
No. 30	0–10	TV ± 4
No. 200	0–3	TV ± 2

If lime treatment is required, you may reduce the lime ratio for the combined aggregate from 1.0 to 0.5 percent for OGFC.

39-4.03 CONSTRUCTION

Use a material transfer vehicle when placing OGFC.

If the atmospheric temperature is below 70 degrees F, cover loads in trucks with tarps. The tarps must completely cover the exposed load until you transfer the mixture to the paver's hopper or to the pavement surface. Tarps are not required if the time from discharge to truck until transfer to the paver's hopper or the pavement surface is less than 30 minutes.

Apply a tack coat before placing OGFC. The tack coat application rate must comply with the requirements of the following table:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Tack Coat Application Rates for OGFC

OGFC over:	Minimum Residual Rates (gal/sq yd)		
	CSS1/CSS1h, SS1/SS1h and QS1h/CQS1h Asphaltic Emulsion	CRS1/CRS2, RS1/RS2 and QS1/CQS1 Asphaltic Emulsion	Asphalt Binder and PMRS2/PMCRS2 and PMRS2h/PMCRS2h Asphaltic Emulsion
New HMA	0.03	0.04	0.03
PCC and existing AC surfacing	0.05	0.06	0.04
Planed pavement	0.06	0.07	0.05

Compact OGFC with steel-tired, 2-axle tandem rollers. If placing over 300 tons of OGFC per hour, use at least 3 rollers for each paver. If placing less than 300 tons of OGFC per hour, use at least 2 rollers for each paver. Each roller must weigh between 126 to 172 lb per linear inch of drum width. Turn the vibrator off.

Compact OGFC with 2 coverages. The Engineer may order fewer coverages if the layer thickness of OGFC is less than 0.20 foot.

For HMA-O with unmodified asphalt binder:

1. Spread and compact only if the atmospheric temperature is at least 55 degrees F and the surface temperature is at least 60 degrees F.
2. Complete the 1st coverage using 2 rollers before the surface temperature drops below 240 degrees F.
3. Complete all compaction before the surface temperature drops below 200 degrees F.

For HMA-O with modified asphalt binder except asphalt rubber binder:

1. Spread and compact only if the atmospheric temperature is at least 50 degrees F and the surface temperature is at least 50 degrees F.
2. Complete the 1st coverage using 2 rollers before the surface temperature drops below 240 degrees F.
3. Complete all compaction before the surface temperature drops below 180 degrees F.

For RHMA-O and RHMA-O-HB:

1. Spread and compact only if the atmospheric temperature is at least 55 degrees F and surface temperature is at least 60 degrees F.
2. Complete the 1st coverage using 2 rollers before the surface temperature drops below 280 degrees F.
3. Complete compaction before the surface temperature drops below 250 degrees F.

Spread sand at a rate between 1 and 2 lb/sq yd on new RHMA-O and RHMA-O-HB pavement when finish rolling is complete. Sand must be free of clay or organic matter. Sand must comply with section 90-1.02C(3). Keep traffic off the pavement until spreading sand is complete.

If you choose to correct OGFC for smoothness, the Engineer determines if the corrective method causes raveling. OGFC that is raveling must be removed and replaced.

39-4.04 PAYMENT

Not Used

39-5 BONDED WEARING COURSES

39-5.01 GENERAL

39-5.01A General

39-5.01A(1) Summary

Section 39-5 includes specifications for producing and placing bonded wearing courses.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CTA Contract No. XXX

BWC includes placing a polymer modified asphaltic emulsion and the specified HMA in a single pass with an integrated paving machine.

BWC using RHMA-G, RHMA-O, or HMA-O must comply with the specifications for RHMA-G, RHMA-O, or HMA-O.

39-5.01A(2) Definitions

Reserved

39-5.01A(3) Submittals

With your JMF submittal, include:

1. Asphaltic emulsion membrane target residual rate
2. Weight ratio of water to bituminous material in the original asphaltic emulsion

Within 3 business days following the 1st job site delivery, submit test results for asphaltic emulsion properties performed on a sample taken from the asphaltic emulsion delivered.

Within 1 business day of each job site delivery of asphaltic emulsion, submit to METS a 2-quart sample and a certificate of compliance. Ship each sample so that it is received at METS within 48 hours of sampling.

Each day BWC is placed, submit the residual and application rate for the asphaltic emulsion membrane.

During production, submit certified volume or weight slips for the materials supplied.

39-5.01A(4) Quality Control and Assurance

39-5.01A(4)(a) General

For each job site delivery of asphaltic emulsion, take a 2-quart sample in the presence of the Engineer. Take samples from the delivery truck at mid-load from a sampling tap or thief. If the sample is taken from the tap, draw and discard 4 quarts before sampling.

If you unload asphalt binder or asphaltic emulsion into a bulk storage tank, do not use material from the tank until you submit test results for a sample taken from the bulk storage tank. Testing must be performed by an AASHTO-accredited laboratory.

39-5.01A(4)(b) Quality Control

Sample BWC in two 1-gallon metal containers.

The asphaltic emulsion membrane must be tested under ASTM D2995 at least once per paving day at the job site.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

39-5.01A(4)(c) Department Acceptance

The Department accepts asphaltic emulsion membrane based on compliance with the requirements shown in the following tables:

Asphaltic Emulsion Membrane

Quality characteristic	Test method	Requirement
Saybolt Furol Viscosity at 25 °C (SFS) ^a	AASHTO T 59	20–100
Sieve test on original emulsion at time of delivery (max, %)	AASHTO T 59	0.05
24-hour storage stability (max, %)	AASHTO T 59	1
Residue by evaporation (min, %)	California Test 331	63
Tests on residue from evaporation test:		
Torsional recovery, measure entire arc of recovery at 25 °C (min, %)	California Test 332	40
Penetration at 25 °C (0.01 mm) PG76-22 M PG64-28 M	AASHTO T 49	50–70 150–200

^a SFS means Saybolt Furol seconds

The Department accepts the BWC based on the submitted asphaltic emulsion membrane target residual rate ± 0.02 gal/sq yd when tested under ASTM D2995.

39-5.01B Materials

39-5.01B(1) General

Reserved

39-5.01B(2) Asphaltic Emulsion Membrane

The asphaltic emulsion membrane must comply with the requirements shown in the following table:

Asphaltic Emulsion Membrane

Quality characteristic	Test method	Requirement
Saybolt Furol Viscosity at 25 °C (SFS) ^a	AASHTO T 59	20–100
Sieve test on original emulsion at time of delivery (max, %)	AASHTO T 59	0.05
24-hour storage stability (max, %)	AASHTO T 59	1
Residue by evaporation (min, %)	California Test 331	63
Tests on residue from evaporation test:		
Torsional recovery, measure entire arc of recovery at 25 °C (min, %)	California Test 332	40
Penetration at 25 °C (0.01 mm) PG76-22 M PG64-28 M	AASHTO T 49	50–70 150–200

^a SFS means Saybolt Furol seconds

39-5.01B(3) Reserved

39-5.01C Construction

39-5.01C(1) General

Use method compaction for BWC.

Do not dilute the asphaltic emulsion.

Do not place BWC if rain is forecast for the project area within 24 hours by the National Weather Service.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

39-5.01C(2) Spreading and Compacting Equipment

Use a material transfer vehicle when placing BWC.

Use an integrated distributor paver capable of spraying the asphaltic emulsion membrane, spreading the HMA, and leveling the mat surface in 1 pass.

Apply asphaltic emulsion membrane at a uniform rate for the full paving width. The asphaltic emulsion membrane must not be touched by any part of the paver including wheels or tracks.

If the spray bar is adjusted for changing pavement widths, the paver must prevent excess spraying of asphaltic emulsion beyond 2 inches of the HMA edge.

39-5.01C(3) Applying Asphaltic Emulsion

Before spreading HMA, apply asphaltic emulsion membrane on dry or damp pavement with no free water. Apply asphaltic emulsion when the atmospheric and pavement temperatures are above:

1. 50 degrees F if PG 76-22 M is specified
2. 45 degrees F if PG 64-28 M is specified

Apply emulsion at a temperature from 120 to 180 degrees F and in a single application at the residual rate specified for the condition of the underlying surface. Asphaltic emulsion membrane must have a target residual rate for the surfaces to receive the emulsion as shown in the following table:

Asphaltic Emulsion Membrane Target Residual Rate

Surface to receive asphaltic emulsion membrane	Target residual rates (gal/sq yd)
PCC pavement	0.09–0.11
Dense, compacted, new HMA pavement	0.11–0.14
Open textured, dry, aged or oxidized existing AC pavement	0.13–0.17

If requested and authorized, you may change the asphaltic emulsion membrane application rates.

39-5.01C(4) Placing and Compacting Hot Mix Asphalt

Construct a transverse joint if the HMA remains in the paver for more than 30 minutes.

Do not reintroduce HMA spread over asphaltic emulsion membrane into the paving process.

Do not overlap or hot lap HMA. Pave through lanes after paving adjacent:

1. Shoulders
2. Tapers
3. Transitions
4. Road connections
5. Driveways
6. Curve widenings
7. Chain control lanes
8. Turnouts
9. Turn pockets
10. Ramps

For BWC placed on areas adjacent to through lanes that extend into the through lanes, cut the BWC to a neat, straight vertical line at the lane line.

If you spill asphaltic emulsion into the paver hopper, stop paving and remove the contaminated material.

39-5.01D Payment

Not Used

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

39-5.02 BONDED WEARING COURSES-GAP GRADED

39-5.02A General

39-5.02A(1) Summary

Section 39-5.02 includes specifications for producing bonded wearing course-gap graded.

39-5.02A(2) Definitions

Reserved

39-5.02A(3) Submittals

Include film thickness and calculations and AASHTO T 305 results with your JMF submittal.

39-5.02A(4) Quality Control and Assurance

39-5.02A(4)(a) General

Reserved

39-5.02A(4)(b) Quality Control

39-5.02A(4)(b)(i) General

Reserved

39-5.02A(4)(b)(ii) Aggregate

Test the quality characteristics of aggregate under the test methods and frequencies shown in the following table:

Aggregate Testing Frequencies

Quality characteristic	Test method	Minimum testing frequency
Gradation	AASHTO T 27	1 per 750 tons and any remaining part
Sand equivalent ^{a, b}	AASHTO T 176	
Moisture content ^c	AASHTO T 329	1 per 1500 tons and any remaining part
Crushed particles	AASHTO T 335	1 per 10,000 tons or 2 per project, whichever is greater
Los Angeles rattler	AASHTO T 96	
Flat and elongated particles	ASTM D4791	
Fine aggregate angularity	AASHTO T 304 Method A	

^aReported value must be the average of 3 tests from a single sample.

^bUse of a sand reading indicator is required as shown in AASHTO T 176, Figure 1. Sections 4.7, 4.8, 7.1.2, 8.4.2, and 8.4.3 do not apply.

^cTest at continuous mixing plants only.

For lime treated aggregate, test aggregate before treatment and test for gradation and moisture content during BWC-G production.

39-5.02A(4)(b)(iii) Hot Mix Asphalt Production

Sample BWC in two 1-gallon metal containers.

Test the quality characteristics of BWC-G under the test methods and frequencies shown in the following table:

BWC-G Testing Frequencies

Quality characteristic	Test method	Minimum testing frequency
Asphalt binder content	AASHTO T 308 Method A	1 per 750 tons and any remaining part
HMA moisture content	AASHTO T 329	1 per 2,500 tons but not less than 1 per paving day

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

39-5.02A(4)(b)(iv)–39-5.02A(4)(b)(vii) Reserved

39-5.02A(4)(c) Department Acceptance

The Department accepts BWC-G based on compliance with:

1. Asphalt binder content at JMF -0.4, +0.5 percent when tested under AASHTO T 308, Method A.
2. Aggregate quality requirements shown in the following table:

Aggregate Quality		
Quality characteristic	Test method	Requirement
Aggregate gradation	AASHTO T 27	JMF ± Tolerance
Percent of crushed particles	AASHTO T 335	-- 90
Coarse aggregate (min, %)		
One-fractured face		
Two-fractured faces		
Fine aggregate (min, %)	AASHTO T 335	85
(Passing No. 4 sieve		
and retained on No. 8 sieve.)		
One fractured face	AASHTO T 96	12 35
Los Angeles Rattler (max, %)		
Loss at 100 Rev.		
Loss at 500 Rev.	AASHTO T 176	47
Sand equivalent (min)		
Flat and elongated particles (max, % by weight at 5:1)	ASTM D4791	25
Fine aggregate angularity (min, %)	AASHTO T 304 Method A	45

^aReported value must be the average of 3 tests from a single sample.

^bUse of a sand reading indicator is required as shown in AASHTO T 176, Figure 1. Sections 4.7, 4.8, 7.1.2, 8.4.2 and 8.4.3 do not apply.

The Department accepts asphaltic emulsion membrane based on compliance with the requirements shown in the following tables:

Asphaltic Emulsion Membrane		
Quality characteristic	Test method	Requirement
Saybolt Furol Viscosity at 25 °C (SFS) ^a	AASHTO T 59	20–100
Sieve test on original emulsion at time of delivery (max, %)	AASHTO T 59	0.05
24-hour storage stability (max, %)	AASHTO T 59	1
Residue by evaporation (min, %)	California Test 331	63
Tests on residue from evaporation test:		
Torsional recovery, measure entire arc of recovery at 25 °C (min, %)	California Test 332	40
Penetration at 25 °C (0.01 mm)	AASHTO T 49	50–70 150–200
PG76-22 M		
PG64-28 M		

^a SFS means Saybolt Furol seconds

39-5.02B Materials

39-5.02B(1) General

Reserved

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

39-5.02B(2) Mix Design

For BWC-G, the 1st paragraph of section 39-1.02B(1) does not apply.

Determine the proposed OBC from a mix design that complies with the requirements shown in the following table:

Hot Mix Asphalt Mix Design Requirements

Quality characteristic	Test method	Requirement
Film thickness (min, μm)	Asphalt Institute MS-2 Table 6.1 ^a	12
Drain down (max, %)	AASHTO T 305 ^b	0.1

^a Film thickness is calculated based on the effective asphalt content and determined as follows:

$$FT = \left(\frac{P_{be}}{SA \times G_b \times 1000} \right) 10^6$$

Where:

FT = Film thickness in μm

P_{be} = Effective asphalt content by total weight of mix using SP-2
Asphalt Mixture

SA = Estimated surface area of the aggregate blend in m^2/kg from
Table 6.1 in the Asphalt Institute Manual Series No. 2 (MS-2).

G_b = Specific gravity of asphalt binder

^b Combine aggregate and asphalt at the asphalt binder supplier's instructed mixing temperature. Coated aggregates that fall through the wire basket during loading must be returned to the basket before conditioning at 350 °F for 1 hour.

The OBC must be greater than 4.9 percent by total weight of mix.

39-5.02B(3) Asphalt Binder

Reserved

39-5.02B(4) Aggregate

The aggregate must comply with the requirements shown in the following table:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Aggregate Quality

Quality characteristic	Test method	Requirement
Percent of crushed particles Coarse aggregate (min, %) One-fractured face Two-fractured faces Fine aggregate (min, %) (Passing No. 4 sieve and retained on No. 8 sieve.) One fractured face	AASHTO T 335	-- 90 85
Los Angeles Rattler (max, %) Loss at 100 Rev. Loss at 500 Rev.	AASHTO T 96	12 35
Sand equivalent (min)	AASHTO T 176	47
Flat and elongated particles (max, % by weight @ 5:1)	ASTM D4791	25
Fine aggregate angularity (min, %)	AASHTO T 304 Method A	45

^aReported value must be the average of 3 tests from a single sample.

^bUse of a sand reading indicator is required as shown in AASHTO T 176, Figure 1.
Sections 4.7, 4.8, 7.1.2, 8.4.2 and 8.4.3 do not apply.

The aggregate gradations for BWC-G must comply with the requirements shown in the following table:

Aggregate Gradation Requirements

BWC-G pavement thickness	Gradation
less than 0.08 foot	No. 4 or 3/8 inch
0.08 foot and greater	1/2 inch

The proposed aggregate gradation must be within the TV limits for the specified sieve sizes shown in the following tables:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

**Aggregate Gradation
(Percentage Passing)
Bonded Wearing Course—Gap Graded**

1/2-inch BWC-G

Sieve sizes	Target value limits	Allowable tolerance
3/4"	100	--
1/2"	80–100	TV ± 6
3/8"	55–80	TV ± 6
No. 4	25–40	TV ± 7
No. 8	19–32	TV ± 5
No. 16	16–22	TV ± 5
No. 30	10–18	TV ± 4
No. 50	8–13	TV ± 4
No. 100	6–10	TV ± 2
No. 200	4.0–7.0	TV ± 2

3/8-inch BWC-G

Sieve sizes	Target value limits	Allowable tolerance
1/2"	100	--
3/8"	80–100	TV ± 6
No. 4	25–40	TV ± 7
No. 8	19–32	TV ± 5
No. 16	16–22	TV ± 5
No. 30	10–18	TV ± 4
No. 50	8–13	TV ± 4
No. 100	7–11	TV ± 2
No. 200	6.0–10.0	TV ± 2

No. 4 BWC-G

Sieve sizes	Target value limits	Allowable tolerance
1/2"	100	--
3/8"	95–100	TV ± 2
No. 4	42–55	TV ± 7
No. 8	19–32	TV ± 5
No. 16	16–22	TV ± 5
No. 30	10–18	TV ± 4
No. 50	8–13	TV ± 4
No. 100	7–11	TV ± 2
No. 200	6.0–10.0	TV ± 2

39-5.02C Construction

Not Used

39-5.02D Payment

Not Used

39-6 HOT MIX ASPHALT ON BRIDGE DECKS

39-6.01 GENERAL

Section 39-6 includes specifications for producing and placing hot mix asphalt on bridge decks.

HMA used for bridge decks must comply with the specifications for Type A HMA in section 39-2.

39-6.02 MATERIALS

Do not use the 1-inch or 3/4-inch aggregate gradation for HMA on bridge decks.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

The grade of asphalt binder for HMA must be PG 64-10 or PG 64-16.

39-6.03 CONSTRUCTION

Spread and compact HMA on bridge decks using method compaction.

If a concrete expansion dam is to be placed at a bridge deck expansion joint, tape oil-resistant construction paper to the deck over the area to be covered by the dam before placing the tack coat{ XE "Tack coat" } and HMA across the joint.

Apply tack coat at the minimum residual rate specified in section 39-1.03C(5). For HMA placed on a deck seal, use the minimum residual rate specified for PCC.

For HMA placed on a deck seal:

1. Place the HMA within 7 days after installing the deck seal.
2. If a paper mask is placed on the deck under section 54-5.03, place the HMA continuously across the paper mask.
3. Place HMA in at least 2 approximately equal layers.
4. For placement of the 1st HMA layer:
 - 4.1. Comply with the HMA application temperature recommended by the deck seal manufacturer.
 - 4.2. Deliver and place HMA using equipment with pneumatic tires or rubber-faced wheels. Do not operate other vehicles or equipment on the bare deck seal.
 - 4.3. Deposit HMA on the deck seal in such a way that the deck seal is not damaged. Do not use a windrow.
 - 4.4. Place HMA in a downhill direction on bridge decks with grades over 2 percent.
 - 4.5. Self-propelled spreading equipment is not required.

39-6.04 PAYMENT

Not Used

39-7 MINOR HOT MIX ASPHALT

39-7.01 GENERAL

39-7.01A Summary

Section 39-7 includes specifications for producing and placing minor hot mix asphalt.

Minor HMA must comply with section 39-2 except as specified in this section 39-7.

39-7.01B Definitions

Reserved

39-7.01C Submittals

The QC plan, test results, and inertial profiler specifications in sections 39-1.01C(3), 39-1.01C(4), 39-1.01C(13)(c)–(d) do not apply.

39-7.01D Quality Control and Assurance

39-7.01D(1) General

For minor HMA, the JMF renewal, inertial profiler certifications and testing, and prepaving meeting specifications in sections 39-1.01D(4), 39-1.01D(6)(c), and 39-1.01D(7) do not apply.

Test pavement smoothness with a 12 foot straightedge.

39-7.01D(2) Quality Control

For minor HMA, section 39-2.01D(2) applies except testing for compliance with the following quality characteristics is not required:

1. Flat and elongated particles
2. Fine aggregate angularity
3. Hamburg wheel track
4. Moisture susceptibility

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

39-7.01D(3) Department Acceptance

The Department accepts minor HMA under section 39-2.01D(5) except compliance with the following quality characteristics is not required:

1. Flat and elongated particles
2. Fine aggregate angularity
3. Hamburg wheel track
4. Moisture susceptibility

39-7.02 MATERIALS

39-7.02A General

Reserved

39-7.02B Mix Design

The mix design for minor HMA must comply with section 39-2.02B except the Hamburg wheel track and moisture susceptibility requirements do not apply.

39-7.02C Asphalt Binder

The grade of asphalt binder for minor HMA must be PG-64-10 or PG-64-16.

39-7.02D Liquid Antistrip Treatment

Treat minor HMA with liquid antistrip.

39-7.03 CONSTRUCTION

Not Used

39-7.04 PAYMENT

Not Used

39-8-39-10 RESERVED

AA

40 CONCRETE PAVEMENT

07-19-13

Replace the headings and paragraphs in section 40 with:

07-19-13

40-1 GENERAL

40-1.01 GENERAL

40-1.01A Summary

Section 40-1 includes general specifications for constructing concrete pavement.

40-1.01B Definitions

concrete raveling: Progressive disintegration of the pavement surface resulting from dislodged aggregate.

full depth crack: Crack that runs from one edge of the slab to the opposite or adjacent side of the slab, except a crack parallel to and within 0.5 foot of either side of a planned contraction joint

working crack: Crack that extends through the full depth of the slab and is parallel to and within 0.5 foot of either side of a planned contraction joint.

action limit: Value at which corrective actions must be made while production may continue.

suspension limit: Value at which production must be suspended while corrections are made.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

40-1.01C Submittals

40-1.01C(1) General

At least 15 days before delivery to the job site, submit manufacturer's recommendations and instructions for storage and installation of:

1. Threaded tie bar splice couplers
2. Joint filler

As an informational submittal, submit calibration documentation and operational guidelines for frequency measuring devices (tachometer) for concrete consolidation vibrators.

Submit updated quality control charts each paving day.

40-1.01C(2) Certificates of Compliance

Submit a certificate of compliance for:

1. Tie bars
2. Threaded tie bar splice couplers
3. Dowel bars
4. Tie bar baskets
5. Dowel bar baskets
6. Joint filler
7. Epoxy powder coating

40-1.01C(3) Quality Control Plan

Submit a concrete pavement QC plan. Allow 30 days for review.

40-1.01C(4) Mix Design

At least 15 days before testing for mix proportions, submit a copy of the AASHTO accreditation for your laboratory determining the mix proportions. At least 15 days before starting field qualification, submit the proposed concrete mix proportions, the corresponding mix identifications, and laboratory test reports including the modulus of rupture for each trial mixture at 10, 21, 28, and 42 days.

40-1.01C(5) Concrete Field Qualification

Submit field qualification data and test reports including:

1. Mixing date
2. Mixing equipment and procedures used
3. Batch volume in cubic yards. The minimum batch size is 5 cu yd.
4. Type and source of ingredients used
5. Penetration of the concrete
6. Air content of the plastic concrete
7. Age and strength at time of concrete beam testing

Field qualification test reports must be certified with a signature by an official in responsible charge of the laboratory performing the tests.

40-1.01C(6) Cores

Submit for authorization the name of the laboratory you propose to use for testing the cores for air content.

Submit each core in an individual plastic bag marked with a location description.

40-1.01C(7) Profile Data and Straightedge Measurements

At least 5 business days before start of initial profiling or changing profiler or operator, submit:

1. Inertial profiler (IP) certification issued by the Department. The certification must not be more than 12 months old.
2. Operator certification for the IP issued by the Department. The operator must be certified for each different model of IP device operated. The certification must not be more than 12 months old.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

3. List of manufacturer's recommended test procedures for IP calibration and verification.

Within 2 business days after cross correlation testing, submit ProVAL profiler certification analysis report for cross correlation test results performed on test section. ProVAL is FHWA's software. Submit the certification analysis report to the Engineer and to the electronic mailbox address:

smoothness@dot.ca.gov

Within 2 business days after each day of inertial profiling, submit profile data to the Engineer and to the electronic mailbox address:

smoothness@dot.ca.gov

Within 2 business days of performing straightedge testing, submit a report of areas requiring smoothness correction.

40-1.01C(8)–40-1.01C(12) Reserved

40-1.01D Quality Control and Assurance

40-1.01D(1) General

If the pavement quantity is at least 2000 cu yd, provide a QC manager.

Core pavement as described for, thickness, bar placement, and air content.

For the Department's modulus of rupture testing, assist the Engineer in fabricating test beams by providing materials and labor.

Allow at least 25 days for the Department to schedule testing for coefficient of friction. Notify the Engineer when the pavement is scheduled to be opened to traffic. Notify the Engineer when the pavement is ready for testing which is the latter of:

1. Seven days after paving
2. When the pavement has attained a modulus of rupture of at least 550 psi

The Department tests for coefficient of friction within 7 days of receiving notification that the pavement is ready for testing.

40-1.01D(2) Preparing Conference

Schedule a prepping conference at a mutually agreed upon time and place to meet with the Engineer. Make the arrangements for the conference facility. Discuss QC plan and methods of performing each item of the work.

Prepping conference attendees must sign an attendance sheet provided by the Engineer. The prepping conference must be attended by your:

1. Project superintendent
2. QC manager
3. Paving construction foreman
4. Workers and your subcontractor's workers, including:
 - 4.1. Foremen including subcontractor's Foremen
 - 4.2. Concrete plant manager
 - 4.3. Concrete plant operator

Do not start paving activities including test strips until the listed personnel have attended a prepping conference.

40-1.01D(3) Just-In-Time-Training

Reserved

40-1.01D(4) Quality Control Plan

Establish, implement, and maintain a QC plan for pavement. The QC plan must describe the organization and procedures used to:

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

1. Control the production process
2. Determine if a change to the production process is needed
3. Implement a change

The QC plan must include action and suspension limits and details of corrective action to be taken if any process is out of those limits. Suspension limits must not exceed specified acceptance criteria.

The QC plan must address the elements affecting concrete pavement quality including:

1. Mix proportions
2. Aggregate gradation
3. Materials quality
4. Stockpile management
5. Line and grade control
6. Proportioning
7. Mixing and transportation
8. Placing and consolidation
9. Contraction and construction joints
10. Bar reinforcement placement and alignment
11. Dowel bar placement, alignment, and anchorage
12. Tie bar placement
13. Modulus of rupture
14. Finishing and curing
15. Protecting pavement
16. Surface smoothness

40-1.01D(5) Mix Design

Use a laboratory that complies with ASTM C 1077 to determine the mix proportions for concrete pavement. The laboratory must have a current AASHTO accreditation for:

1. AASHTO T 97 or ASTM C 78
2. ASTM C 192/C 192M

Make trial mixtures no more than 24 months before field qualification.

Using your trial mixtures, determine the minimum cementitious materials content. Use your value for minimum cementitious material content for *MC* in equation 1 and equation 2 of section 90-1.02B(3).

To determine the minimum cementitious materials content or maximum water to cementitious materials ratio, use modulus of rupture values of at least 570 psi for 28 days age and at least 650 psi for 42 days age.

If changing an aggregate supply source or the mix proportions, produce a trial batch and field-qualify the new concrete. The Engineer does not adjust contract time for performing sampling, testing, and qualifying new mix proportions or changing an aggregate supply source.

40-1.01D(6) Quality Control Testing

40-1.01D(6)(a) General

Testing laboratories and testing equipment must comply with the Department's Independent Assurance Program.

40-1.01D(6)(b) Concrete Mix

Before placing pavement, your mix design must be field qualified. Use an ACI certified "Concrete Laboratory Technician, Grade I" to perform field qualification tests and calculations. Test for modulus of rupture under California Test 523 at 10, 21, and 28 days of age.

When placing pavement, your quality control must include testing properties at the frequencies shown in the following table:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

QC Testing Frequency

Property	Test method	Minimum frequency
Cleanness value	California Test 227	2 per day
Sand equivalent	California Test 217	2 per day
Aggregate gradation	California Test 202	2 per day
Air content (air entrainment specified)	California Test 504	1 per hour
Air content (air entrainment not specified)	California Test 504	1 per 4 hours
Density	California Test 518	1 per 4 hours
Penetration	California Test 533	1 per 4 hours
Aggregate moisture meter calibration ^a	California Test 223 or California Test 226	1 per day

^a Check calibration of the plant moisture meter by comparing moisture meter readings with California Test 223 or California Test 226 test results.

Maintain control charts to identify potential problems and assignable causes. Post a copy of each control chart at a location determined by the Engineer.

Individual measurement control charts must use the target values in the mix proportions as indicators of central tendency.

Develop linear control charts for:

1. Cleanness value
2. Sand equivalent
3. Fine and coarse aggregate gradation
4. Air content
5. Penetration

Control charts must include:

1. Contract number
2. Mix proportions
3. Test number
4. Each test parameter
5. Action and suspension limits
6. Specification limits
7. Quality control test results

For fine and coarse aggregate gradation control charts, record the running average of the previous 4 consecutive gradation tests for each sieve and superimpose the specification limits.

For air content control charts, the action limit is ± 1.0 percent of the specified value. If no value is specified, the action limit is ± 1.0 percent of the value used for your approved mix design.

As a minimum, a process is out of control if any of the following occurs:

1. For fine and coarse aggregate gradation, 2 consecutive running averages of 4 tests are outside the specification limits
2. For individual penetration or air content measurements:
 - 2.1. One point falls outside the suspension limit line
 - 2.2. Two points in a row fall outside the action limit line

Stop production and take corrective action for out of control processes or the Engineer rejects subsequent material.

Before each day's concrete pavement placement and at intervals not to exceed 4 hours of production, use a tachometer to test and record vibration frequency for concrete consolidation vibrators.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

40-1.01D(6)(c) Pavement Smoothness

40-1.01D(6)(c)(i) General

Notify the Engineer 2 business days before performing smoothness testing including IP calibration and verification testing. The notification must include start time and locations by station.

Before testing the pavement smoothness, remove foreign objects from the surface, and mark the beginning and ending station on the pavement shoulder.

Test pavement smoothness using an IP except use a 12-foot straightedge at the following locations:

1. Traffic lanes less than 1,000 feet in length including ramps, turn lanes, and acceleration and deceleration lanes
2. Areas within 15 feet of manholes
3. Shoulders
4. Weigh-in-motion areas
5. Miscellaneous areas such as medians, gore areas, turnouts, and maintenance pullouts

40-1.01D(6)(c)(ii) Straightedge Testing

Identify locations of areas requiring correction by:

1. Location Number
2. District-County-Route
3. Beginning station or post mile to the nearest 0.01 mile
4. For correction areas within a lane:
 - 4.1. Lane direction as NB, SB, EB, or WB
 - 4.2. Lane number from left to right in direction of travel
 - 4.3. Wheel path as "L" for left, "R" for right, or "B" for both
5. For correction areas not within a lane:
 - 5.1. Identify pavement area (e.g., shoulder, weight station, turnout)
 - 5.2. Direction and distance from centerline as "L" for left or "R" for right
6. Estimated size of correction area

40-1.01D(6)(c)(iii) Inertial Profile Testing

IP equipment must display a current certification decal with expiration date.

Conduct cross correlation IP verification test in the Engineer's presence before performing initial profiling. Verify cross correlation IP verification test at least annually. Conduct 5 repeat runs of the IP on an authorized test section. The test section must be on an existing concrete pavement surface 0.1 mile long. Calculate a cross correlation to determine the repeatability of your device under Section 8.3.1.2 of AASHTO R 56 using ProVAL profiler certification analysis with a 3 feet maximum offset. The cross correlation must be a minimum of 0.92.

Conduct the following IP calibration and verification tests in the Engineer's presence each day before performing inertial profiling:

1. Block test. Verify the height sensor accuracy under AASHTO R 57, section 5.3.2.3.
2. Bounce test. Verify the combined height sensor and accelerometer accuracy under AASHTO R 57, section 5.3.2.3.2.
3. DMI test. Calibrate the accuracy of the testing procedure under AASHTO R 56, section 8.4.
4. Manufacturer's recommended tests.

Collect IP data using the specified ProVAL analysis with 250 mm and IRI filters. Comply with the requirements for data collection under AASHTO R 56.

For IP testing, wheel paths are 3 feet from and parallel to the edge of a lane. Left and right are relative to the direction of travel. The IRI is the pavement smoothness along a wheel path of a given lane. The MRI is the average of the IRI values for the left and right wheel path from the same lane.

Operate the IP according to the manufacturer's recommendations and AASHTO R 57 at 1-inch recording intervals and a minimum 4 inch line laser sensor.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

Collect IP data under AASHTO R 56. IP data must include:

1. Raw profile data for each lane.
2. ProVAL ride quality analysis report for the international roughness index (IRI) of left and right wheel paths of each lane. Submit in pdf file format.
3. ProVAL ride quality analysis report for the mean roughness index (MRI) of each lane. Submit in pdf file format.
4. ProVAL smoothness assurance analysis report for IRIs of left wheel path. Submit in pdf file format.
5. ProVAL smoothness assurance analysis report for IRIs of right wheel path. Submit in pdf file format.
6. GPS data file for each lane in GPS exchange. Submit in GPS eXchange file format.
7. Manufacturer's recommended IP calibration and verification tests results.
8. AASHTO IP calibration and verification test results including bounce, block, and distance measurement instrument (DMI).

Submit the IP raw profile data in unfiltered electronic pavement profile file (PPF) format. Name the PPF file using the following naming convention:

YYYYMMDD_TTCCRRR_D_L_W_S_X_PT.PPF

where:

YYYY = year

MM = Month, leading zero

DD = Day of month, leading zero

TT = District, leading zero

CCC = County, 2 or 3 letter abbreviation as shown in section 1-1.08

RRR = Route number, no leading zeros

D = Traffic direction as NB, SB, WB, or EB

L = Lane number from left to right in direction of travel

W = Wheel path as "L" for left, "R" for right, or "B" for both

S = Beginning station to the nearest foot (e.g., 10+20) or beginning post mile to the nearest hundredth (e.g., 25.06) no leading zero

X = Profile operation as "EXIST" for existing pavement, "PAVE" for after paving, or "CORR" for after final surface pavement correction

PT = Pavement type (e.g., "concrete", etc.)

Determine IRIs using the ProVAL ride quality analysis with a 250 mm and IRI filters. While collecting the profile data to determine IRI, record the following locations in the raw profile data:

1. Begin and end of all bridge approach slabs
2. Begin and end of all bridges
3. Begin and end of all culverts visible on the roadway surface

For each 0.1 mile section, your IRI values must be within 10 percent of the Department's IRI values. The Engineer may order you to recalibrate your IP equipment and reprofile. If your results are inaccurate due to operator error, the Engineer may disqualify your IP operator.

Determine the MRI for 0.1-mile fixed sections. A partial section less than 0.1 mile that is the result of an interruption to continuous pavement surface must comply with the MRI specifications for a full section. Adjust the MRI for a partial section to reflect a full section based on the proportion of a section paved.

Determine the areas of localized roughness. Use the ProVAL smoothness assurance with a continuous IRI for each wheel path, 25-foot interval, and 250 mm and IRI filters.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

40-1.01D(6)(c)(iv) Reserved

40-1.01D(6)(d)–40-1.01D(6)(h) Reserved

40-1.01D(7) Pavement Acceptance

40-1.01D(7)(a) Acceptance Testing

40-1.01D(7)(a)(i) General

The Department's acceptance testing includes testing the pavement properties at the minimum frequencies shown in the following table:

Acceptance Testing		
Property	Test Method	
	CRCP	JPCP
Modulus of rupture (28 day)	California Test 523	
Air content ^b	California Test 504	
Dowel bar placement	--	Measurement ^a
Tie bar placement	--	Measurement ^a
Thickness	California Test 531	
Coefficient of friction	California Test 342	
		Frequency ^a
		1,000 cu yd
		1 day's paving
		700 sq yd
		4,000 sq yd
		1,200 sq yd
		1 day's paving

^aA single test represents no more than the frequency specified.

^bTested only when air entrainment is specified.

Pavement smoothness may be accepted based on your testing in the absence of the Department's testing.

40-1.01D(7)(a)(ii) Air Content

If air-entraining admixtures are specified, the Engineer uses a t-test to compare your QC test results with the Department's test results. The t-value for test data is determined using the following equation:

$$t = \frac{|\bar{X}_c - \bar{X}_v|}{S_p \sqrt{\frac{1}{n_c} + \frac{1}{n_v}}} \quad \text{and} \quad S_p^2 = \frac{S_c^2(n_c - 1) + S_v^2(n_v - 1)}{n_c + n_v - 2}$$

where:

- n_c = Number of your quality control tests (minimum of 6 required)
- n_v = Number of Department's tests (minimum of 2 required)
- \bar{X}_c = Mean of your quality control tests
- \bar{X}_v = Mean of the Department's tests
- S_p = Pooled standard deviation
(When $n_v = 1$, $S_p = S_c$)
- S_c = Standard deviation of your quality control tests
- S_v = Standard deviation of the Department's tests (when $n_v > 1$)

The Engineer compares your QC test results with the Department's test results at a level of significance of $\alpha = 0.01$. The Engineer compares the t-value to t_{crit} , using degrees of freedom showing in the following table:

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

degrees of freedom (nc+nv-2)	tcrit (for $\alpha = 0.01$)
1	63.657
2	9.925
3	5.841
4	4.604
5	4.032
6	3.707
7	3.499
8	3.355
9	3.250
10	3.169

If the t-value calculated is less than or equal to tcrit, your quality control test results are verified. If the t-value calculated is greater than tcrit, quality control test results are not verified.

If your quality control test results are not verified, core at least 3 specimens from concrete pavement under section 40-1.03P. The Engineer selects the core locations. The authorized laboratory must test these specimens for air content under ASTM C 457. The Engineer compares these test results with your quality control test results using the t-test method. If your quality control test results are verified based on this comparison, the Engineer uses the quality control test results for acceptance of concrete pavement for air content. If your quality control test results are not verified based on this comparison, the Engineer uses the air content of core specimens determined by the authorized laboratory under ASTM C 457 for acceptance.

40-1.01D(7)(a)(iii) Dowel and Tie Bar Placement

For JPCP, drill cores under section 40-1.03P for the Department's acceptance testing.

The Engineer identifies which joint and dowel or tie bar are to be tested. Core each day's paving within 2 business days. Each dowel or tie bar test consists of 2 cores, 1 on each bar end to expose both ends and allow measurement.

If the tests indicate dowel or tie bars are not placed within the specified tolerances or if there is unconsolidated concrete around the dowel or tie bars, core additional specimens identified by Engineer to determine the limits of unacceptable work.

40-1.01D(7)(a)(iv) Thickness

Drill cores under section 40-1.03P for the Department's acceptance testing in the primary area, which is the area placed in 1 day for each thickness. Core at locations determined by the Engineer and in the Engineer's presence.

Do not core until any grinding has been completed.

The core specimen diameter must be 4 inches. To identify the limits of concrete pavement deficient in thickness by more than 0.05 foot, you may divide primary areas into secondary areas. The Engineer measures cores under California Test 531 to the nearest 0.01 foot. Core at least 1 foot from existing, contiguous, and parallel concrete pavement not constructed as part of this Contract.

You may request the Engineer make additional thickness measurements and use them to determine the average thickness variation. The Engineer determines the locations with random sampling methods.

If each thickness measurement in a primary area is less than 0.05 foot deficient, the Engineer calculates the average thickness deficiency in that primary area. The Engineer uses 0.02 foot for a thickness difference more than 0.02 foot over the specified thickness.

For each thickness measurement in a primary area deficient by more than 0.05 foot, the Engineer determines a secondary area where the thickness deficiency is more than 0.05 foot. The Engineer determines this secondary area by measuring the thickness of each concrete pavement slab adjacent to

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

the measurement found to be more than 0.05 foot deficient. The Engineer continues to measure the thickness until an area that is bound by slabs with thickness deficient by 0.05 foot or less is determined.

Slabs without bar reinforcement are defined by the areas bound by longitudinal and transverse joints and concrete pavement edges. Slabs with bar reinforcement are defined by the areas bound by longitudinal joints and concrete pavement edges and 15-foot lengths. Secondary area thickness measurements in a slab determine that entire slab's thickness.

The Engineer measures the remaining primary area thickness after removing the secondary areas from consideration for determining the average thickness deficiency.

40-1.01D(7)(a)(v)–40-1.01D(7)(a)(ix) Reserved

40-1.01D(7)(b) Acceptance Criteria

40-1.01D(7)(b)(i) General

Reserved

40-1.01D(7)(b)(ii) Modulus of Rupture

For field qualification, the modulus of rupture at no later than 28 days must be at least:

1. 550 psi for each single beam
2. 570 psi for the average of 5 beams

For production, the modulus of rupture for the average of the individual test results of 2 beams aged for 28 days must be at least 570 psi.

40-1.01D(7)(b)(iii) Air Content

The air content must be within ± 1.5 percent of the specified value. If no value is specified, the air content must be within ± 1.5 percent of, the value used for your approved mix design.

40-1.01D(7)(b)(iv) Bar Reinforcement

In addition to requirements of Section 52, bar reinforcement must be more than 1/2 inch below the saw cut depth at concrete pavement joints.

40-1.01D(7)(b)(v) Dowel Bar and Tie Bar Placement

Tie bar placement must comply with the tolerances shown in the following table:

Tie Bar Tolerance	
Dimension	Tolerance
Horizontal and vertical skew	5 1/4 inch, max
Longitudinal translation	± 2 inch
Horizontal offset (embedment)	± 2 inch
Vertical depth	1. At least 1/2 inch below the bottom of the saw cut 2. When measured at any point along the bar, not less than 2 inches clear of the pavement's surface and bottom

NOTE: Tolerances are measured relative to the completed joint.

Dowel bar placement must comply with the tolerances shown in the following table:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Dowel Bar Tolerances

Dimension	Tolerance
Horizontal offset	±1 inch
Longitudinal translation	±2 inch
Horizontal skew	5/8 inch, max
Vertical skew	5/8 inch, max
Vertical depth	<p>The minimum distance measured from concrete pavement surface to any point along the top of dowel bar must be: DB + 1/2 inch</p> <p>where: DB = one third of pavement thickness in inches, or the saw cut depth, whichever is greater</p> <p>The maximum distance below the depth shown must be 5/8 inch.</p>

NOTE: Tolerances are measured relative to the completed joint.

The Engineer determines the limits for removal and replacement.

40-1.01D(7)(b)(vi) Pavement Thickness

Concrete pavement thickness must not be deficient by more than 0.05 foot.

The minimum thickness is not reduced for specifications that may affect concrete pavement thickness such as allowable tolerances for subgrade construction.

The Engineer determines the areas of noncompliant pavement, the thickness deficiencies, and the limits where removal is required.

Pavement with an average thickness deficiency less than 0.01 foot is acceptable. If the thickness deficiency is 0.01 foot or more and less than 0.05 foot, you may request authorization to leave the pavement in place and accept a pay adjustment. If the deficiency is more than 0.05 foot the pavement must be removed and replaced.

40-1.01D(7)(b)(vii) Pavement Smoothness

Where testing with an IP is required, the pavement surface must have:

1. No areas of localized roughness with an IRI greater than 120 in/mi
2. MRI of 60 in/mi or less within a 0.1 mile section

Where testing with a straightedge is required, the pavement surface must not vary from the lower edge of the straightedge by more than:

1. 0.01 foot when the straightedge is laid parallel with the centerline
2. 0.02 foot when the straightedge is laid perpendicular to the centerline and extends from edge to edge of a traffic lane
3. 0.02 foot when the straightedge is laid within 24 feet of a pavement conform

40-1.01D(7)(b)(viii) Coefficient of Friction

Initial and final texturing must produce a coefficient of friction of at least 0.30. Do not open the pavement to traffic unless the coefficient of friction is at least 0.30.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

40-1.01D(7)(b)(ix)–40-1.01D(7)(b)(xii) Reserved

40-1.02 MATERIALS

40-1.02A General

Water for coring must comply with section 90.

Tack coat must comply with section 39.

40-1.02B Concrete

40-1.02B(1) General

PCC for pavement must comply with section 90-1 except as otherwise specified.

40-1.02B(2) Cementitious Material

Concrete must contain from 505 pounds to 675 pounds cementitious material per cubic yard. The specifications for reducing cementitious material content in section 90-1.02E(2) do not apply.

40-1.02B(3) Aggregate

Aggregate must comply with section 90-1.02C except the specifications for reduction in operating range and contract compliance for cleanness value and sand equivalent specified in section 90-1.02C(2) and section 90-1.02C(3) do not apply.

For coarse aggregate in high desert and high mountain climate regions, the loss must not exceed 25 percent when tested under California Test 211 with 500 revolutions.

For combined aggregate gradings, the difference between the percent passing the 3/8-inch sieve and the percent passing the no. 8 sieve must not be less than 16 percent of the total aggregate.

40-1.02B(4) Air Entrainment

The second paragraph of section 90-1.02I(2)(a) does not apply.

For a project shown in the low and south mountain climate regions, add air-entraining admixture to the concrete at the rate required to produce an air content of 4 percent in the freshly mixed concrete.

For a project shown in the high desert and high mountain climate regions, add air-entraining admixture to the concrete at the rate required to produce an air content of 6 percent in the freshly mixed concrete.

40-1.02B(5)–40-1.02B(8) Reserved

40-1.02C Reinforcement, Bars, and Baskets

40-1.02C(1) Bar Reinforcement

Bar reinforcement must be deformed bars.

If the project is not shown to be in high desert or any mountain climate region, bar reinforcement must comply with section 52.

If the project is shown to be in high desert or any mountain climate regions, bar reinforcement must be one of the following:

1. Epoxy-coated bar reinforcement under section 52-2.03B except bars must comply with either ASTM A 706/A 706M; ASTM A 996/A 996M; or ASTM A 615/A 615M, Grade 40 or 60. Bars must be handled under ASTM D 3963/D 3963M and section 52-2.02C.
2. Low carbon, chromium steel bar complying with ASTM A 1035/A 1035M

40-1.02C(2) Dowel Bars

Dowel bars must be plain bars. Fabricate, sample, and handle epoxy-coated dowel bars under ASTM D 3963/D 3963M and section 52-2.03C except each sample must be 18 inches long.

If the project is not shown to be in high desert or any mountain climate region, dowel bars must be one of the following:

1. Epoxy-coated bars. Bars must comply with ASTM A 615/A 615M, Grade 40 or 60. Epoxy coating must comply with either section 52-2.02B or 52-2.03B.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CTA Contract No. XXX

2. Stainless-steel bars. Bars must be descaled solid stainless-steel bars under ASTM A 955/A 955M, UNS Designation S31603 or S31803.
3. Low carbon, chromium-steel bars under ASTM A 1035/A 1035M.

If the project is shown to be in high desert or any mountain climate region, dowel bars must be one of the following:

1. Epoxy-coated bars. Bars must comply with ASTM A 615/A 615M, Grade 40 or 60. Epoxy coating must comply with section 52-2.03B.
2. Stainless-steel bars. Bars must be descaled solid stainless-steel bars under ASTM A 955/A 955M, UNS Designation S31603 or S31803.

40-1.02C(3) Tie Bars

Tie bars must be deformed bars.

If the project is not shown to be in high desert or any mountain climate region, tie bars must be one of the following:

1. Epoxy-coated bar reinforcement. Bars must comply with either section 52-2.02B or 52-2.03B except bars must comply with either ASTM A 706/A 706M; ASTM A 996/A 996M; or ASTM A 615/A 615M, Grade 40 or 60.
2. Stainless-steel bars. Bars must be descaled solid stainless-steel bars under ASTM A 955/A 955M, UNS Designation S31603 or S31803.
3. Low carbon, chromium-steel bars under ASTM A 1035/A 1035M.

If the project is shown to be in high desert or any mountain climate region, tie bars must be one of the following:

1. Epoxy-coated bar reinforcement. Bars must comply with section 52-2.03B except bars must comply with either ASTM A 706/A 706M; ASTM A 996/A 996M; or ASTM A 615/A 615M, Grade 40 or 60.
2. Stainless-steel bars. Bars must be descaled solid stainless-steel bars under ASTM A 955/A 955M, UNS Designation S31603 or S31803.

Fabricate, sample, and handle epoxy-coated tie bars under ASTM D 3963/D 3963M, section 52-2.02, or section 52-2.03.

Do not bend tie bars.

40-1.02C(4) Dowel and Tie Bar Baskets

For dowel and tie bar baskets, wire must comply with ASTM A 82/A 82M and be welded under ASTM A 185/A 185M, Section 7.4. The minimum wire-size no. is W10. Use either U-frame or A-frame shaped assemblies.

If the project is not shown to be in high desert or any mountain climate region, baskets may be epoxy-coated, and the epoxy coating must comply with either section 52-2.02B or 52-2.03B.

If the project is shown to be in high desert or any mountain climate region, wire for dowel bar and tie bar baskets must be one of the following:

1. Epoxy-coated wire complying with section 52-2.03B
2. Stainless-steel wire. Wire must be descaled solid stainless-steel. Wire must comply with (1) the chemical requirements in ASTM A 276/A 276M, UNS Designation S31603 or S31803 and (2) the tension requirements in ASTM A 1022/ A 1022M.

Handle epoxy-coated tie bar and dowel bar baskets under ASTM D 3963/D 3963M and either section 52-2.02 or 52-2.03.

Fasteners must be driven fasteners under ASTM F 1667. Fasteners on lean concrete base or HMA must have a minimum shank diameter of 3/16 inch and a minimum shank length of 2-1/2 inches. For asphalt treated permeable base or cement treated permeable base, the shank diameter must be at least 3/16 inch and the shank length must be at least 5 inches.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

Fasteners, clips, and washers must have a minimum 0.2-mil thick zinc coating applied by either electroplating or galvanizing.

40-1.02D Dowel Bar Lubricant

Dowel bar lubricant must be petroleum paraffin based or a curing compound. Paraffin-based lubricant must be Dayton Superior DSC BB-Coat or Valvoline Tectyl 506 or an approved equal and must be factory-applied. Curing compound must be curing compound no. 3.

40-1.02E Joint Filler

Joint filler for isolation joint must be preformed expansion joint filler for concrete (bituminous type) under ASTM D 994.

40-1.02F Curing Compound

Curing compound must be curing compound no. 1 or 2.

40-1.02G Nonshrink Hydraulic Cement Grout

Nonshrink hydraulic cement grout must comply with ASTM C 1107/C 1107M. Clean, uniform, rounded aggregate filler may be used to extend the grout. Aggregate filler must not exceed 60 percent of the grout mass or the maximum recommended by the manufacturer, whichever is less. Aggregate filler moisture content must not exceed 0.5 percent when tested under California Test 223 or California Test 226. Aggregate filler tested under California Test 202 must comply with the grading shown in the following table:

Aggregate Filler Grading	
Sieve size	Percentage passing
1/2-inch	100
3/8-inch	85–100
No. 4	10–30
No. 8	0–10
No. 16	0–5

40-1.02H Temporary Roadway Pavement Structure

Temporary roadway pavement structure must comply with section 41-1.02E.

40-1.02I–40-1.02N Reserved

40-1.03 CONSTRUCTION

40-1.03A General

Aggregate and bulk cementitious material must be proportioned by weight by means of automatic proportioning devices of approved types.

For widenings and lane reconstruction, construct only the portion of pavement where the work will be completed during the same lane closure. If you fail to complete the construction during the same lane closure, construct a temporary pavement structure under section 41-1.

40-1.03B Water Supply

Before placing concrete pavement, develop enough water supply.

40-1.03C Test Strips

Construct a test strip for each type of pavement with a quantity of more than 2,000 cu yd. Obtain authorization of the test strip before constructing pavement. Test strips must be:

1. 700 to 1,000 feet long
2. Same width as the planned paving, and
3. Constructed using the same equipment proposed for paving

The Engineer selects from 6 to 12 core locations for dowel bars and up to 6 locations for tie bars per test strip. If you use mechanical dowel bar inserters, the test strip must demonstrate they do not leave voids, segregations, or surface irregularities such as depressions, dips, or high areas.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

Test strips must comply with the acceptance criteria for:

1. Smoothness, except IP is not required
2. Dowel bars and tie bars placement
3. Pavement thickness
4. Final finishing, except the coefficient of friction is not considered

Allow 3 business days for evaluation. If the test strip is noncompliant, stop paving and submit a plan for changed materials, methods, or equipment. Allow 3 business days for authorization of the plan. Construct another test strip per the authorized plan.

Remove and dispose of noncompliant test strips.

If the test strip is compliant except for smoothness and final finishing, you may grind the surface. After grinding retest the test strip smoothness under section 40-1.01D(6)(c).

If the test strip is compliant for smoothness and thickness, construction of an additional test strip is not required and the test strip may remain in place.

Construct additional test strips if you:

1. Propose different paving equipment including:
 - 1.1. Paver
 - 1.2. Dowel bar inserter
 - 1.3. Tie bar inserter
 - 1.4. Tining
 - 1.5. Curing equipment
2. Change concrete mix proportions

You may request authorization to eliminate the test strip if you use paving equipment and personnel from a Department project (1) for the same type of pavement and (2) completed within the past 12 months. Submit supporting documents and previous project information with your request.

40-1.03D Joints

40-1.03D(1) General

Do not bend tie bars or reinforcement in existing concrete pavement joints.

For contraction joints and isolation joints, saw cut a groove with a power-driven saw. After cutting, immediately wash slurry from the joint with water at less than 100 psi pressure.

Keep joints free from foreign material including soil, gravel, concrete, and asphalt. To keep foreign material out of the joint, you may use filler material. Filler material must not react adversely with the concrete or cause concrete pavement damage. After sawing and washing, install filler material that keeps moisture in the adjacent concrete during the 72 hours after paving. If you install filler material, the specifications for spraying the sawed joint with additional curing compound in section 40-1.03K does not apply. If using absorptive filler material, moisten the filler immediately before or after installation.

40-1.03D(2) Construction Joints

Construction joints must be vertical.

Before placing fresh concrete against hardened concrete, existing concrete pavement, or structures, apply curing compound no. 1 or 2 to the vertical surface of the hardened concrete, existing concrete pavement, or structures and allow it to dry.

At joints between concrete pavement and HMA, apply tack coat between the concrete pavement and HMA.

Use a metal or wooden bulkhead to form transverse construction joints. If dowel bars are described, the bulkhead must allow dowel bar installation.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

40-1.03D(3) Contraction Joints

Saw contraction joints before cracking occurs and after the concrete is hard enough to saw without spalling, raveling, or tearing.

Saw cut using a power saw with a diamond blade. After cutting, immediately wash slurry from the joint with water at less than 100 psi pressure.

Except for longitudinal joints parallel to a curving centerline, transverse and longitudinal contraction joints must not deviate by more than 0.1 foot from either side of a 12-foot straight line

Cut transverse contraction joints within 0.5 foot of the spacing described. Adjust spacing if needed such that slabs are at least 10 feet long.

For widenings, do not match transverse contraction joints with existing joint spacing or skew unless otherwise described.

Cut transverse contraction joints straight across the full concrete pavement width, between isolation joints and edges of pavement. In areas of converging and diverging pavements, space transverse contraction joints such that the joint is continuous across the maximum pavement width. Longitudinal contraction joints must be parallel with the concrete pavement centerline, except when lanes converge or diverge.

40-1.03D(4) Isolation Joints

Before placing concrete at isolation joints, prepare the existing concrete face and secure joint filler. Prepare by saw cutting and making a clean flat vertical surface. Make the saw cut the same depth as the depth of the new pavement.

40-1.03E Bar Reinforcement

Place bar reinforcement under section 52.

40-1.03F Dowel Bar Placement

If using curing compound as lubricant, apply the curing compound to dowels in 2 separate applications. Lubricate each dowel bar entirely before placement. The last application must be applied not more than 8 hours before placing the dowel bars. Apply each curing compound application at a rate of 1 gallon per 150 square feet.

Install dowel bars using one of the following methods:

1. Drill and bond bars. Comply with section 41-10.
2. Mechanical insertion. Eliminate evidence of the insertion by reworking the concrete over the dowel bars.
3. Dowel bar baskets. Anchor baskets with fasteners. Use at least 1 fastener per foot for basket sections. Baskets must be anchored at least 200 feet in advance of the concrete placement activity unless your waiver request is authorized. If requesting a waiver, describe the construction limitations or restricted access preventing the advanced anchoring. After the baskets are anchored and before the concrete is placed, cut and remove temporary spacer wires and demonstrate the dowel bars do not move from their specified depth and alignment during concrete placement.

If dowel bars are noncompliant, stop paving activities, demonstrate your correction, and obtain verbal approval from the Engineer.

40-1.03G Tie Bar Placement

Install tie bars at longitudinal joints using one of the following methods:

1. Drill and bond bars. Comply with section 41-10.
2. Insert bars. Mechanically insert tie bars into plastic slip-formed concrete before finishing. Inserted tie bars must have full contact between the bar and the concrete. Eliminate evidence of the insertion by reworking the concrete over the tie bars.
3. Threaded couplers. Threaded tie bar splice couplers must be fabricated from deformed bar reinforcement and free of external welding or machining.
4. Tie bar baskets. Anchor baskets at least 200 feet in advance of pavement placement activity. If you request a waiver, describe the construction limitations or restricted access preventing the advanced

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

anchoring. After the baskets are anchored and before paving, demonstrate the tie bars do not move from their specified depth and alignment during paving. Use fasteners to anchor tie bar baskets.

If tie bars are noncompliant, stop paving activities, demonstrate your correction, and obtain verbal approval from the Engineer.

40-1.03H Placing Concrete

40-1.03H(1) General

Immediately prior to placing concrete, the surface to receive concrete must be:

1. In compliance with specified requirements, including compaction and elevation tolerances
2. Free of loose and extraneous material
3. Uniformly moist, but free of standing or flowing water

Place concrete pavement with stationary side forms or slip-form paving equipment.

Place consecutive concrete loads within 30 minutes of each other. Construct a transverse construction joint when concrete placement is interrupted by more than 30 minutes. The transverse construction joint must coincide with the next contraction joint location, or you must remove fresh concrete pavement to the preceding transverse joint location.

Place concrete pavement in full slab widths separated by construction joints or monolithically in multiples of full lane widths with a longitudinal contraction joint at each traffic lane line.

Do not retemper concrete.

If the concrete pavement surface width is constructed as specified, you may construct concrete pavement sides on a batter not flatter than 6:1 (vertical:horizontal).

40-1.03H(2) Paving Adjacent to Existing Concrete Pavement

Where pavement is placed adjacent to existing concrete pavement:

1. Grinding adjacent pavement must be completed before placing the pavement
2. Use paving equipment with padded crawler tracks or rubber-tired wheels with enough offset to prevent damage
3. Match pavement grade with the elevation of existing concrete pavement after grinding.

40-1.03H(3) Concrete Pavement Transition Panel

For concrete pavement placed in a transition panel, texture the surface with a drag strip of burlap, broom, or spring steel tine device that produces scoring in the finished surface. Scoring must be either parallel or transverse to the centerline. Texture at the time that produces the coarsest texture.

40-1.03H(4) Stationary Side Form Construction

Stationary side forms must be straight and without defects including warps, bends, and indentations. Side forms must be metal except at end closures and transverse construction joints where other materials may be used.

You may build up side forms by attaching a section to the top or bottom. If attached to the top of metal forms, the attached section must be metal.

The side form's base width must be at least 80 percent of the specified concrete pavement thickness.

Side forms including interlocking connections with adjoining forms must be rigid enough to prevent springing from subgrading and paving equipment and concrete pressure.

Construct subgrade to final grade before placing side forms. Side forms must bear fully on the foundation throughout their length and base width. Place side forms to the specified grade and alignment of the finished concrete pavement's edge. Support side forms during concrete placing, compacting, and finishing.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CTA Contract No. XXX

After subgrade work is complete and immediately before placing concrete, true side forms and set to line and grade for a distance that avoids delays due to form adjustment.

Clean and oil side forms before each use.

Side forms must remain in place for at least 1 day after placing concrete and until the concrete pavement edge no longer requires protection from the forms.

Spread, screed, shape, and consolidate concrete with 1 or more machines. The machines must uniformly distribute and consolidate the concrete. The machines must operate to place the concrete pavement to the specified cross section with minimal hand work.

Consolidate the concrete without segregation. If vibrators are used:

1. The vibration rate must be at least 3,500 cycles per minute for surface vibrators and 5,000 cycles per minute for internal vibrators
2. Amplitude of vibration must cause perceptible concrete surface movement at least 1 foot from the vibrating element
3. Use a calibrated tachometer for measuring frequency of vibration
4. Vibrators must not rest on side forms or new concrete pavement
5. Power to vibrators must automatically cease when forward or backward motion of the paving machine is stopped
6. Uniformly consolidate the concrete across the paving width including adjacent to forms by using high-frequency internal vibrators within 15 minutes of depositing concrete on the subgrade
7. Do not shift the mass of concrete with vibrators.

40-1.03H(5) Slip-Form Construction

If slip-form construction is used, spread, screed, shape, and consolidate concrete to the specified cross section with slip-form machines and minimal hand work. Slip-form paving machines must be equipped with traveling side forms and must not segregate the concrete.

Do not deviate from the specified concrete pavement alignment by more than 0.1 foot.

Slip-form paving machines must use high frequency internal vibrators to consolidate concrete. You may mount vibrators with their axes parallel or normal to the concrete pavement alignment. If mounted with axes parallel to the concrete pavement alignment, space vibrators no more than 2.5 feet measured center to center. If mounted with axes normal to the concrete pavement alignment, space the vibrators with a maximum 0.5-foot lateral clearance between individual vibrators.

Each vibrator must have a vibration rate from 5,000 to 8,000 cycles per minute. The amplitude of vibration must cause perceptible concrete surface movement at least 1 foot from the vibrating element. Use a calibrated tachometer to measure frequency of vibration.

40-1.03I Edge Treatment

Construct edge treatments as shown. Regrade when required for the preparation of safety edge areas.

Sections 40-1.03J(2) and 40-1.03J(3) do not apply to safety edges.

For safety edges placed after the concrete pavement is complete, concrete may comply with the requirements for minor concrete.

For safety edges placed after the concrete pavement is complete, install connecting bar reinforcement under section 52.

Saw cutting or grinding may be used to construct safety edges.

For safety edges, the angle of the slope must not deviate by more than ± 5 degrees from the angle shown. Measure the angle from the plane of the adjacent finished pavement surface.

40-1.03J Finishing

40-1.03J(1) General

Reserved

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

40-1.03J(2) Preliminary Finishing

40-1.03J(2)(a) General

Preliminary finishing must produce a smooth and true-to-grade finish. After preliminary finishing, mark each day's paving with a stamp. The stamp must be authorized before paving starts. The stamp must be approximately 1 by 2 feet in size. The stamp must form a uniform mark from 1/8 to 1/4 inch deep. Locate the mark 20 ± 5 feet from the transverse construction joint formed at each day's start of paving and 1 ± 0.25 foot from the pavement's outside edge. The stamp mark must show the month, day, and year of placement and the station of the transverse construction joint. Orient the stamp mark so it can be read from the pavement's outside edge.

Do not apply water to the pavement surface before float finishing.

40-1.03J(2)(b) Stationary Side Form Finishing

If stationary side form construction is used, give the pavement a preliminary finish by the machine float method or the hand method.

If using the machine float method:

1. Use self-propelled machine floats.
2. Determine the number of machine floats required to perform the work at a rate equal to the pavement delivery rate. If the time from paving to machine float finishing exceeds 30 minutes, stop pavement delivery. When machine floats are in proper position, you may resume pavement delivery and paving.
3. Run machine floats on side forms or adjacent pavement lanes. If running on adjacent pavement, protect the adjacent pavement surface under section 40-1.03L. Floats must be hardwood, steel, or steel-shod wood. Floats must be equipped with devices that adjust the underside to a true flat surface.

If using the hand method, finish pavement smooth and true to grade with manually operated floats or powered finishing machines.

40-1.03J(2)(c) Slip-Form Finishing

If slip-form construction is used, the slip-form paver must give the pavement a preliminary finish. You may supplement the slip-form paver with machine floats.

Before the pavement hardens, correct pavement edge slump in excess of 0.02 foot exclusive of edge rounding.

40-1.03J(3) Final Finishing

After completing preliminary finishing, round the edges of the initial paving widths to a 0.04-foot radius. Round transverse and longitudinal construction joints to a 0.02-foot radius.

Before curing, texture the pavement. Perform initial texturing with a burlap drag or broom device that produces striations parallel to the centerline. Perform final texturing with a steel-tined device that produces grooves parallel with the centerline.

Construct longitudinal grooves with a self-propelled machine designed specifically for grooving and texturing pavement. The machine must have tracks to maintain constant speed, provide traction, and maintain accurate tracking along the pavement surface. The machine must have a single row of rectangular spring steel tines. The tines must be from 3/32 to 1/8 inch wide, on 3/4-inch centers, and must have enough length, thickness, and resilience to form grooves approximately 3/16 inch deep. The machine must have horizontal and vertical controls. The machine must apply constant down pressure on the pavement surface during texturing. The machines must not cause raveling.

Construct grooves over the entire pavement width in a single pass except do not construct grooves 3 inches from the pavement edges and longitudinal joints. Final texture must be uniform and smooth. Use a guide to properly align the grooves. Grooves must be parallel and aligned to the pavement edge across the pavement width. Grooves must be from 1/8 to 3/16 inch deep after the pavement has hardened.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CTA Contract No. XXX

For irregular areas and areas inaccessible to the grooving machine, you may hand-construct grooves using the hand method. Hand-constructed grooves must comply with the specifications for machine-constructed grooves.

For ramp termini, use heavy brooming normal to the ramp centerline to produce a coefficient of friction of at least 0.35 determined on the hardened surface under California Test 342.

40-1.03K Curing

Cure the concrete pavement's exposed area under section 90-1.03B using the waterproof membrane method or curing compound method. If using the curing compound method use curing compound no. 1 or 2. When side forms are removed within 72 hours of the start of curing, also cure the concrete pavement edges.

Apply curing compound with mechanical sprayers. Reapply curing compound to saw cuts and disturbed areas.

40-1.03L Protecting Concrete Pavement

Protect concrete pavement under section 90-1.03C.

Maintain the concrete pavement surface temperature at not less than 40 degrees F for the initial 72 hours.

Protect the concrete pavement surface from activities that cause damage and reduce texture and coefficient of friction. Do not allow soil, gravel, petroleum products, concrete, or asphalt mixes on the concrete pavement surface.

Construct crossings for traffic convenience. If authorized, you may use RSC for crossings. Do not open crossings until the Department determines that the pavement's modulus of rupture is at least 550 psi under California Test 523 or California Test 524.

Do not open concrete pavement to traffic or use equipment on the concrete pavement for 10 days after paving nor before the concrete has attained a modulus of rupture of 550 psi based on Department's testing except:

1. If the equipment is for sawing contraction joints
2. If authorized, one side of paving equipment's tracks may be on the concrete pavement after a modulus of rupture of 350 psi has been attained, provided:
 - 2.1. Unit pressure exerted on the concrete pavement by the paver does not exceed 20 psi
 - 2.2. You change the paving equipment tracks to prevent damage or the paving equipment tracks travel on protective material such as planks
 - 2.3. No part of the track is closer than 1 foot from the concrete pavement's edge

If concrete pavement damage including visible cracking occurs, stop operating paving equipment on the concrete pavement and repair the damage.

40-1.03M Early Use of Concrete Pavement

If requesting early use of concrete pavement:

1. Furnish molds and machines for modulus of rupture testing
2. Sample concrete
3. Fabricate beam specimens
4. Test for modulus of rupture under California Test 523

If you request early use, concrete pavement must have a modulus of rupture of at least 350 psi. Protect concrete pavement under section 40-1.03L.

40-1.03N Reserved

40-1.03O Shoulder Rumble Strip

40-1.03O(1) General

Construct shoulder rumble strips by rolling or grinding indentations in new concrete pavement.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

Do not construct shoulder rumble strips on structures or approach slabs.

Construct rumble strips within 2 inches of the specified alignment. Rumble strip equipment must be equipped with a sighting device enabling the operator to maintain the rumble strip alignment.

Indentations must not vary from the specified dimensions by more than 1/16 inch in depth nor more than 10 percent in length and width.

Grind or remove and replace noncompliant rumble strip indentations at locations determined by the Engineer. Ground surface areas must be neat and uniform in appearance.

Remove grinding residue under section 42-1.03B.

40-1.03O(2) Rolled-In Indentations

Construct rolled-in indentations before final concrete set. Indentation construction must not displace adjacent concrete.

40-1.03O(3) Ground-In Indentations

Concrete pavement must be hardened before grinding rumble strips indentations. Do not construct indentations until the following occurs:

1. 10 days elapse after concrete placement
2. Concrete has developed a modulus of rupture of 550 psi determined under California Test 523,

40-1.03P Drilling Cores

Drill concrete pavement cores under ASTM C 42/C 42M. Use diamond impregnated drill bits.

Clean, dry, and fill core holes with hydraulic cement grout (nonshrink) or pavement concrete. Coat the core hole walls with epoxy adhesive for bonding new concrete to old concrete under section 95. Finish the backfill to match the adjacent surface elevation and texture.

40-1.03Q Pavement Repair and Replacement

40-1.03Q(1) General

If surface raveling or full-depth cracks occur within one year of Contract acceptance, repair or replace the pavement under section 6-3.06.

Repair and replace pavement in the following sequence:

1. Replace pavement
2. Repair spall, ravel, and working cracks
3. Correct smoothness and coefficient of friction
4. Treat partial depth cracks
5. Replace damaged joint seals under section 41-5

In addition to removing pavement for other noncompliance, remove and replace JPCP slabs that:

1. Have one or more full depth crack
2. Have raveled surfaces such that either:
 - 2.1. Combined raveled areas are more than 5 percent of the total slab area
 - 2.2. Single area is more than 4 sq ft

Remove and replace JPCP 3 feet on both sides of a joint with a rejected dowel bar.

40-1.03Q(2) Spall and Ravel Repair

Repair spalled or raveled areas that are:

1. Deeper than 0.05 foot
2. Wider than 0.10 foot
3. Longer than 0.3 foot

Repairs must comply with section 41-4 and be completed before opening pavement to traffic.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

40-1.03Q(3) Crack Repair

Treat partial depth cracks for JPCP under section 41-3.

If the joints are sealed, repair working cracks by routing and sealing. Use a powered rotary router mounted on wheels, with a vertical shaft and a routing spindle that casters as it moves along the crack. Form a reservoir 3/4 inch deep by 3/8 inch wide in the crack. Equipment must not cause raveling nor spalling

Treat the contraction joint adjacent to the working crack by either:

1. Epoxy resin under ASTM C 881/C 881M, Type IV, Grade 2
2. Pressure injecting epoxy resin under ASTM C 881/C881M, Type IV, Grade 1

40-1.03Q(4) Smoothness and Friction Correction

Correct pavement that is noncompliant for:

1. Smoothness by grinding under section 42-3
2. Coefficient of friction by grooving or grinding under section 42

Do not start corrective work until:

1. Pavement has cured 10 days
2. Pavement has at least a 550 psi modulus of rupture
3. Your corrective method is authorized

Correct the entire lane width. Begin and end grinding at lines perpendicular to the roadway centerline. The corrected area must have a uniform texture and appearance.

If corrections are made within areas where testing with an IP is required, retest the entire lane length with an IP under sections 40-1.01D(6)(c) and 40-1.01D(7)(b)(vii).

If corrections are made within areas where testing with a 12-foot straightedge is required, retest the corrected area with a straightedge under sections 40-1.01D(6)(c) and 40-1.01D(7)(b)(vii).

Allow 25 days for the Department's coefficient of friction retesting.

40-1.03R–40-1.03U Reserved

40-1.04 PAYMENT

The payment quantity for pavement is based on the dimensions shown.

The deduction for pavement thickness deficiency in each primary area is shown in the following table:

Deduction for Thickness Deficiency	
Average thickness deficiency (foot) ^a	Deduction(\$/sq yd)
0.01	0.90
0.02	2.30
0.03	4.10
0.04	6.40
0.05	9.11

^aValues greater than 0.01 are rounded to the nearest 0.01 foot.

Shoulder rumble strips are measured by the station along each shoulder on which the rumble strips are constructed without deductions for gaps between indentations.

If the initial cores show that dowel bars or tie bars are within alignment tolerances and the Engineer orders more dowel or tie bar coring, the additional cores are paid for as change order work.

The Department does not pay for additional coring to check dowel or tie bar alignment which you request.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

If the Engineer accepts a test strip and it remains as part of the paving surface, the test strip is paid for as the type of pavement involved.

If the curvature of a slab affects tie bar spacing and additional tie bars are required, no additional payment is made for the additional tie bars.

Payment for grinding existing pavement is not included in the payment for the type of pavement involved.

40-2 CONTINUOUSLY REINFORCED CONCRETE PAVEMENT

40-2.01 GENERAL

40-2.01A Summary

Section 40-2 includes specifications for constructing CRCP.

Terminal joints include saw cutting, dowel bars, drill and bond dowel bars, support slab, support slab reinforcement, tack coat, and temporary hot mix asphalt.

Expansion joints include polystyrene, support slab, support slab reinforcement, dowel bars, drill and bond dowel bars, and bond breaker.

Wide flange beam terminals include polyethylene foam, support slab, and support slab reinforcement.

Pavement anchors include cross drains, anchor reinforcement, filter fabric, and permeable material.

40-2.01B Definitions

Reserved

40-2.01C Submittals

Reserved

40-2.01D Quality Control and Assurance

40-2.01D(1) General

Reserved

40-2.01D(2) Testing for Coefficient of Thermal Expansion

For field qualification, test coefficient of thermal expansion under AASHTO T 336. The coefficient of thermal expansion must not exceed 6.0 microstrain/degree Fahrenheit.

40-2.02 MATERIALS

40-2.02A General

Class 1 permeable material, filter fabric, and slotted plastic pipe cross drain as shown for pavement anchors must comply with section 68-3.

40-2.02B Concrete

Concrete for terminal joints, support slabs, and pavement anchors must comply with section 40-1.02.

40-2.02C Transverse Bar Assembly

Instead of transverse bar and other support devices, you may use transverse bar assemblies to support longitudinal bar. Bar reinforcement and wire must comply with section 40-1.02C.

40-2.02D Wide Flange Beam

Wide flange beams and studs must be either rolled structural steel shapes under ASTM A 36/A 36M or structural steel under ASTM A 572/A 572M.

40-2.02E Joints

Joint seals for wide flange beam terminals must comply with section 51-2.02.

Joint seals for transverse expansion joints must comply with section 51-2.02.

Expanded polystyrene for transverse expansion joints must comply with section 51-2.01B(1).

40-2.03 CONSTRUCTION

40-2.03A General

Reserved

40-2.03B Test Strips

Comply with section 40-1.03C except during the evaluation, the Engineer visually checks reinforcement, dowel and tie bar placement.

40-2.03C Construction Joints

Transverse construction joints must be perpendicular to the lane line. Construct joints to allow for lap splices of the longitudinal bar. Comply with the lap splice lengths shown for CRCP.

Clean construction joint surfaces before placing fresh concrete against the joint surfaces. Remove surface laitance, curing compound, and other foreign materials.

40-2.03D Bar Reinforcement

Place bar reinforcement under section 52-1.03D, except you may request to use plastic chairs. Plastic chairs will only be considered for support directly under the transverse bars. Your request to use plastic chairs must include a sample of the plastic chair, the manufacturer's written recommendations for the applicable use and load capacity, chair spacing, and your calculation for the load on a chair for the area of bar reinforcement sitting on it. Vertical and lateral stability of the bar reinforcement and plastic chairs must be demonstrated during construction of the test strip. Obtain authorization before using the proposed plastic chairs for work after the test strip is accepted.

For transverse bar in a curve with a radius under 2,500 feet, place the reinforcement in a single continuous straight line across the lanes and aligned with the radius point as shown.

40-2.03E Wide Flange Beams

Weld stud ends with an electric arc welder completely fusing the studs to the wide flange beam. Replace studs dislodged in shipping or that can be dislodged with a hammer.

40-2.03F Repair and Replacement

40-2.03F(1) General

Requirements for repair of cracks under section 40-1.03Q do not apply to CRCP. High molecular weight methacrylate is not to be applied to cracks in CRCP.

New CRCP will be monitored for 1 year from contract acceptance or relief from maintenance, whichever is less. CRCP that develops raveling areas of 6 inches by 6 inches or greater will require partial depth repair under section 6-3.06. CRCP that develops one or more full-depth transverse cracks with faulting greater than 0.25 inch or one or more full-depth longitudinal cracks with faulting greater 0.50 inch will require full depth repair.

40-2.03F(2) Partial Depth Repair

Partial depth repair must comply with section 41-4 except:

1. Determine a rectangular boundary which extends 6 inches beyond the damaged area. The limits of saw depth must be between 2 inches from the surface to 1/2 inch above the longitudinal bars.
2. If each length of the repair boundaries is equal to or greater than 3 ft, additional reinforcement is needed for the repair area. Submit a plan for authorization before starting the repair.

40-2.03F(3) Full Depth Repair

40-2.03F(3)(a) General

Removal of CRCP must be full depth except for portion of reinforcement to remain. Provide continuity of reinforcement. Comply with section 52-6. Submit a plan for authorization, before starting the repair. Do not damage the base, concrete and reinforcement to remain. Place concrete in the removal area.

40-2.03F(3)(b) Transverse Cracks

Make initial full-depth transverse saw cuts normal to the lane line a distance of 3 feet on each side of the transverse crack.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

40-2.03F(3)(c) Longitudinal Cracks

Remove the cracked area normal to the lane line for the full width of the lane a distance of 1 foot beyond the ends of the crack. You may propose alternate limits with your repair plan for authorization.

40-2.03G Reserved

40-2.04 PAYMENT

Not Used

40-3 RESERVED

40-4 JOINTED PLAIN CONCRETE PAVEMENT

40-4.01 GENERAL

40-4.01A Summary

Section 40-4 includes specifications for constructing JPCP.

40-4.01B Definitions

Reserved

40-4.01C Submittals

40-4.01C(1) General

Reserved

40-4.01C(2) Early Age Crack Mitigation System

At least 24 hours before each paving shift, submit the following information as an informational submittal:

1. Early age stress and strength predictions
2. Scheduled sawing and curing activities
3. Contingency plan if cracking occurs

40-4.01C(3)–40-4.01C(8) Reserved

40-4.01D Quality Control and Assurance

40-4.01D(1) General

Reserved

40-4.01D(2) Quality Control Plan

The QC plan must include a procedure for identifying transverse contraction joint locations relative to the dowel bars longitudinal center and a procedure for consolidating concrete around the dowel bars.

40-4.01D(3) Early Age Crack Mitigation System

For JPCP, develop and implement a system for predicting stresses and strength during the initial 72 hours after paving. The system must include:

1. Subscription to a weather service to obtain forecasts for wind speed, ambient temperatures, humidity, and cloud cover
2. Portable weather station with an anemometer, temperature and humidity sensors, located at the paving site
3. Early age concrete pavement stress and strength prediction plan
4. Analyzing, monitoring, updating, and reporting the system's predictions

40-4.01D(4)–40-4.01D(9) Reserved

40-4.02 MATERIALS

Not Used

40-4.03 CONSTRUCTION

40-4.03A General

Transverse contraction joints on a curve must be on a single straight line through the curve's radius point. If transverse joints do not align in a curve, drill a full depth 2" diameter hole under ASTM C 42/C 42M

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCA Contract No. XXX**

where the joint meets the adjacent slab. Fill the hole with joint filler. If joints are not sealed, avoid joint filler material penetration into the joint.

40-4.03B Repair and Replacement

If replacing concrete, saw cut and remove to full depth.

Saw cut full slabs at the longitudinal and transverse joints. Saw cut partial slabs at joints and at locations determined by the Engineer. Saw cut must be vertical.

After lifting the slab, paint the cut ends of dowels and tie bars.

Construct transverse and longitudinal construction joints between the new slab and existing concrete. If slabs are constrained at both longitudinal edges by existing pavement, use dowel bars instead of tie bars. For longitudinal joints, offset dowel bar holes from original tie bars by 3 inches. For transverse joints, offset dowel bar holes from the original dowel bar by 3 inches.

Drill and bond bars to the existing concrete. Comply with section 41-10. Clean the faces of joints and underlying base from loose material and contaminants. Coat the faces with a double application of pigmented curing compound under section 28-2.03F. For partial slab replacements, place preformed sponge rubber expansion joint filler at new transverse joints under ASTM D 1752. Place concrete in the removal area.

40-4.03C–40-4.03G Reserved

40-4.04 PAYMENT

Not Used

40-5 JOINTED PLAIN CONCRETE PAVEMENT WITH RAPID STRENGTH CONCRETE

Reserved

40-6–40-15 RESERVED

41 CONCRETE PAVEMENT REPAIR

04-18-14

Replace the headings and paragraphs in section 41 with:

07-19-13

41-1 GENERAL

41-1.01 GENERAL

41-1.01A Summary

Section 41-1 includes general specifications for repairing concrete pavement.

Dowel bars must comply with section 40-1.

41-1.01B Definitions

Reserved

41-1.01C Submittals

At least 15 days before delivering fast-setting concrete, polyester resin binder, or bonding agent to the job site, submit the manufacturer's recommendations, instructions, and MSDS. Notify the Engineer if polyester resin binder will be stored in containers over 55 gallons.

41-1.01D Quality Control and Assurance

41-1.01D(1) General

Before using polyester concrete, allow 14 days for sampling and testing of the polyester resin binder.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

41-1.01D(2) Reserved

41-1.02 MATERIALS

41-1.02A General

Water for washing aggregates, mixing concrete, curing, and coring must comply with section 90-1.02D.

Use the minimum amount of water to produce workable concrete and comply with the manufacturer's instructions.

41-1.02B Fast-Setting Concrete

Fast-setting concrete must be one of the following:

1. Magnesium phosphate concrete that is either:
 - 1.1. Single component water activated
 - 1.2. Dual component with a prepackaged liquid activator
2. Modified high-alumina based concrete
3. Portland cement based concrete

Fast-setting concrete must be stored in a cool and dry environment.

If used, the addition of retarders must comply with the manufacturer's instructions.

You may use any accelerating chemical admixtures complying with ASTM C494/C494M, Type C and section 90-1.02E.

Fast-setting concrete properties must have the values shown in the following table:

Fast-Setting Concrete		
Property	Test method	Value
Compressive strength ^a (psi, min)		
at 3 hours	California Test 551	3,000
at 24 hours	California Test 551	5,000
Flexural strength ^a (psi, min, at 24 hours)	California Test 551	500
Bond strength ^a (psi, min, at 24 hours)		
Saturated surface dry concrete	California Test 551	300
Dry concrete	California Test 551	400
Water absorption (% , max)	California Test 551	10
Abrasion resistance ^a (g, max, at 24 hours)	California Test 550	25
Drying shrinkage (% , max, at 4 days)	ASTM C596	0.13
Water soluble chlorides ^b (% , max, by weight)	California Test 422	0.05
Water soluble sulfates ^b (% , max, by weight)	California Test 417	0.25
Thermal stability (% , min)	California Test 553	90

^aPerform test with aggregate filler if used.

^bTest must be performed on a cube specimen, fabricated under California Test 551, cured at least 14 days, and then pulverized to 100% passing the no. 50 sieve.

Aggregate filler may be used to extend prepackaged concrete. Aggregate filler must:

1. Be clean and uniformly rounded.
2. Have a moisture content of 0.5-percent by weight or less when tested under California Test 226.
3. Comply with sections 90-1.02C(2) and 90-1.02C(3).
4. Not exceed 50 percent of the concrete volume or the maximum recommended by the fast-setting concrete manufacturer, whichever is less.

When tested under California Test 202, aggregate filler must comply with the grading in the following table:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Aggregate Filler Grading

Sieve size	Percentage passing
3/8 inch	100
No. 4	50–100
No. 16	0–5

41-1.02C Polyester Concrete

Polyester concrete consists of polyester resin binder and dry aggregate. The polyester resin binder must be an unsaturated isophthalic polyester-styrene copolymer.

Polyester resin binder properties must have the values shown in the following table:

Polyester Resin Binder

Property	Test method	Value
Viscosity ^a (Pa·s) RVT, No. 1 spindle, 20 RPM at 77 °F	ASTM D2196	0.075–0.200
Specific gravity ^a (77 °F)	ASTM D1475	1.05–1.10
Elongation (% min) Type I specimen, 0.25 ± 0.03 inch thick Speed of testing = 0.45 inch/minute Condition 18/25/50+5/70: T—23/50	ASTM D638	35
Tensile strength (psi, min) Type I specimen, 0.25 ± 0.03 inch thick Speed of testing = 0.45 inch/minute Condition 18/25/50+5/70: T—23/50	ASTM D638	2,500
Styrene content ^a (% by weight)	ASTM D2369	40–50
Silane coupler (% min, by weight of polyester resin binder)	--	1.0
PCC saturated surface-dry bond strength at 24 hours and 70 ± 2 °F (psi, min)	California Test 551	500
Static volatile emissions ^a (g/sq m, max)	South Coast Air Quality Management District, Method 309-91 ^b	60

^aPerform the test before adding initiator.

^bFor the test method, go to:

<http://www.aqmd.gov/tao/methods/lab/309-91.pdf>

Silane coupler must be an organosilane ester, gamma-methacryloxypropyltrimethoxysilane. Promoter must be compatible with suitable methyl ethyl ketone peroxide (MEKP) and cumene hydroperoxide (CHP) initiators.

Aggregate for polyester concrete must comply with section 90-1.02C(1), 90-1.02C(2), and 90-1.02C(3).

When tested under California Test 202, the combined aggregate grading must comply with one of the gradations in the following table:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Combined Aggregate Grading

Sieve size	Percentage passing		
	A	B	C
1/2"	100	100	100
3/8"	83–100	100	100
No. 4	65–82	62–85	45–80
No. 8	45–64	45–67	35–67
No. 16	27–48	29–50	25–50
No. 30	12–30	16–36	15–36
No. 50	6–17	5–20	5–20
No. 100	0–7	0–7	0–9
No. 200	0–3	0–3	0–6

Aggregate retained on the no. 8 sieve must have a maximum of 45 percent crushed particles under California Test 205. Fine aggregate must be natural sand.

The weighted average absorption must not exceed 1 percent when tested under California Tests 206 and 207.

You may submit an alternative grading or request to use manufactured sand as fine aggregate but 100 percent of the combined grading must pass the 3/8 inch sieve. Allow 21 days for authorization.

Polyester concrete must have a minimum compressive strength of 1250 psi at 3 hours and 30 minutes under California Test 551 or ASTM C109.

41-1.02D Bonding Agent

Bonding agent must comply with the concrete manufacturer's recommendations.

41-1.02E Temporary Pavement Structure

Temporary pavement structure consists of RSC or aggregate base with HMA. RSC not conforming to the specifications may serve as temporary pavement structure if:

1. The modulus of rupture is at least 200 psi before opening to traffic
2. RSC thickness is greater than or equal to the existing concrete pavement surface layer
3. RSC is replaced during the next paving shift

Aggregate base for temporary pavement structure must comply with the 3/4-inch maximum grading specified in section 26-1.02B.

04-18-14

HMA must comply with the specifications for minor HMA in section 39.

07-19-13

41-1.02F Reserved

41-1.03 CONSTRUCTION

41-1.03A General

Repair only the portion of pavement where the work will be completed during the same lane closure. If removal is required, remove only the portion of pavement where the repair will be completed during the same traffic closure. Completion of concrete repair includes curing until the concrete attains the specified minimum properties required before opening the repaired pavement to traffic.

If you fail to complete the concrete pavement repair during the same lane closure, construct temporary pavement before opening the lane to traffic.

Before starting repair work, except saw cutting: the equipment, materials, and personnel for constructing temporary pavement structure must be at the job site or an approved location. If HMA can be delivered to the job site within 1 hour, you may request 1-hour delivery as an alternative to having the HMA at the job site.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CTA Contract No. XXX

Maintain the temporary pavement structure and replace it as a first order of work as soon as you resume concrete pavement repair work.

After removing temporary pavement structure, you may stockpile that aggregate base at the job site and reuse it for temporary pavement structure.

41-1.03B Mixing and Applying Bonding Agent

Mix and apply the bonding agent at the job site under the manufacturer's instructions and in small quantities.

Apply bonding agent after cleaning the surface and before placing concrete.

Apply a thin, even coat of bonding agent with a stiff bristle brush until the entire repair surface is scrubbed and coated with bonding agent.

41-1.03C Mixing Concrete

41-1.03C(1) General

Mix concrete in compliance with the manufacturer's instructions. For repairing spalls, mix in a small mobile drum or paddle mixer. Comply with the manufacturer's recommended limits for the quantity of aggregate filler, water, and liquid activator.

Mix the entire contents of prepackaged dual-component magnesium phosphate concrete as supplied by the manufacturer. Use the full amount of each component and do not add water to dual-component magnesium phosphate concrete.

Magnesium phosphate concrete must not be mixed in containers or worked with tools containing zinc, cadmium, aluminum, or copper.

Modified high-alumina based concrete must not be mixed in containers or worked with tools containing aluminum.

41-1.03C(2) Polyester Concrete

When mixing with resin, the moisture content of the combined aggregate must not exceed 1/2 of the average aggregate absorption when tested under California Test 226.

Proportion the polyester resin and aggregate to produce a mixture with suitable workability for the intended work. Only a minimal amount of resin may rise to the surface after finishing.

41-1.03D Placing Concrete

The pavement surface temperature must be at least 40 degrees F before placing concrete. You may propose methods to heat the surfaces.

Place magnesium phosphate concrete on a dry surface.

Place portland cement and modified high-alumina concrete on surfaces treated with a bonding agent recommended by the concrete manufacturer. If no bonding agent is recommended by the manufacturer, place concrete on damp surfaces that are not saturated.

Do not retemper concrete. Use dry finishing tools cleaned with water before working the concrete.

41-1.03E Curing Concrete

Cure concrete under the manufacturer's instructions. When curing compound is used, comply with section 90-1.03B for curing compound no. 1 or 2.

41-1.03F Reserved

41-1.04 PAYMENT

Not Used

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

41-2 SUBSEALING AND JACKING

41-2.01 GENERAL

41-2.01A Summary

Section 41-2 includes specifications for filling voids under existing concrete pavement.

41-2.01B Definitions

Reserved

41-2.01C Submittals

Submit shipping invoices with packaged or bulk fly ash and cement.

Before grouting activities begin, submit a proposal for the materials to be used. Include authorized laboratory test data for the grout indicating:

1. Time of initial setting under ASTM C266.
2. Compressive strength results at 1, 3, and 7 days for 10, 12, and 14-second grout efflux times.

If requesting a substitution of grout materials, submit a proposal that includes test data.

41-2.01D Quality Control and Assurance

Reserved

41-2.02 MATERIALS

41-2.02A General

Reserved

41-2.02B Grout

Grout must consist of Type II portland cement, fly ash, and water. Use from 2.4 to 2.7 parts fly ash to 1 part portland cement by weight. Use enough water to produce the following grout efflux times determined under California Test 541, Part D:

1. From 10 to 16 seconds for subsealing
2. From 10 to 26 seconds for jacking

Cement for grout must comply with the specifications for Type II portland cement in section 90-1.02B(2).

Fly ash must comply with AASHTO M 295, Class C or Class F. Fly ash sources must be on the Authorized Material List.

You may use chemical admixtures and calcium chloride. Chemical admixtures must comply with section 90-1.02E(2). Calcium chloride must comply with ASTM D98.

Test grout compressive strength under California Test 551, Part 1 at 7-days with 12 seconds efflux time. Follow the procedures for moist cure. The 7-day compressive strength must be at least 750 psi.

41-2.02C Mortar

Mortar must be a prepackaged fast-setting mortar that complies with ASTM C928.

41-2.02D Reserved

41-2.03 CONSTRUCTION

41-2.03A General

Drill holes in the pavement, inject grout, plug the holes, and finish the holes with mortar.

Drill holes through the pavement and underlying base to a depth from 15 to 18 inches below the pavement surface. The hole diameter must match the fitting for the grout injecting equipment.

41-2.03B Injecting Grout

41-2.03B(1) General

Inject grout within 2 days of drilling holes.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

Immediately before injecting grout, clean the drilled holes with water at a minimum pressure of 40 psi. The cleaning device must have at least 4 jets that direct water horizontally at the slab-base interface.

Do not inject grout if the atmospheric or subgrade temperature is below 40 degrees F. Do not inject grout in inclement weather. If water is present in the holes, obtain the Engineer's authorization before injecting grout.

Do not inject grout until at least 2 consecutive slabs requiring subsealing are drilled ahead of the grouting activities.

The grout plant must have a positive displacement cement injection pump and a high-speed colloidal mixer capable of operating from 800 to 2,000 rpm. The injection pump must sustain 150 psi if pumping grout with a 12-second efflux time. A pressure gauge must be located immediately adjacent to the supply valve of the grout hose supply valve and positioned for easy monitoring.

Before mixing, weigh dry cement and fly ash if delivered in bulk. If the materials are packaged, each container must weigh the same.

Introduce water to the mixer through a meter or scale.

Inject grout under pressure until the voids under the pavement slab are filled. The injection nozzle must not leak. Do not inject grout if the nozzle is below the bottom of the slab. Inject grout 1 hole at a time.

Stop injecting grout in a hole if either:

1. Grout does not flow under a sustained pump gauge pressure of 150 psi after 7 seconds and there is no indication the slab is moving.
2. Injected grout rises to the surface at any joint or crack, or flows into an adjacent hole.

Dispose of unused grout within 1 hour of mixing.

41-2.03B(2) Subsealing

If a slab raises more than 1/16 inch due to grout injection, stop injecting grout in that hole.

41-2.03B(3) Jacking

The positive displacement pump used for grout injection must be able to provide a sustained gauge pressure of 200 psi. Gauge pressures may be from 200 to 600 psi for brief periods to start slab movement.

You may add additional water to initiate pressure injection of grout. Do not reduce the grout efflux time below 10 seconds.

Raise the slabs uniformly. Use string lines to monitor the pavement movement.

Do not move adjacent slabs not specified for pavement jacking. If you move adjacent slabs, correct the grade within the tolerances for final pavement elevation.

41-2.03B(4) Finishing

Immediately after removing the injection nozzle, plug the hole with a round, tapered wooden plug. Do not remove plugs until adjacent holes are injected with grout and no grout surfaces through previously injected holes.

After grouting, remove grout from drilled holes at least 4 inches below the pavement surface. Clean holes and fill with mortar. Finish filled holes flush with the pavement surface.

41-2.03B(5) Tolerances

The final pavement elevation must be within 0.01 foot of the required grade. If the final pavement elevation is between 0.01 and 0.10 foot higher than the required grade, grind the noncompliant pavement surface under section 42 to within 0.01 foot of the required grade.

If the final pavement elevation is higher than 0.10 foot from the required grade, remove and replace the noncompliant pavement under section 41-9.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

41-2.04 PAYMENT

The payment quantity for subsealing is calculated by adding the dry weight of cement and fly ash used for the placed grout. The payment quantity for jacking is calculated by adding the dry weight of cement and fly ash used for the placed grout.

The Department does not pay for wasted grout.

The Department does not adjust the unit price for an increase or decrease in the subsealing quantity.

The Department does not adjust the unit price for an increase or decrease in the jacking quantity.

41-3 CRACK TREATMENT

41-3.01 GENERAL

41-3.01A Summary

Section 41-3 includes specifications for applying high-molecular-weight methacrylate (HMWM) to concrete pavement surface cracks that do not extend the full slab depth.

41-3.01B Definitions

Reserved

41-3.01C Submittals

41-3.01C(1) General

Submit HMWM samples 20 days before use.

If sealant is to be removed, submit the proposed removal method at least 7 days before sealant removal. Do not remove sealant until the proposed sealant removal method is authorized.

41-3.01C(2) Public Safety and Placement Plans

Before starting crack treatment, submit a public safety plan for HMWM and a placement plan for construction activity as shop drawings.

The public safety and placement plans must identify the materials, equipment, and methods to be used.

In the public safety plan, include the MSDS for each component of HMWM and details for:

1. Shipping
2. Storage
3. Handling
4. Disposal of residual HMWM and containers

If the project is in an urban area adjacent to a school or residence, the public safety plan must also include an airborne emissions monitoring plan prepared by a CIH certified in comprehensive practice by the American Board of Industrial Hygiene. Submit a copy of the CIH's certification. The CIH must monitor the emissions at a minimum of 4 points including the mixing point, the application point, and the point of nearest public contact. At work completion, submit a report by the industrial hygienist with results of the airborne emissions monitoring plan.

The placement plan must include:

1. Crack treatment schedule including coefficient of friction testing
2. Methods and materials including:
 - 2.1. Description of equipment for applying HMWM
 - 2.2. Description of equipment for applying sand
 - 2.3. Gel time range and final cure time for resin

Revise rejected plans and resubmit. With each plan rejection, the Engineer gives revision directions including detailed comments in writing. The Engineer notifies you of a plan's acceptance or rejection within 2 weeks of receiving that plan.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

41-3.01C(3) Reserved

41-3.01D Quality Control and Assurance

41-3.01D(1) General

Use test tiles to evaluate the HMWM cure time. Coat at least one 4 by 4 inch smooth glazed tile for each batch of HMWM. Place the coated tile adjacent to the area being treated. Do not apply sand to the test tiles.

Use the same type of crack treatment equipment for testing and production.

41-3.01D(2) Test Area

Before starting crack treatment, treat a test area of at least 500 square feet within the project limits at a location accepted by the Engineer. Use test areas outside the traveled way if available.

Treat the test area under weather and pavement conditions similar to those expected during crack treatment production.

The Engineer evaluates the test area based on the acceptance criteria. Do not begin crack treatment until the Engineer accepts the test area.

41-3.01D(3) Reserved

41-3.01D(4) Acceptance Criteria

The Engineer accepts a treated area if:

1. Corresponding test tiles are dry to the touch
2. Treated surface is tack-free and not oily
3. Sand cover adheres enough to resist hand brushing
4. Excess sand is removed
5. Coefficient of friction is at least 0.30 when tested under California Test 342

41-3.02 MATERIALS

HMWM consists of compatible resin, promoter, and initiator. HMWM resin may be prepromoted by mixing promoter and resin together before filling containers. Identify prepromoted resin on the container label.

Adjust the gel time to compensate for temperature changes throughout the application.

HMWM resin properties must have the following values:

Property	Test method	Value
Viscosity ^a (cP, max, Brookfield RVT with UL adapter, 50 RPM at 77 °F)	ASTM D2196	25
Specific gravity ^a (min, at 77 °F)	ASTM D1475	0.90
Flash point ^a (°F, min)	ASTM D3278	180
Vapor pressure ^a (mm Hg, max, at 77 °F)	ASTM D323	1.0
Tack-free time (minutes, max, at 77 °F)	Specimen prepared under California Test 551	400
Volatile content ^a (% , max)	ASTM D2369	30
PCC saturated surface-dry bond strength (psi, min, at 24 hours and 77 ± 2 °F)	California Test 551	500

^aPerform the test before adding initiator.

Sand must be commercial quality dry blast sand. At least 95 percent of the sand must pass the no. 8 sieve and at least 95 percent must be retained on the no. 20 sieve when tested under California Test 202.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

41-3.02D Reserved

41-3.03 CONSTRUCTION

41-3.03A General

Before applying HMWM, clean the pavement surface by abrasive blasting and blow loose material from visible cracks with high-pressure air. Remove concrete curing seals from the pavement to be treated. The pavement must be dry when blast cleaning is performed. If the pavement surface becomes contaminated before applying the HMWM, clean the pavement surface by abrasive blasting.

If performing abrasive blasting within 10 feet of a lane occupied by traffic, operate abrasive blasting equipment with a concurrently operating vacuum attachment.

During pavement treatment, protect pavement joints, working cracks, and surfaces not being treated.

The equipment applying HMWM must combine the components by either static in-line mixers or by external intersecting spray fans. The pump pressure at the spray bars must not cause atomization. Do not use compressed air to produce the spray. Use a shroud to enclose the spray bar apparatus.

You may apply HMWM manually to prevent overspray onto adjacent traffic. If applying resin manually, limit the batch quantity of HMWM to 5 gallons.

Apply HMWM at a rate of 90 square feet per gallon. The prepared area must be dry and the surface temperature must be from 50 to 100 degrees F while applying HMWM. Do not apply HMWM if the ambient relative humidity is more than 90 percent.

Protect existing facilities from HMWM. Repair or replace existing facilities contaminated with HMWM at your expense.

Flood the treatment area with HMWM to penetrate the pavement and cracks. Apply HMWM within 5 minutes after complete mixing. Mixed HMWM viscosity must not increase. Redistribute excess material with squeegees or brooms within 10 minutes of application. Remove excess material from tined grooves.

Wait at least 20 minutes after applying HMWM before applying sand. Apply sand at a rate of approximately 2 pounds per square yard or until refusal. Remove excess sand by vacuuming or sweeping.

Do not allow traffic on the treated surface until:

1. Treated surface is tack-free and non-oily
2. Sand cover adheres enough to resist hand brushing
3. Excess sand is removed
4. Coefficient of friction is at least 0.30 determined under California Test 342

41-3.04 PAYMENT

Not Used

41-4 SPALL REPAIR

41-4.01 GENERAL

Section 41-4 includes specifications for repairing spalls in concrete pavement.

41-4.02 MATERIALS

Repair spalls using polyester concrete with a bonding agent. The bonding agent must comply with the requirements for HMWM in section 41-3.02 except tack-free time requirements do not apply and the HMWM must not contain wax.

Form board must be corrugated cardboard with a 6-mil polyethylene covering.

41-4.03 CONSTRUCTION

41-4.03A General

Prepare spall areas by removing concrete and cleaning. Use a form board to provide compression relief at joints and cracks.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

After completing spall repairs do not allow traffic on the repairs for at least 2 hours after the time of final setting under ASTM C403/403M.

41-4.03B Remove Pavement

The Engineer determines the rectangular limits of unsound concrete pavement. Before removing pavement, mark the saw cut lines and spall repair area on the pavement surface.

Do not remove pavement until the Engineer verbally authorizes the saw cut area.

Use a power-driven saw with a diamond blade.

Remove pavement as shown and:

1. From the center of the repair area towards the saw cut
2. To the full saw cut depth
3. At least 2 inches beyond the saw cut edge to produce a rough angled surface

Produce a rough surface by chipping or other removal methods that do not damage the pavement remaining in-place. Completely remove any saw overcuts. Pneumatic hammers used for concrete removal must weigh 15 lbs or less.

If you damage concrete pavement outside the removal area, enlarge the area to remove the damaged pavement.

If dowel bars are exposed during removal, remove concrete from the exposed surface and cover with duct tape.

41-4.03C Cleaning

After pavement has been removed, clean the exposed faces of the concrete by:

1. Sand or water blasting. Water blasting equipment must be capable of producing a blast pressure of 3,000 to 6,000 psi.
2. Blowing the exposed concrete area with compressed air free of moisture and oil to remove debris after blasting. Air compressors must deliver air at a minimum of 120 cfm and develop 90 psi of nozzle pressure.

41-4.03D Form Board Installation

After cleaning, place the form board to match the existing joint or crack alignment. Extend the form board at least 3 inches beyond each end of the repair and at least 1 inch deeper than the repair. Remove the form board before sealing joints or cracks.

41-4.03E–41-4.03I Reserved

41-4.04 PAYMENT

Payment is calculated based on the authorized saw cut area.

The Department does not adjust the unit price for an increase or decrease in the spall repair quantity.

41-5 JOINT SEALS

41-5.01 GENERAL

41-5.01A Summary

Section 41-5 includes specifications for sealing concrete pavement joints or replacing existing concrete pavement joint seals. Pavement joints include isolation joints.

41-5.01B Definitions

Reserved

41-5.01C Submittals

At least 15 days before delivery to the job site, submit a certificate of compliance, MSDS, manufacturer's recommendations, and instructions for storage and installation of:

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

1. Liquid joint sealant.
2. Backer rods. Include the manufacturer data sheet verifying compatibility with the liquid joint sealant.
3. Preformed compression joint seal. Include the manufacturer data sheet used to verify the seal for the joint dimensions shown.
4. Lubricant adhesive.

Asphalt rubber joint sealant containers must comply with ASTM D6690. Upon delivery of asphalt rubber joint sealant to the job site, submit a certified test report for each lot based on testing performed within 12 months.

Submit a work plan for removing pavement and joint materials. Allow 10 days for authorization. Include descriptions of the equipment and methods for removal of existing pavement and joint material.

41-5.01D Quality Control and Assurance

41-5.01D(1) General

Before sealing joints, arrange for a representative from the manufacturer to provide training on cleaning and preparing the joint and installing the liquid joint sealant or preformed compression joint seal. Do not seal joints until your personnel and the Department's personnel have been trained.

The Engineer accepts joint seals based on constructed dimensions and visual inspection of completed seals for voids.

41-5.01D(2) Reserved

41-5.02 MATERIALS

41-5.02A General

Use the type of seal material described.

Silicone or asphalt rubber joint sealant must not bond or react with the backer rod.

41-5.02B Silicone Joint Sealant

Silicone joint sealant must be on the Authorized Material List.

41-5.02C Asphalt Rubber Joint Sealant

Asphalt rubber joint sealant must:

1. Be paving asphalt mixed with not less than 10 percent ground rubber by weight. Ground rubber must be vulcanized or a combination of vulcanized and devulcanized materials that pass a no. 8 sieve.
2. Comply with ASTM D6690 for Type II.
3. Be capable of melting at a temperature below 400 degrees F and applied to cracks and joints.

41-5.02D Backer Rods

Backer rods must:

1. Comply with ASTM D5249:
 - 1.1. Type 1 for asphalt rubber joint sealant
 - 1.2. Type 1 or Type 3 for silicone joint sealant
2. Be expanded, closed-cell polyethylene foam
3. Have a diameter at least 25 percent greater than the saw cut joint width

41-5.02E Preformed Compression Joint Seals

Preformed compression joint seals must:

1. Comply with ASTM D2628
2. Have 5 or 6 cells, except seals 1/2 inch wide or less may have 4 cells

Lubricant adhesive used to install seals must comply with ASTM D2835.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

41-5.02F–41-5.02K Reserved

41-5.03 CONSTRUCTION

41-5.03A General

If joint sealing is described for new concrete pavement, do not start joint sealing activities until the pavement has been in place for at least 7 days. Seal new concrete pavement joints at least 7 days after concrete pavement placement if shown.

Remove existing pavement and joint material by sawing, rectangular plowing, cutting, or manual labor. Saw cut the reservoir before cleaning the joint. Use a power-driven saw with a diamond blade.

If you damage a portion of the pavement to remain in place, repair the pavement under section 41-4.

41-5.03B Joint Cleaning

41-5.03B(1) General

Clean the joint after removal and any repair is complete before installing joint seal material. Cleaning must be completed no more than 4 hours before installing backer rods, liquid joint seal, or preformed compression seals using the following sequence:

1. Removing debris
2. Drying
3. Sandblasting
4. Air blasting
5. Vacuuming

Clean in 1 direction to minimize contamination of surrounding areas.

41-5.03B(2) Removing Debris

Remove debris including dust, dirt, and visible traces of old sealant from the joint after sawing, plowing, cutting, or manual removal. Do not use chemical solvents to wash the joint.

41-5.03B(3) Drying

After removing debris, allow the reservoir surfaces to dry or remove moisture and dampness at the joint with compressed air that may be moderately hot.

41-5.03B(4) Sandblasting

After the joint is dry, sandblast the reservoir to remove remaining residue using a 1/4-inch diameter nozzle and 90 psi minimum pressure. Do not sandblast straight into the reservoir. Angle the sandblasting nozzle within 1 to 2 inches from the concrete and make at least 1 pass to clean each reservoir face.

41-5.03B(5) Air Blasting

After sandblasting, air blast the reservoir to remove sand, dirt, and dust 1 hour before sealing the joint. Use compressed air free of oil and moisture delivered at a minimum rate of 120 cfm and 90 psi nozzle pressure.

41-5.03B(6) Vacuuming

After air blasting, use a vacuum sweeper to remove debris and contaminants from the pavement surfaces surrounding the joint.

41-5.03B(7) Reserved

41-5.03C Installing Liquid Joint Sealant

Where backer rods are shown, place the rods before installing liquid joint sealant. Place backer rods under the manufacturer's instructions unless otherwise specified. The pavement and reservoir surfaces must be dry and the ambient air temperature must be at least 40 degrees F and above the dew point. The reservoir surface must be free of residue or film. Do not puncture the backer rod.

Immediately after placing the backer rod, install liquid joint sealant under the manufacturer's instructions unless otherwise specified. Before installing, demonstrate that fresh liquid sealant is ejected from the nozzle free of cooled or cured material. For asphalt rubber joint sealant, the pavement surface temperature must be at least 50 degrees F before installing.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

Pump liquid joint sealant through a nozzle sized for the width of the reservoir so that liquid joint sealant is placed directly onto the backer rod. The installer must draw the nozzle toward his body and extrude liquid joint sealant evenly. Liquid joint sealant must maintain continuous contact with the reservoir walls during extrusion.

After placing liquid joint sealant, recess it to the depth shown within 10 minutes of installation and before a skin begins to form.

After each joint is sealed, remove excess liquid joint sealant on the pavement surface. Do not allow traffic over the sealed joints until the liquid joint sealant is set, tack free, and firm enough to prevent embedment of roadway debris.

41-5.03D Installing Preformed Compression Joint Seals

Install preformed compression joint seals using lubricant adhesive as shown and under the manufacturer's instructions.

Install longitudinal seals before transverse seals. Longitudinal seals must be continuous except splicing is allowed at intersections with transverse seals. Transverse seals must be continuous for the entire transverse length of concrete pavement except splices are allowed for widening and staged construction. With a sharp instrument, cut across the longitudinal seal at the intersection with transverse construction joints. If the longitudinal seal does not relax enough to properly install the transverse seal, trim the longitudinal seal to form a tight seal between the 2 joints.

If splicing is authorized, comply with the manufacturer's instructions.

Use a machine specifically designed for preformed compression joint seal installation. The machine must install the seal:

1. To the specified depth
2. To make continuous contact with the joint walls
3. Without cutting, nicking, or twisting the seal
4. Without stretching the seal more than 4 percent

Cut preformed compression joint seal material to the exact length of the pavement joint to be sealed. The Engineer measures this length. After you install the preformed compression joint seal, the Engineer measures the excess length of material at the joint end. The Engineer divides the excess length by the measured cut length to determine the stretch percentage.

Seals must be compressed from 30 to 50 percent of the joint width when complete in place.

41-5.03E Reserved

41-5.04 PAYMENT

Not Used

41-6 CRACK AND SEAT

41-6.01 GENERAL

41-6.01A Summary

Section 41-6 includes specifications for cracking, seating, and preparing the surface of existing concrete pavement.

41-6.01B Definitions

Reserved

41-6.01C Submittals

Submit each core in a plastic bag or tube for acceptance at the time of sampling. Mark each core with a location description.

41-6.01D Quality Control and Assurance

41-6.01D(1) General

If cracking is noncompliant:

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

1. Stop crack and seat work
2. Modify your equipment and procedures and crack the noncompliant pavement again
3. Construct another test section
4. Take additional core samples to verify compliance
5. Construct an inspection strip if the concrete pavement has HMA on the surface

41-6.01D(2) Test Section

The Engineer determines and marks a test section up to 1000 square feet within the crack and seat area shown. Construct the test section and obtain the Engineer's verbal authorization before starting crack and seat work.

Immediately before cracking the test section, apply water to the pavement surface so that cracking can be readily evaluated. Crack the test section and vary impact energy and striking patterns to verify your procedure.

41-6.01D(3) Coring

Drill cores at least 6 inches in diameter under ASTM C42 to verify cracking in the Engineer's presence. Take at least 2 cores per test section and 1 core per lane mile for each pavement cracking machine used. The Engineer determines the core locations.

41-6.01D(4) Reserved

41-6.02 MATERIALS

41-6.02A General

Use fast-setting or polyester concrete to fill core holes.

41-6.03 CONSTRUCTION

41-6.03A Cracking

Crack existing concrete pavement using the procedures and equipment from the authorized test section.

Do not allow flying debris during cracking operations.

Crack existing concrete pavement into segments that nominally measure 6 feet transversely by 4 feet longitudinally. If the existing pavement is already cracked into segments, crack it into equal-sized square or rectangular pieces that nominally measure not more than 6 feet transversely and from 3 to 5 feet longitudinally. Do not impact the pavement within 1 foot of another break line, pavement joint, or edge of pavement.

Cracks must be vertical, continuous, and penetrate the full depth of pavement. Cracks must be within 6 inches of vertical along the full depth of pavement. Do not cause surface spalling over 0.10-foot deep or excessive shattering of the pavement or base.

Cracking equipment must impact the pavement with a variable force in a controlled location. Do not use unguided free-falling weights such as "headache balls."

If the concrete pavement has no more than 0.10 foot of asphalt concrete on the surface, you may crack the pavement without removing the asphalt concrete. After cracking, construct an inspection strip by removing at least 500 square feet of asphalt concrete at a location determined by the Engineer. Construct additional inspection strips to demonstrate compliance where ordered by the Engineer.

After cracking, allow public traffic on the cracked or initial pavement layer for no more than 15 days.

41-6.03B Seating

Seat cracked concrete by making at least 5 passes over the cracked concrete with either:

1. Oscillating type pneumatic-tired roller at least 4 feet wide. Pneumatic tires must be of equal size, diameter, type, and ply. The tires must be inflated to 60 psi minimum and maintained so that the air pressure does not vary more than 5 psi. The roller's gross static weight must be at least 15 tons.

04-18-14

2. Vibratory pad-foot roller exerting a dynamic centrifugal force of at least 10 tons

07-19-13

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

A pass is 1 movement of a roller in either direction at 5 mph or less.

After all segments have been seated, clean loose debris from joints and cracks using compressed air free of moisture and oil.

Reseat any segment of cracked pavement that has not been overlaid within 24 hours of seating.

41-6.03C Surface Preparation

Before opening cracked and seated pavement to traffic or overlaying:

1. Fill joints, cracks, and spalls wider than 3/4 inch and deeper than 1 inch by applying tack coat and placing minor HMA under section 39. Use the no. 4 gradation. 04-18-14

2. Remove all loose debris and sweep the pavement. 07-19-13

41-6.03D Reserved

41-6.04 PAYMENT

Crack and seat existing concrete pavement is measured from the area of pavement cracked and seated. No deduction is made for existing cracked segments. The Department does not pay for HMA used to fill joints, cracks, and spalls.

41-7 TRANSITION TAPER

41-7.01 GENERAL

Section 41-7 includes specifications for constructing transition tapers in existing pavement.

41-7.02 MATERIALS

Not Used

41-7.03 CONSTRUCTION

Construct transition tapers by either grinding or removing and replacing the existing concrete. Do not allow flying debris during the construction of tapers.

Grinding must comply with section 42.

Replacement concrete must comply with section 41-9 except place concrete to the taper level shown and finish the surface with a coarse broom.

If the transition taper will be overlaid with HMA that is not placed before opening to traffic and there is a grade difference of more than 0.04 foot, construct a temporary taper by placing minor HMA that complies with section 39. Remove the temporary HMA taper before constructing the transition taper. 04-18-14

41-7.04 PAYMENT

Pavement transition tapers are measured using the dimensions shown. The Department does not pay for temporary HMA tapers. 07-19-13

41-8 DOWEL BAR RETROFIT

Reserved

41-9 INDIVIDUAL SLAB REPLACEMENT WITH RAPID STRENGTH CONCRETE

41-9.01 GENERAL

41-9.01A Summary

Section 41-9 includes specifications for removing existing concrete pavement and constructing individual slab replacement with rapid strength concrete (ISR—RSC).

41-9.01B Definitions

concrete raveling: Disintegration of the concrete surface layer from aggregate loss.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

early age: Any age less than 10 times the time of final setting for concrete determined under ASTM C403/C403M.

full-depth crack: Crack that runs from one edge of the concrete slab to the opposite or adjacent side of the slab.

opening age: Age when the minimum modulus of rupture specified for opening to traffic and equipment is attained.

time of final setting: Elapsed time required to develop a concrete penetration resistance that is at least 4,000 psi under ASTM C403/C403M.

41-9.01C Submittals

41-9.01C(1) General

At least 15 days before delivery to the job site, submit manufacturer's recommendations, MSDS and instructions for storage and installation of joint filler material.

At least 45 days before starting ISR—RSC work submit a sample of cement from each proposed lot and samples of proposed admixtures in the quantities ordered by the Engineer.

During ISR—RSC placement operations, submit uniformity reports for hydraulic cement at least once every 30 days to the Engineer and METS, attention Cement Laboratory. Uniformity reports must comply with ASTM C917 except testing age and water content may be modified to suit the particular material.

Except for modulus of rupture tests, submit QC test result forms within 48 hours of the paving shift. Submit modulus of rupture results within:

1. 15 minutes of opening age test completion
2. 24 hours of 3-day test completion

41-9.01C(2) Quality Control Plan

If the quantity of ISR—RSC is at least 300 cu yd, submit a QC plan at least 20 days before placing trial slabs. If the quantity of ISR—RSC is less than 300 cu yd, submit proposed forms for RSC inspection, sampling, and testing.

41-9.01C(3) Mix Design

At least 10 days before use in a trial slab, submit a mix design. The maximum ambient temperature range for a mix design is 18 degrees F. Submit more than 1 mix design based on ambient temperature variations anticipated during RSC placement. Each mix design must include:

1. Mix design identification number
2. Aggregate source
3. Opening age
4. Aggregate gradation
5. Types of cement and chemical admixtures
6. Mix proportions
7. Maximum time allowed between batching and placing
8. Range of effective ambient temperatures
9. Time of final setting
10. Modulus of rupture development data from laboratory-prepared samples, including tests at:
 - 10.1. 1 hour before opening age
 - 10.2. Opening age
 - 10.3. 1 hour after opening age
 - 10.4. 1 day
 - 10.5. 3 days
 - 10.6. 7 days
 - 10.7. 28 days
11. Shrinkage test data
12. Any special instructions or conditions such as water temperature requirements

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

41-9.01C(4) Reserved

41-9.01D Quality Control and Assurance

41-9.01D(1) General

Designate a QC manager and assistant QC managers to administer the QC plan. The QC managers must hold current American Concrete Institute (ACI) certification as a Concrete Field Testing Technician-Grade I and a Concrete Laboratory Testing Technician-Grade II, except the assistant QC managers may hold Concrete Laboratory Testing Technician-Grade I instead of Grade II.

The QC manager responsible for the production period involved must review and sign the sampling, inspection, and test reports before submitting them. The QC manager must be present for:

1. Each stage of mix design
2. Trial slab construction
3. Production and construction of RSC
4. Meetings with the Engineer relating to production, placement, or testing

The QC manager must not be a member of this project's production or paving crews, an inspector, or a tester. The QC manager must have no duties during the production and placement of RSC except those specified.

Testing laboratories and equipment must comply with the Department's Independent Assurance Program. At the time of the QC plan submittal, the Department evaluates the quality control samplers and testers.

41-9.01D(2) Just-in-time Training

Reserved

41-9.01D(3) Quality Control Plan

Establish, implement, and maintain a QC plan for pavement. The QC plan must describe the organization and procedures used to:

1. Control the production process
2. Determine if a change to the production process is needed
3. Implement a change

The QC plan must include:

1. Names, qualifications, and certifications of QC personnel, including:
 - 1.1. QC manager
 - 1.2. Assistant QC managers
 - 1.3. Samplers and testers
2. Outline of procedure for the production, transportation, placement, and finishing of RSC
3. Outline of procedure and forms for concrete QC, sampling, and testing to be performed during and after RSC construction, including testing frequencies for modulus of rupture
4. Contingency plan for identifying and correcting problems in production, transportation, placement, or finishing RSC including:
 - 4.1. Action limits
 - 4.2. Suspension limits that do not exceed specified material requirements
 - 4.3. Detailed corrective action if limits are exceeded
 - 4.4. Temporary pavement structure provisions, including:
 - 4.4.1. The quantity and location of standby material
 - 4.4.2. Determination of need
5. Location of your quality control testing laboratory and testing equipment during and after paving operations
6. List of the testing equipment to be used, including the date of last calibration
7. Production target values for material properties that impact concrete quality or strength including cleanliness value and sand equivalent
8. Outline procedure for placing and testing trial slabs, including:
 - 8.1. Locations and times
 - 8.2. Production procedures

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

- 8.3. Placing and finishing methods
- 8.4. Sampling methods, sample curing, and sample transportation
- 8.5. Testing and test result reporting
- 9. Name of source plant with approved Material Plant Quality Program (MPQP)
- 10. Procedures or methods for controlling pavement quality including:
 - 10.1. Materials quality
 - 10.2. Contraction and construction joints
 - 10.3. Protecting pavement before opening to traffic

41-9.01D(4) Prepaving Conference

Schedule a prepaving conference and provide a facility to meet with the Engineer.

Prepaving conference attendees must sign an attendance sheet provided by the Engineer. The prepaving conference must be attended by your:

- 1. Project superintendent
- 2. Project manager
- 3. QC manager
- 4. Workers and your subcontractor's workers, including:
 - 4.1. Foremen
 - 4.2. Concrete plant manager
 - 4.3. Concrete plant operator
 - 4.4. Concrete plant inspectors
 - 4.5. Personnel performing saw cutting and joint sealing
 - 4.6. Paving machine operators
 - 4.7. Inspectors
 - 4.8. Samplers
 - 4.9. Testers

The purpose of the prepaving conference is to familiarize personnel with the project's specifications. Discuss the QC plan and processes for constructing each item of work, including:

- 1. Production
- 2. Transportation
- 3. Trial slabs
- 4. Pavement structure removal
- 5. Placement
- 6. Contingency plan
- 7. Sampling
- 8. Testing
- 9. Acceptance

Do not start trial slabs or paving activities until the listed personnel have attended the prepaving conference.

41-9.01D(5) Trial Slabs

Before starting individual slab replacement work, complete 1 trial slab for each mix design.

Place trial slabs near the job site at a mutually-agreed location that is neither on the roadway nor within the project limits. Trial slabs must be 10 by 20 feet and at least 10 inches thick.

During trial slab construction, sample and split the aggregate for grading, cleanness value, and sand equivalent testing.

Fabricate and test beams under California Test 524 to determine the modulus of rupture values.

Cure beams fabricated for early age testing such that the monitored temperatures in the beams and the slab are always within 5 degrees F of each other.

Monitor and record the internal temperatures of trial slabs and early age beams at intervals of at least 5 minutes. Install thermocouples or thermistors connected to strip-chart recorders or digital data loggers to

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

monitor the temperatures. Temperature recording devices must be accurate to within 2 degrees F. Measure internal temperatures at 1 inch from the top, 1 inch from the bottom, and no closer than 3 inches from any edge until early age testing is completed.

Cure beams fabricated for 3-day testing under California Test 524 except place them into sand at a time that is from 5 to 10 times the time of final setting measured under ASTM C403/403M or 24 hours, whichever is earlier.

Trial slabs must have an opening age modulus of rupture of not less than 400 psi and a 3-day modulus of rupture of not less than 600 psi.

After authorization, remove and dispose of trial slabs and testing materials.

41-9.01D(6) Quality Control Testing

41-9.01D(6)(a) General

Provide continuous process control and quality control sampling and testing throughout RSC production and placement. Notify the Engineer at least 2 business days notice before any sampling and testing. Establish a testing facility at the job site or at an authorized location.

Sample under California Test 125.

During ISR—RSC placement, sample and fabricate beams for modulus of rupture testing within the first 30 cubic yards, at least once every 130 cu yd, and within the final truckload. Submit split samples and fabricate test beams for the Department's testing unless the Engineer informs you otherwise.

Determine the modulus of rupture at opening age under California Test 524, except beam specimens may be fabricated using an internal vibrator under ASTM C 31. Cure beams under the same conditions as the pavement until 1 hour before testing. Test 3 beam specimens in the presence of the Engineer and average the results. A single test represents no more than that day's production or 130 cu yd, whichever is less.

Determine the modulus of rupture at other ages using beams cured and tested under California Test 524 except place them in sand from 5 to 10 times the time of final setting under ASTM C403/C403M or 24 hours, whichever is earlier.

41-9.01D(6)(b) Rapid Strength Concrete

Your quality control must include testing RSC for the properties at the frequencies shown in the following table:

RSC Minimum Quality Control

Property	Test method	Minimum testing frequency ^a
Cleanness value	California Test 227	650 cu yd or 1 per shift
Sand equivalent	California Test 217	650 cu yd or 1 per shift
Aggregate gradation	California Test 202	650 cu yd or 1 per shift
Air content	California Test 504	130 cu yd or 2 per shift
Yield	California Test 518	2 per shift
Slump or penetration	ASTM C143 or California Test 533	1 per 2 hours of paving
Unit weight	California Test 518	650 cubic yards or 2 per shift
Aggregate Moisture Meter Calibration ^b	California Test 223 or California Test 226	1 per shift
Modulus of rupture	California Test 524	Comply with section 41-9.01D(6)(a)

^aTest at the most frequent interval.

^bCheck calibration of the plant moisture meter by comparing moisture meter readings with California Test 223 or California Test 226 test results

Maintain control charts to identify potential problems and causes. Post a copy of each control chart at a location determined by the Engineer.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

Individual measurement control charts must use the target values in the mix proportions as indicators of central tendency.

Develop linear control charts for:

1. Cleanness value
2. Sand equivalent
3. Fine and coarse aggregate gradation
4. Air content
5. Penetration

Control charts must include:

1. Contract number
2. Mix proportions
3. Test number
4. Each test parameter
5. Action and suspension limits
6. Specification limits
7. Quality control test results

For fine and coarse aggregate gradation control charts, record the running average of the previous 4 consecutive gradation tests for each sieve and superimpose the specification limits.

For air content control charts, the action limit is ± 1.0 percent and the suspension limit is ± 1.5 percent of the specified values. If no value is specified, apply the air content value used in the approved mix design.

As a minimum, a process is out of control if any of the following occurs:

1. For fine and coarse aggregate gradation, 2 consecutive running averages of 4 tests are outside the specification limits
2. For individual penetration or air content measurements:
 - 2.1. One point falls outside the suspension limit line
 - 2.2. Two points in a row fall outside the action limit line

Stop production and take corrective action for out of control processes or the Engineer rejects subsequent RSC.

Before each day's concrete pavement placement and at intervals not to exceed 4 hours of production, use a tachometer to test and record vibration frequency for concrete consolidation vibrators.

41-9.01D(6)(c) Reserved

41-9.01D(7) Acceptance Criteria

41-9.01D(7)(a) General

The final texture of ISR—RSC must pass visual inspection and have a coefficient of friction of at least 0.30 determined under California Test 342.

Allow at least 25 days for the Department to schedule testing for coefficient of friction. Notify the Engineer when the pavement is scheduled to be opened to traffic.

41-9.01D(7)(b) Modulus of Rupture

ISR—RSC is accepted based on your testing for modulus of rupture at opening age and the Department's testing for modulus of rupture at 3 days.

ISR—RSC must have a modulus of rupture at opening age that is at least 400 psi and a modulus of rupture at 3 days that is at least 600 psi.

Calculate the test result as the average from testing 3 beams for each sample. The test result represents 1 paving shift or 130 cu yd, whichever is less.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

41-9.01D(7)(c) Concrete Pavement Smoothness

The Department tests for concrete pavement smoothness using a 12-foot straightedge. Straightedge smoothness specifications do not apply to the pavement surface placed within 12 inches of existing concrete pavement except parallel to the centerline at the midpoint of a transverse construction joint.

The concrete pavement surface must not vary from the lower edge of a 12-foot straightedge by more than:

1. 0.01 feet when parallel to the centerline
2. 0.02 feet when perpendicular to the centerline extending from edge to edge of a traffic lane

41-9.01D(7)(d) Cracking and Raveling

The Engineer rejects an ISR—RSC slab under section 6-3.06 if within 1 year of contract acceptance there is either:

1. Partial or full-depth cracking
2. Concrete raveling consisting of either:
 - 2.1. Combined raveled areas more than 5 percent of each ISR—RSC slab area
 - 2.2. Any single raveled area of more than 4 sq ft

41-9.01D(8) Reserved

41-9.02 MATERIALS

41-9.02A General

Reserved

41-9.02B Rapid Strength Concrete

RSC for ISR—RSC must comply with section 90-3.

Use either the 1-1/2 inch maximum or the 1-inch maximum combined grading specified in section 90-1.02C(4)(d).

Air content must comply with the minimum requirements in section 40-1.02B(4).

41-9.02C Base Bond Breaker

Use base bond breaker no. 3, 4, or 5 under section 36-2.

41-9.02D Reserved

41-9.03 CONSTRUCTION

41-9.03A General

Complete ISR—RSC adjacent to new pavement or existing pavement shown for construction as a 1st order of work. Replace individual slabs damaged during construction before placing final pavement delineation.

41-9.03B Removing Existing Pavement

Remove pavement under section 15-2.02. The Engineer determines the exact ISR—RSC limits after overlying layers are removed.

After removing pavement to the depth shown, grade to a uniform plane. Water as needed and compact the material remaining in place to a firm and stable base. The finished surface of the remaining material must not extend above the grade established by the Engineer.

41-9.03C Drill and Bond Dowel Bars

Drill existing concrete and bond dowel bars under section 41-10 if described. Do not install dowel bars in contraction joints.

41-9.03D Base Bond Breaker

Place base bond breaker before placing ISR—RSC. Comply with section 36-2.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

41-9.03E Placing Rapid Strength Concrete

Do not place RSC if the ambient air temperature is forecast by the National Weather Service to be less than 40 degrees F within 72 hours of final finishing.

Before placing RSC against existing concrete, place 1/4-inch thick commercial quality polyethylene flexible foam expansion joint filler across the original transverse and longitudinal joint faces and extend the full depth of pavement to the top of the base layer. Place the top of the joint filler flush with the top of the pavement. Secure joint filler to the joint face of the existing pavement to prevent the joint filler from moving during the placement of RSC.

Use metal or wood side forms. Wood side forms must not be less than 1-1/2 inches thick. Side forms and connections must be of sufficient rigidity that movement will not occur under forces from equipment or RSC. Clean and oil side forms before each use. Side forms must remain in place until the pavement edge no longer requires the protection of forms.

After you place RSC, consolidate it using high-frequency internal vibrators adjacent to forms and across the full paving width. Place RSC as nearly as possible to its final position. Do not use vibrators for extensive shifting of concrete pavement.

Spread and shape RSC with powered finishing machines supplemented by hand finishing. After you mix and place RSC, do not add water to the surface to facilitate finishing. You may request authorization to use surface finishing additives. Submit the manufacturer's instructions with your request.

Place consecutive concrete loads without interruption. Do not allow cold joints where a visible lineation forms after concrete is placed, sets, and hardens before additional concrete placed.

Where the existing transverse joint spacing in an adjacent lane exceeds 15 feet, construct an additional transverse contraction joint midway between the existing joints. Complete sawing of contraction joints within 2 hours of completion of final finishing.

Cut contraction joints a minimum of 1/3 the slab depth.

41-9.03F Final Finishing

After preliminary finishing, round the edges of the initial paving width to a 0.04-foot radius. Round transverse and longitudinal construction joints to a 0.02-foot radius. Mark each ISR—RSC area with a stamp. The stamp mark must show the month, day, and year of placement and contract number. Level the location of the stamp with a steel trowel below the pavement texture. Orient the stamp mark so it can be read from the outside edge of ISR—RSC.

Before curing, texture the pavement. Perform initial texturing with a burlap drag or broom device that produces striations parallel to the centerline. Perform final texturing with a steel-tined device that produces grooves parallel with the centerline.

Tines must be from 3/32 to 1/8 inch wide on 3/4-inch centers and have enough length, thickness, and resilience to form grooves from 1/8 to 3/16 inch deep after the concrete has hardened. Grooves must extend over the entire pavement width except do not construct grooves 3 inches from longitudinal pavement edges or joints.

Final texture must be uniform and smooth. Grooves must be parallel and aligned to the pavement edge across the pavement width. The groove alignment must not vary more than 0.1 foot for every 12 foot length.

Protect RSC under section 90-1.03C.

41-9.03G Temporary Pavement Structure

Temporary pavement structure must be RSC or 3-1/2 inch thick HMA over aggregate base.

41-9.03H Noncompliant Individual Slab Replacement

Replace an ISR—RSC slab with any of the following:

1. One or more full-depth cracks.
2. Concrete raveling.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CTA Contract No. XXX

3. Noncompliant smoothness except you may request authorization for grinding under section 42 and retesting. Grinding that causes a depression will not be considered. Smoothness must be corrected within 48 hours of placing ISR—RSC.
4. Noncompliant modulus of rupture.

If the modulus of rupture at opening age is at least 400 psi and the modulus of rupture at 3 days is at least 500 psi but less than 600 psi, you may request authorization to leave the ISR—RSC in place and accept the specified deduction.

If pavement is noncompliant for coefficient of friction, groove or grind the pavement under section 42. Comply with section 40-1.03Q(4) and groove or grind before the installation of any required joint seal or edge drains adjacent to the areas to the noncompliant area.

If an ISR—RSC slab has partial depth cracking, treat it with high-molecular-weight methacrylate under section 41-3.

41-9.03I Replace Pavement Delineation

Replace traffic stripes, pavement markings, and markers that are removed, obliterated, or damaged by ISR—RSC under sections 84 and 85.

41-9.03J Reserved

41-9.04 PAYMENT

Replace base is not included in the payment for individual slab replacement (RSC).

Drill and bond dowel bars are not included in payment for individual slab replacement (RSC).

For individual slab replacement (RSC) with a modulus of rupture at opening age that is at least 400 psi and a modulus of rupture at 3 days that is greater than or equal to 500 psi but less than 550 psi, the Department deducts 10 percent of the payment for individual slab replacement (RSC).

For individual slab replacement (RSC) with a modulus of rupture at opening age that is at least 400 psi and a modulus of rupture at 3 days that is greater than or equal to 550 psi but less than 600 psi, the Department deducts 5 percent of the payment for individual slab replacement (RSC).

41-10 DRILL AND BOND BARS

41-10.01 GENERAL

41-10.01A Summary

Section 41-10 includes specifications for drilling, installing, and bonding tie bars and dowel bars in concrete pavement.

41-10.01B Definitions

Reserved

41-10.01C Submittals

Submit a certificate of compliance for:

1. Tie bars
2. Dowel bars
3. Dowel bar lubricant
4. Chemical adhesive
5. Epoxy powder coating

At least 15 days before delivery to the job site, submit the manufacturer's recommendations and instructions for storage, handling, and use of chemical adhesive.

41-10.01D Quality Control and Assurance

41-10.01D(1) General

Drill and bond bar is accepted based on inspection before concrete placement.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

41-10.01D(2) Reserved

41-10.02 MATERIALS

41-10.02A General

Dowel bar lubricant must comply with section 40-1.02D.

Chemical adhesive for drilling and bonding bars must be on the Authorized Material List. The Authorized Material List indicates the appropriate chemical adhesive system for concrete temperature and installation conditions.

Each chemical adhesive system container must clearly and permanently show the following:

1. Manufacturer's name
2. Model number of the system
3. Manufacture date
4. Batch number
5. Expiration date
6. Current International Conference of Building Officials Evaluation Report number
7. Directions for use
8. Storage requirement
9. Warnings or precautions required by state and federal laws and regulations

41-10.02B Reserved

41-10.03 CONSTRUCTION

41-10.03A General

Drill holes for bars. Clean drilled holes in compliance with the chemical adhesive manufacturer's instructions. Holes must be dry at the time of placing the chemical adhesive and bars. Use a grout retention ring when drilling and bonding dowel bars. Immediately after inserting the bar into the chemical adhesive, support the bar to prevent movement until chemical adhesive has cured the minimum time recommended by the manufacturer.

Apply dowel bar lubricant to the entire exposed portion of the dowel bar.

If the Engineer rejects a bar installation: stop paving, drilling, and bonding activities. Adjust your procedures and obtain the Engineer's verbal authorization before resuming paving, drilling, and bonding.

Cut the rejected bar flush with the pavement joint surface and coat the exposed end of the bar with chemical adhesive. Offset the new hole 3 inches horizontally from the rejected hole's center.

41-10.03B Tie Bar Tolerance

Place tie bars within the tolerances shown in the following table:

Tie Bar Tolerances	
Dimension	Tolerance
Horizontal skew (vertical skew: bar length)	1:6
Vertical skew (vertical skew: bar length)	1:6
Longitudinal translation (inch)	±1
Horizontal offset (embedment, inch)	±1
Height relative to the adjacent bar	±1
Vertical Depth (clearance from the pavement surface or bottom, inches, min)	3

41-10.03C Dowel Bar Tolerance

Place dowel bars within the tolerances specified in section 40-1.01D(7)(b)(v).

41-10.03D Reserved

41-10.04 PAYMENT

Not Used

AA

42 GROOVE AND GRIND CONCRETE

07-19-13

Replace the paragraph of section 42-1.01A with:

Section 42-1 includes general specifications for grooving and grinding concrete.

07-19-13

Replace the headings and paragraphs in section 42-3 with:

07-19-13

42-3.01 GENERAL

42-3.01A Summary

Section 42-3 includes specifications for grinding the surfaces of pavement, bridge decks, and approach slabs.

42-3.01B Definitions

Reserved

42-3.01C Submittals

Reserved

42-3.01D Quality Control and Assurance

Reserved

42-3.02 MATERIALS

Not Used

42-3.03 CONSTRUCTION

42-3.03A General

Grind surfaces in the longitudinal direction of the traveled way and grind the full lane width. Begin and end grinding at lines perpendicular to the roadway centerline.

Grinding must result in a parallel corduroy texture with grooves from 0.08 to 0.12 inch wide and from 55 to 60 grooves per foot of width. Grooves must be from 0.06 to 0.08 inch from the top of the ridge to the bottom of the groove.

Grind with abrasive grinding equipment using diamond cutting blades mounted on a self-propelled machine designed for grinding and texturing concrete pavements.

42-3.03B Pavement

Grind existing concrete pavement that is adjacent to an individual slab replacement. Grind the replaced individual slab and all the existing slabs immediately surrounding it. Grind after the individual slab is replaced.

Grind existing concrete pavement that is adjacent to new lanes of concrete pavement. Grind before paving.

After grinding, the existing pavement must comply with requirements for smoothness and coefficient of friction in section 40 except:

1. At the midpoint of a joint or crack, test smoothness with a straightedge. Both sides must have uniform texture.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

2. Straightedge and inertial profiler requirements do not apply to areas abnormally depressed from subsidence or other localized causes. End smoothness testing 15 feet before and resume 15 feet after these areas.
3. Cross-slope must be uniform and have positive drainage across the traveled way and shoulder.

As an alternative to grinding existing concrete pavement, you may replace the existing pavement. The new concrete pavement must be the same thickness as the removed pavement. Replace existing pavement between longitudinal joints or pavement edges and transverse joints. Do not remove portions of slabs.

Replacement of existing concrete pavement must comply with requirements for individual slab replacement in section 41-9.

42-3.03C Bridge Decks, Approach Slabs, and Approach Pavement

Grind bridge decks, approach slabs, and approach pavement only if described.

The following ground areas must comply with the specifications for smoothness and concrete cover over reinforcing steel in section 51-1.01D(4):

1. Bridge decks
2. Approach slabs
3. Adjacent 50 feet of approach pavement

After grinding, the coefficient of friction must comply with section 51-1.01D(4).

42-3.04 PAYMENT

Grinding existing approach slabs and adjacent 50 feet of approach pavement is paid for as grind existing bridge deck.

The Department does not pay for grinding replacement concrete pavement or for additional grinding to comply with smoothness requirements.

Add to section 42:

42-4-42-9 RESERVED

07-19-13

AA

**DIVISION VI STRUCTURES
46 GROUND ANCHORS AND SOIL NAILS**

07-19-13

Replace the 1st paragraph of section 46-1.01C(2) with:

04-19-13

Submit 5 copies of shop drawings to OSD, Documents Unit. Notify the Engineer of the submittal. Include in the notification the date and contents of the submittal. Allow 30 days for the Department's review. After review, submit from 6 to 12 copies, as requested, for authorization and use during construction.

Shop drawings and calculations must be sealed and signed by an engineer who is registered as a civil engineer in the State.

Replace the 3rd paragraph of section 46-1.01C(2) with:

01-18-13

Ground anchor shop drawings must include:

1. Details and specifications for the anchorage system and ground anchors.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

2. Details for the transition between the corrugated plastic sheathing and the anchorage assembly.
3. If shims are used during lock-off, shim thickness and supporting calculations.
4. Calculations for determining the bonded length. Do not rely on any capacity from the grout-to-ground bond within the unbonded length.

Delete the 5th and 6th paragraphs of section 46-1.01C(2).

01-18-13

Replace the 4th paragraph of section 46-1.01D(2)(b) with:

Each jack and its gage must be calibrated as a unit under the specifications for jacks used to tension prestressing steel permanently anchored at 25 percent or more of its specified minimum ultimate tensile strength in section 50-1.01D(3).

01-18-13

Replace the 3rd paragraph of section 46-1.01D(2)(d) with:

The Department may verify the test loads using the Department's load cells. If requested, install and support the Department's testing equipment during testing and remove the equipment after testing is complete.

07-19-13

Add to section 46-1.02:

46-1.02C Grout

07-19-13

Grout must consist of cement and water and may contain an admixture if authorized. Cement must comply with section 90-1.02B(2). Water must comply with section 90-1.02D. Admixtures must comply with section 90, except they must not contain chloride ions in excess of 0.25 percent by weight. Do not exceed 5 gallons of water per 94 lb of cement.

Mix the grout as follows:

1. Add water to the mixer followed by cement and any admixtures or fine aggregate.
2. Mix the grout with mechanical mixing equipment that produces a uniform and thoroughly mixed grout.
3. Agitate the grout continuously until the grout is pumped.
4. Do not add water after the initial mixing.

Add to section 46-1.03B:

Dispose of drill cuttings under section 19-2.03B.

04-20-12

Add to the end of section 46-1.03C:

Grouting equipment must be:

07-19-13

1. Capable of grouting at a pressure of at least 100 psi
2. Equipped with a pressure gage having a full-scale reading of not more than 300 psi

Delete the 3rd paragraph of section 46-2.01A.

07-19-13

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Add to the beginning of section 46-2.01C:

07-19-13

Submittals for strand tendons, bar tendons, bar couplers, and anchorage assemblies must comply with section 50-1.01C.

Add to section 46-2.01D:

07-19-13

46-2.01D(3) Steel

Strand tendons, bar tendons, bar couplers, and anchorage assemblies must comply with section 50-1.01D.

46-2.01D(4) Grout

The Department tests the efflux time of the grout under California Test 541.

Add to the beginning of section 46-2.02B:

07-19-13

Strand tendons, bar tendons, and bar couplers must comply with section 50-1.02B.

Replace the 1st paragraph of section 46-2.02E with:

07-19-13

The efflux time of the grout immediately after mixing must be at least 11 seconds.

Add between the 13th and 14th paragraphs of section 46-2.03A:

07-19-13

If hot weather conditions will contribute to quick stiffening of the grout, cool the grout by authorized methods as necessary to prevent blockages during pumping activities.

Add between the 1st and 2nd paragraphs of section 46-2.03D:

07-19-13

Secure the ends of strand tendons with a permanent type anchorage system that:

1. Holds the prestressing steel at a force producing a stress of at least 95 percent of the specified ultimate tensile strength of the steel
2. Permanently secures the ends of the prestressing steel

Replace the 2nd sentence of the 1st paragraph of section 46-3.02A with:

07-19-13

The epoxy-coated prefabricated reinforcing bar must comply with section 52-2.03, except the epoxy thickness must be from 10 to 12 mils.

Replace the 2nd paragraph of section 46-3.02B with:

07-19-13

Concrete anchors on bearing plates must comply with the specifications for studs in clause 7 of AWS D1.1.

07-19-13

07-18-14

02-17-12

10-19-12

01-20-12

07-18-14

07-19-13

Revised Standard Specifications

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

47-3.02B Crib Members

47-3.02B(1) General

All members may be manufactured to dimensions 1/8 inch greater in thickness than shown. The thickness of the lowest step must not be less than the dimension shown.

Stretchers may be manufactured 1/2 inch less in length than shown.

When an opening is shown in the face of the wall, special length stretchers and additional headers may be necessary.

For non-tangent wall alignments, special length stretchers may be required.

For non-tangent wall alignments and at locations where filler blocks are required, special length front face closure members may be required.

47-3.02B(2) Reinforcement

Reinforcing wire must comply with ASTM A 496/A 496M.

For hoops or stirrups use either (1) reinforcing wire or (2) deformed steel welded wire reinforcement. The size must be equivalent to the reinforcing steel shown. Deformed steel welded wire reinforcement must comply with ASTM A 497/A 497M.

47-3.02B(3) Concrete

Concrete test cylinders must comply with section 90-1.01D(5), except when the penetration of fresh concrete is less than 1 inch, the concrete in the test mold must be consolidated by vibrating the mold equivalent to the consolidating effort being used to consolidate the concrete in the members.

Cure crib members under section 51-4.02C.

When removed from forms, the members must present a true surface of even texture, free from honeycombs and voids larger than 1 inch in diameter and 5/16 inch in depth. Clean and fill other pockets with mortar under sections 51-1.02F and 51-1.03E(2).

External vibration resulting in adequate consolidation may be used.

If the Engineer determines that rock pockets are of the extent or character as to affect the strength of the member or to endanger the life of the steel reinforcement, replace the member.

Finish concrete-to-concrete bearing surfaces to a smooth plane. Section 51-1.03F does not apply to concrete crib members.

47-3.03 Construction

Place reinforced concrete crib walls to the lines and grades established by the Engineer. The foundation must be accepted by the Engineer before any crib members are placed.

The gap between bearing surfaces must not exceed 1/8 inch.

Where a gap of 1/16 inch to 1/8 inch exists or where shown, place a 1/16-inch pad of asphalt felt or sheet neoprene between the bearing surfaces.

47-3.04 Payment

The area of reinforced concrete crib wall is measured on the batter at the outer face for the height from the bottom of the bottom stretcher to the top of the top stretcher and for a length measured from end to end of each section of wall.

Add between the 3rd and 4th paragraphs of section 47-5.01:

Reinforcement must comply with section 52.

10-19-12

10-19-12

04-19-13

copies

AA

07-19-13

04-19-13

07-19-13

04-19-13

04-19-13

- 07-19-13

copies

09-16-11

Revised Standard Specifications

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Add to section 48-2.01C(2):

07-19-13

Shop drawings and calculations for falsework removal systems employing methods of holding falsework from above by winches, hydraulic jacks with prestressing steel, HS rods, or cranes must include:

1. Design code used for the analysis of the structural members of the independent support system
2. Provisions for complying with current Cal/OSHA requirements
3. Load tests and ratings within 1 year of intended use of hydraulic jacks and winches
4. Location of the winches, hydraulic jacks with prestressing steel, HS rods, or cranes
5. Analysis showing that the bridge deck and overhang are capable of supporting all loads at all time
6. Analysis showing that winches will not overturn or slide during all stages of loading
7. Location of deck and soffit openings if needed
8. Details of repair for the deck and soffit openings after falsework removal

Replace the 1st paragraph of section 48-2.01D(2) with:

04-19-13

Welding must comply with AWS D1.1 or other recognized welding standard, except for fillet welds where the load demands are 1,000 lb or less per inch for each 1/8 inch of fillet weld.

Replace the 1st through 3rd sentences in the 2nd paragraph of section 48-2.01D(2) with:

04-19-13

Perform NDT on welded splices using UT or RT. Each weld and any repair made to a previously welded splice must be tested.

Replace the 3rd paragraph of section 48-2.01D(2) with:

04-19-13

For previously welded splices, perform and document all necessary testing and inspection required to certify the ability of the falsework members to sustain the design stresses.

Add to section 48-2.01D(3)(a):

07-19-13

Falsework removal system employing methods of holding falsework from above and members of the independent support system must support the sum of the actual vertical and horizontal loads due to falsework materials, equipment, construction sequence or other causes, and wind loading. Identifiable mechanical devices used in the falsework removal plan must meet applicable industry standards and manufacturer instructions for safe load carrying capacity. Unidentifiable winches must be capable of carrying twice the design load.

The load used for the analysis of overturning moment and sliding of the winch system must be 150 percent of the design load.

Add to section 48-2.03D:

07-19-13

Falsework removal employing methods of holding falsework by winches, hydraulic jacks with prestressing steel, HS rods, or cranes must also be supported by an independent support system when the system is not actively lowering the falsework at vehicular, pedestrian, or railroad traffic openings.

Bridge deck openings used to facilitate falsework removal activities must be formed and located away from the wheel path. The formed openings must be wedge shaped with a 5-inch maximum diameter at the top and a 3-inch maximum diameter at the bottom.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Anchor 10-inch-square aluminum or galvanized steel wire, 1/4-inch-mesh hardware cloth with a 0.025-inch minimum wire diameter firmly to the inside of the soffit openings. Construct a 1/2-inch drip groove to the outside of soffit openings.

Clean and roughen openings made in the bridge deck. Fill the deck openings with rapid setting concrete complying with section 15-5.02.

49 PILING

07-18-14

Replace "sets" in the 1st paragraph of section 49-1.01C(2) with:

copies

04-19-13

Replace "set" in the 2nd paragraph of section 49-1.01C(2) with:

copy

04-19-13

Replace "Load Applied to Pile by Hydraulic Jack(s) Acting at One End of Test Beam(s) Anchored to the Pile" in the 5th paragraph of section 49-1.01D(2) with:

"Tensile Load Applied by Hydraulic Jack(s) Acting Upward at One End of Test Beam(s)"

07-20-12

Add to section 49-1.03:

Dispose of drill cuttings under section 19-2.03B.

04-20-12

Replace the paragraph of section 49-2.01A(1) with:

Section 49-2.01 includes general specifications for fabricating and installing driven piles.

07-19-13

Epoxy-coated bar reinforcing steel used for pile anchors must comply with section 52-2.02.

Replace the 2nd paragraph of section 49-2.01D with:

Furnish piling is measured along the longest side of the pile from the specified tip elevation shown to the plane of pile cutoff.

01-20-12

Replace the paragraph of section 49-2.02A(1) with:

Section 49-2.02 includes specifications for fabricating and installing steel pipe piles.

07-19-13

Replace the definitions in section 49-2.02A(2) with:

shop welding: Welding performed at a plant on the Department's Authorized Facility Audit List.

07-19-13

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

field welding: Welding not performed at a plant on the Department's Authorized Facility Audit List.

Replace item 2 in the list in the paragraph of section 49-2.02A(3)(b) with:

07-19-13

2. Certified mill test reports for each heat number of steel used in pipe piles being furnished.

Replace the paragraph of section 49-2.02A(4)(a) with:

07-19-13

Section 11-3.02 does not apply to shop welds in steel pipe piles fabricated at a facility on the Department's Authorized Facility Audit List.

For groove welds using submerged arc welding from both sides without backgouging, qualify the WPS under Table 4.5 of AWS D1.1.

Replace "0.45" in the 2nd paragraph of section 49-2.02B(1)(a) with:

07-19-13

0.47

Replace the 1st paragraph of section 49-2.02B(1)(b) with:

07-19-13

Welds must comply with AWS D1.1. Circumferential welds must be CJP welds.

Delete the 5th paragraph of section 49-2.02B(1)(b).

07-19-13

Add to section 49-2.02B(1):

07-19-13

49-2.02B(1)(d) Reserved

Replace "4.8.4" in item 2.3 in the list in the 2nd paragraph of section 49-2.02B(2) with:

07-19-13

4.9.4

Delete the 3rd paragraph of section 49-2.02C(2).

07-19-13

Replace the paragraph of section 49-2.03A(1) with:

07-19-13

Section 49-2.03 includes specifications for fabricating and installing structural shape steel piles.

Replace the paragraph of section 49-2.03A(3) with:

07-19-13

Submit a certified material test report and a certificate of compliance that includes a statement that all materials and workmanship incorporated in the work and all required tests and inspections of this work have been performed as described.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Replace the 1st paragraph of section 49-2.03B with:

07-19-13

Structural shape steel piles must comply with ASTM A 36/A 36M, ASTM A 572/A 572M, ASTM A 709/A 709M, or ASTM A 992/A 992M.

Replace "sets" in the 1st paragraph of section 49-2.04A(3) with:

04-19-13

copies

Delete the 1st paragraph of section 49-2.04A(4).

07-19-13

Replace the 3rd and 4th paragraphs of section 49-2.04B(2) with:

10-19-12

Piles in a corrosive environment must be steam or water cured under section 90-4.03.

If piles in a corrosive environment are steam cured, either:

1. Keep the piles continuously wet for at least 3 days. The 3 days includes the holding and steam curing periods.
2. Apply curing compound under section 90-1.03B(3) after steam curing.

Replace the 1st paragraph of section 49-3.01A with:

07-19-13

Section 49-3.01 includes general specifications for constructing CIP concrete piles.

Add to section 49-3.01A:

01-20-12

Concrete must comply with section 51.

Replace the 1st paragraph of section 49-3.01C with:

01-20-12

Except for CIDH concrete piles constructed under slurry, construct CIP concrete piles such that the excavation methods and the concrete placement procedures provide for placing the concrete against undisturbed material in a dry or dewatered hole.

Replace "Reserved" in section 49-3.02A(2) with:

01-20-12

dry hole:

1. Except for CIDH concrete piles specified as end bearing, a drilled hole that:
 - 1.1. Accumulates no more than 12 inches of water in the bottom of the drilled hole during a period of 1 hour without any pumping from the hole during the hour.
 - 1.2. Has no more than 3 inches of water in the bottom of the drilled hole immediately before placing concrete.
2. For CIDH concrete piles specified as end bearing, a drilled hole free of water without the use of pumps.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Replace "Reserved" in section 49-3.02A(3)(a) with:

01-20-12

If plastic spacers are proposed for use, submit the manufacturer's data and a sample of the plastic spacer. Allow 10 days for review.

Replace item 5 in the list in the 1st paragraph of section 49-3.02A(3)(b) with:

10-19-12

5. Methods and equipment for determining:
 - 5.1. Depth of concrete
 - 5.2. Theoretical volume of concrete to be placed, including the effects on volume if casings are withdrawn
 - 5.3. Actual volume of concrete placed

Add to the list in the 1st paragraph of section 49-3.02A(3)(b):

01-18-13

8. Drilling sequence and concrete placement plan.

Replace item 2 in the list in the 1st paragraph of section 49-3.02A(3)(g) with:

01-20-12

2. Be sealed and signed by an engineer who is registered as a civil engineer in the State. This requirement is waived for either of the following conditions:
 - 2.1. The proposed mitigation will be performed under the current Department-published version of *ADSC Standard Mitigation Plan 'A' - Basic Repair* without exception or modification.
 - 2.2. The Engineer determines that the rejected pile does not require mitigation due to structural, geotechnical, or corrosion concerns, and you elect to repair the pile using the current Department-published version of *ADSC Standard Mitigation Plan 'B' - Grouting Repair* without exception or modification.

Replace "49-2.03A(4)(d)" in the 1st paragraph of section 49-3.02A(4)(d)(i) with:

07-19-13

49-3.02A(4)(d)

Add to the beginning of section 49-3.02A(4)(d)(ii):

07-19-13

If the drilled hole is dry or dewatered without the use of temporary casing to control ground water, installation of inspection pipes is not required.

Replace item 1 in the list in the 1st paragraph of section 49-3.02A(4)(d)(ii) with:

01-20-12

1. Inspection pipes must be schedule 40 PVC pipe complying with ASTM D 1785 with a nominal pipe size of 2 inches. Watertight PVC couplers complying with ASTM D 2466 are allowed to facilitate pipe lengths in excess of those commercially available. Log the location of the inspection pipe couplers with respect to the plane of pile cutoff.

Add to section 49-3.02A(4)(d)(iv):

01-20-12

If the Engineer determines it is not feasible to use one of ADSC's standard mitigation plans to mitigate the pile, schedule a meeting and meet with the Engineer before submitting a nonstandard mitigation plan.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

The meeting attendees must include your representatives and the Engineer's representatives involved in the pile mitigation. The purpose of the meeting is to discuss the type of pile mitigation acceptable to the Department.

Provide the meeting facility. The Engineer conducts the meeting.

Replace the 1st paragraph of section 49-3.02B(5) with:

07-19-13

Grout must consist of cementitious material and water, and may contain an admixture if authorized. Do not exceed 5 gallons of water per 94 lb of cement.

Cementitious material must comply with section 90-1.02B, except SCMs are not required.

Water must comply with section 90-1.02D. If municipally supplied potable water is used, the testing specified in section 90-1.02D is waived.

Admixtures must comply with section 90, except admixtures must not contain chloride ions in excess of 0.25 percent by weight.

Use aggregate to extend the grout as follows:

1. Aggregate must consist of at least 70 percent fine aggregate and approximately 30 percent pea gravel, by weight.
2. Fine aggregate must comply with section 90-1.02C(3).
3. Size of pea gravel must be such that 100 percent passes the 1/2-inch sieve, at least 85 percent passes the 3/8-inch sieve, and not more than 5 percent passes the no. 8 sieve.
4. Minimum cementitious material content of the grout must not be less than 845 lb/cu yd of grout.

Mix the grout as follows:

1. Add water to the mixer followed by cementitious material, aggregates, and any admixtures.
2. Mix the grout with mechanical mixing equipment that produces a uniform and thoroughly mixed grout.
3. Agitate the grout continuously until the grout is pumped.
4. Do not add water after initial mixing.

Replace section 49-3.02B(8) with:

01-20-12

49-3.02B(8) Spacers

Spacers must comply with section 52-1.03D, except you may use plastic spacers.

Plastic spacers must:

1. Comply with sections 3.4 and 3.5 of the Concrete Reinforcing Steel Institute's *Manual of Standard Practice*
2. Have at least 25 percent of their gross plane area perforated to compensate for the difference in the coefficient of thermal expansion between the plastic and concrete
3. Be of commercial quality

Add between the 1st and 2nd paragraphs of section 49-3.02C(2):

07-19-13

For CIDH concrete piles with a pile cap, the horizontal tolerance at the center of each pile at pile cut-off is the larger of 1/24 of the pile diameter or 3 inches. The horizontal tolerance for the center-to-center spacing of 2 adjacent piles is the larger of 1/24 of the pile diameter or 3 inches.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Add between the 3rd and 4th paragraphs of section 49-3.02C(2):

07-18-14

If drilling slurry is used during excavation, maintain the slurry level at least 10 feet above the piezometric head.

Add to section 49-3.02C(4):

01-20-12

Unless otherwise shown, the bar reinforcing steel cage must have at least 3 inches of clear cover measured from the outside of the cage to the sides of the hole or casing.

Place spacers at least 5 inches clear from any inspection tubes.

Place plastic spacers around the circumference of the cage and at intervals along the length of the cage, as recommended by the manufacturer.

07-19-13

For a single CIDH concrete pile supporting a column:

1. If the pile and the column share the same reinforcing cage diameter, this cage must be accurately placed as shown
2. If the pile reinforcing cage is larger than the column cage and the concrete is placed under dry conditions, maintain a clear horizontal distance of at least 3.5 inches between the two cages
3. If the pile reinforcing cage is larger than the column cage and the concrete is placed under slurry, maintain a clear horizontal distance of at least 5 inches between the two cages

Replace section 49-3.02C(6) with:

07-19-13

49-3.02C(6) Construction Joint

Section 49-3.02C(6) applies to CIDH concrete piles where a construction joint is shown.

If a permanent steel casing is not shown, you must furnish and install a permanent casing. The permanent casing must:

1. Be watertight and of sufficient strength to prevent damage and to withstand the loads from installation procedures, drilling and tooling equipment, lateral concrete pressures, and earth pressures.
2. Extend at least 5 feet below the construction joint. If placing casing into rock, the casing must extend at least 2 feet below the construction joint.
3. Not extend above the top of the drilled hole or final grade whichever is lower.
4. Not increase the diameter of the CIDH concrete pile more than 2 feet.
5. Be installed by impact or vibratory hammers, oscillators, rotators, or by placing in a drilled hole. Casings placed in a drilled hole must comply with section 49-3.02C(5).

Section 49-2.01A(4)(b) does not apply to permanent casings specified in this section.

Replace item 3 in the list in the 11th paragraph of section 49-3.02C(8) with:

07-18-14

3. Maintain the slurry level at least 10 feet above the piezometric head

Add to section 49-4.01:

07-19-13

Steel soldier piles must comply with section 49-2.03.

07-19-13

50 PRESTRESSING CONCRETE

Replace "sets" at each occurrence in the 2nd and 3rd paragraphs of section 50-1.01C(3) with:

04-19-13

copies

07-19-13

Include a grouting plan with your shop drawing submittal. The grouting plan must include:

1. Detailed grouting procedures
2. Type, quantity, and brand of materials to be used
3. Type of equipment to be used including provisions for backup equipment
4. Types and locations of grout inlets, outlets, and vents
5. Methods to clean ducts before grouting
6. Methods to control the rate of flow within ducts
7. Theoretical grout volume calculations for each duct
8. Duct repair procedures due to an air pressure test failure
9. Mixing and pumping procedures
10. Direction of grouting
11. Sequence of use of inlets and outlets
12. Procedure for handling blockages
13. Proposed forms for recording grouting information
14. Procedure for secondary grouting
15. Names of people who will perform grouting activities including their relevant experience and certifications

07-19-13

50-1.01C(5) Grout

Submit a daily grouting report for each day grouting is performed. Submit the report within 3 days after grouting. The report must be signed by the technician supervising the grouting activity. The report must include:

1. Identification of each tendon
2. Date grouting occurred
3. Time the grouting started and ended
4. Date of placing the prestressing steel in the ducts
5. Date of stressing
6. Type of grout used
7. Injection end and applied grouting pressure
8. Actual and theoretical quantity of grout used to fill duct
9. Ratio of actual to theoretical grout quantity
10. Records of air, grout, and structure surface temperatures during grouting.
11. Summary of tests performed and results, except submit compressive strength and chloride ion test results within 48 hours of test completion
12. Names of personnel performing the grouting activity

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

13. Summary of problems encountered and corrective actions taken
14. Summary of void investigations and repairs made

Replace the introductory clause in the 1st paragraph of section 50-1.01C(4) with:

07-19-13

Submit test samples for the materials shown in the following table to be used in the work:

Add between "the" and "test samples" in the 1st paragraph of section 50-1.01D(2):

07-19-13

prestressing steel

Replace the 3rd paragraph of section 50-1.01D(2) with:

10-19-12

The Department may verify the prestressing force using the Department's load cells.

Replace the 3rd paragraph in section 50-1.01D(3) with:

07-19-13

Each pressure gage must be fully functional and have an accurately reading, clearly visible dial or display. The dial must be at least 6 inches in diameter and graduated in 100 psi increments or less.

Add between the 5th and 6th paragraphs of section 50-1.01D(3):

07-19-13

Each jack and its gages must be calibrated as a unit.

Replace the 6th paragraph in section 50-1.01D(3) with:

07-19-13

Each jack used to tension prestressing steel permanently anchored at 25 percent or more of its specified minimum ultimate tensile strength must be calibrated by METS within 1 year of use and after each repair. You must:

1. Schedule the calibration of the jacking equipment with METS
2. Mechanically calibrate the gages with a dead weight tester or other authorized means before calibration of the jacking equipment by METS
3. Verify that the jack and supporting systems are complete, with proper components, and are in good operating condition
4. Provide labor, equipment, and material to (1) install and support the jacking and calibration equipment and (2) remove the equipment after the calibration is complete
5. Plot the calibration results

Each jack used to tension prestressing steel permanently anchored at less than 25 percent of its specified minimum ultimate tensile strength must be calibrated by an authorized laboratory within 6 months of use and after each repair.

Add to section 50-1.01D:

07-19-13

50-1.01D(4) Pressure Testing Ducts

For post-tensioned concrete bridges, pressure test each duct with compressed air after stressing. To pressure test the ducts:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

1. Seal all inlets, outlets, and grout caps.
2. Open all inlets and outlets on adjacent ducts.
3. Attach an air compressor to an inlet at 1 end of the duct. The attachment must include a valve that separates the duct from the air source.
4. Attach a pressure gage to the inlet at the end of the duct.
5. Pressurize the duct to 50 psi.
6. Lock-off the air source.
7. Record the pressure loss after 1 minute.
8. If there is a pressure loss exceeding 25 psi, repair the leaks with authorized methods and retest.

Compressed air used to clear and test the ducts must be clean, dry, and free of oil or contaminants.

50-1.01D(5) Duct Demonstration of Post-Tensioned Members

Before placing forms for deck slabs of box girder bridges, demonstrate that any prestressing steel placed in the ducts is free and unbonded. If no prestressing steel is in the ducts, demonstrate that the ducts are unobstructed.

If prestressing steel is installed after the concrete is placed, demonstrate that the ducts are free of water and debris immediately before installing the steel.

Before post-tensioning any member, demonstrate that the prestressing steel is free and unbonded in the duct.

The Engineer must witness all demonstrations.

50-1.01D(6) Void Investigation

In the presence of the Engineer, investigate the ducts for voids between 24 hours and 72 hours after grouting completion. As a minimum, inspect the inlet and outlet ports at the anchorages and at high points in the tendons for voids after removal. Completely fill any voids found with secondary grout.

50-1.01D(7) Personnel Qualifications

Perform post-tensioning field activities, including grouting, under the direct supervision of a technician certified as a level 2 Bonded PT Field Specialist through the Post-Tensioning Institute. Grouting activities may be performed under the direct supervision of a technician certified as a Grouting Technician through the American Segmental Bridge Institute.

Replace the 6th paragraph of section 50-1.02B with:

Package the prestressing steel in containers or shipping forms that protect the steel against physical damage and corrosion during shipping and storage.

07-19-13

Replace the 13th paragraph of section 50-1.02B with:

Prestressing steel is rejected if surface rust either:

1. Cannot be removed by hand-cleaning with a fine steel wool pad
2. Leaves pits visible to the unaided eye after cleaning

07-19-13

Replace the 4th paragraph of section 50-1.02C with:

Admixtures must comply with section 90, except admixtures must not contain chloride ions in excess of 0.25 percent by weight.

07-19-13

Delete the 5th paragraphs of section 50-1.02C.

07-19-13

Add to section 50-1.02C:

07-19-13

Secondary grout must:

1. Comply with ASTM C 1107
2. Not have a deleterious effect on the steel, concrete, or bond strength of the steel to concrete

Replace item 9 including items 9.1 and 9.2 in the list in the 1st paragraph of section 50-1.02D with:

07-19-13

9. Have an inside cross-sectional area of at least 2.5 times the net area of the prestressing steel for multistrand tendons

Replace "3/8" in item 10 in the list in the 1st paragraph of section 50-1.02D with:

07-19-13

1/2

Delete the 2nd sentences in the 1st paragraph of section 50-1.02E.

07-19-13

Replace section 50-1.02F with:

07-19-13

50-1.02F Permanent Grout Caps

Permanent grout caps for anchorage systems of post-tensioned tendons must:

1. Be glass-fiber-reinforced plastic with antioxidant additives. The environmental stress-cracking failure time must be at least 192 hours under ASTM D 1693, Condition C.
2. Completely cover and seal the wedge plate or anchorage head and all exposed metal parts of the anchorage against the bearing plate using neoprene O-ring seals.
3. Have a grout vent at the top of the cap.
4. Be bolted to the anchorage with stainless steel complying with ASTM F 593, alloy 316. All fasteners, including nuts and washers, must be alloy 316.
5. Be pressure rated at or above 150 psi.

Add to section 50-1.02:

09-16-11

50-1.02G Sheathing

Sheathing for debonding prestressing strand must:

1. Be split or un-split flexible polymer plastic tubing
2. Have a minimum wall thickness of 0.025 inch
3. Have an inside diameter exceeding the maximum outside diameter of the strand by 0.025 to 0.14 inch

Split sheathing must overlap at least 3/8 inch.

Waterproofing tape used to seal the ends of the sheathing must be flexible adhesive tape.

The sheathing and waterproof tape must not react with the concrete, coating, or steel.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Replace the 2nd paragraph of section 50-1.03A(3) with:

After installation, cover the duct ends and vents to prevent water or debris from entering.

07-19-13

Add to section 50-1.03A(3):

Support ducts vertically and horizontally during concrete placement at a spacing of at most 4 feet.

07-19-13

Delete "at least" in the 1st paragraph of section 50-1.03B(1).

07-19-13

Add to section 50-1.03B(1):

After seating, the maximum tensile stress in the prestressing steel must not exceed 75 percent of the minimum ultimate tensile strength shown.

01-20-12

Delete the 1st through 4th paragraphs of section 50-1.03B(2)(a).

07-19-13

Replace "temporary tensile strength" in the 7th paragraph of section 50-1.03B(2)(a) with:

temporary tensile stress

07-19-13

Add to section 50-1.03B(2)(a):

If prestressing strand is installed using the push-through method, use guide caps at the front end of each strand to protect the duct from damage.

07-19-13

Add to the list in the 2nd paragraph of section 50-1.03B(2)(c):

3. Be equipped with permanent grout caps

07-19-13

Replace section 50-1.03B(2)(d) with:

07-19-13

50-1.03B(2)(d) Bonding and Grouting

50-1.03B(2)(d)(i) General

Bond the post-tensioned prestressing steel to the concrete by completely filling the entire void space between the duct and the prestressing steel with grout.

Ducts, vents, and grout caps must be clean and free from water and deleterious materials that would impair bonding of the grout or interfere with grouting procedures. Compressed air used for cleaning must be clean, dry, and free of oil or contaminants.

Prevent the leakage of grout through the anchorage assembly by positive mechanical means.

Before starting daily grouting activities, drain the pump system to remove any water from the piping system.

Break down and thoroughly clean the pump and piping system after each grouting session.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

After completing duct grouting activities:

1. Abrasive blast clean and expose the aggregate of concrete surfaces where concrete is to be placed to cover and encase the anchorage assemblies
2. Remove the ends of vents 1 inch below the roadway surface

50-1.03B(2)(d)(ii) Mixing and Proportioning

Proportion solids by weight to an accuracy of 2 percent.

Proportion liquids by weight or volume to an accuracy of 1 percent.

Mix the grout as follows:

1. Add water to the mixer followed by the other ingredients.
2. Mix the grout with mechanical mixing equipment that produces a uniform and thoroughly mixed grout without an excessive temperature increase or loss of properties of the mixture.
3. Do not exceed 5 gal of water per 94 lb of cement or the quantity of water in the manufacturer's instructions, whichever is less.
4. Agitate the grout continuously until the grout is pumped. Do not add water after the initial mixing.

50-1.03B(2)(d)(iii) Placing

Pump grout into the duct within 30 minutes of the 1st addition of the mix components.

Inject grout from the lowest point of the duct in an uphill direction in 1 continuous operation maintaining a one-way flow of the grout. You may inject from the lowest anchorage if complete filling is ensured.

Before injecting grout, open all vents.

Continuously discharge grout from the vent to be closed. Do not close any vent until free water, visible slugs of grout, and entrapped air have been ejected and the consistency of the grout flowing from the vent is equivalent to the injected grout.

Pump the grout at a rate of 16 to 50 feet of duct per minute.

Conduct grouting at a pressure range of 10 to 50 psi measured at the grout inlet. Do not exceed maximum pumping pressure of 150 psi at the grout inlet.

As grout is injected, close the vents in sequence in the direction of flow starting with the closest vent.

Before closing the final vent at the grout cap, discharge at least 2 gal of grout into a clean receptacle.

Bleed all high point vents.

Lock a pressure of 5 psi into the duct by closing the grout inlet valve.

50-1.03B(2)(d)(iv) Weather Conditions

If hot weather conditions will contribute to quick stiffening of the grout, cool the grout by authorized methods as necessary to prevent blockages during pumping activities.

If freezing weather conditions are anticipated during and following the placement of grout, provide adequate means to protect the grout in the ducts from damage by freezing.

50-1.03B(2)(d)(v) Curing

During grouting and for a period of 24 hours after grouting, eliminate vibration from contractor controlled sources within 100 feet of the span in which grouting is taking place, including from moving vehicles, jackhammers, large compressors or generators, pile driving activities, soil compaction, and falsework removal. Do not vary loads on the span.

For PC concrete members, do not move or disturb the members after grouting for 24 hours. If ambient temperature drops below 50 degrees F, do not move or disturb the members for 48 hours.

Do not remove or open valves until grout has cured for at least 24 hours.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

50-1.03B(2)(d)(vi) Grouting Equipment

Grouting equipment must be:

1. Capable of grouting at a pressure of at least 100 psi
2. Equipped with a pressure gage having a full-scale reading of not more than 300 psi
3. Able to continuously grout the longest tendon on the project in less than 20 minutes

Grout must pass through a screen with clear openings of 1/16 inch or less before entering the pump.

Fit grout injection pipes, ejection pipes, and vents with positive mechanical shutoff valves capable of withstanding the pumping pressures. Do not remove or open valves until the grout has set. If authorized, you may substitute mechanical valves with suitable alternatives after demonstrating their effectiveness.

Provide a standby grout mixer and pump.

50-1.03B(2)(d)(vii) Grout Storage

Store grout in a dry environment.

50-1.03B(2)(d)(viii) Blockages

If the grouting pressure reaches 150 psi, close the inlet and pump the grout at the next vent that has just been or is ready to be closed as long as a one-way flow is maintained. Do not pump grout into a succeeding outlet from which grout has not yet flowed.

When complete grouting of the tendon cannot be achieved by the steps specified, stop the grouting operation.

50-1.03B(2)(d)(ix) Secondary Grouting

Perform secondary grouting by vacuum grouting under the direct supervision of a person who has been trained and has experience in the use of vacuum grouting equipment and procedures.

The vacuum grouting process must be able to determine the size of the void and measure the volume of grout filling the void.

Vacuum grouting equipment must consist of:

1. Volumeter for the measurement of void volume
2. Vacuum pump with capacity of at least 10 cfm and equipped with a flow meter capable of measuring the amount of grout being injected

50-1.03B(2)(d)(x) Vertical Tendon Grouting

Provide a standpipe at the upper end of the tendon to collect bleed water and allow it to be removed from the grout. The standpipe must be large enough to prevent the grout elevation from dropping below the highest point of the upper anchorage device. If the grout level drops to the highest point of the upper anchorage device, immediately add grout to the standpipe.

Remove the standpipe after the grout has hardened.

For vertical tendons in excess of 100 feet high or if grouting pressure exceeds 145 psi, inject grout at a higher vent from which grout has already flowed to maintain one-way flow.

50-1.03B(2)(d)(xi) Vents

Place vents at the following locations:

1. Anchorage areas at both ends of the tendon
2. Each high point
3. 4 feet upstream and downstream of each crest of a high point
4. Each change in the cross section of duct

50-1.03B(2)(e) Debonding Prestressing Strands

Thoroughly seal the ends with waterproof tape to prevent the intrusion of water or cement paste before placing the concrete.

Replace the paragraphs of section 51-1.01A with:

copies

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Replace the heading of section 51-1.01D(4) with:

Testing Concrete Surfaces

04-19-13

Add to section 51-1.01D(4)(a):

The Engineer tests POC deck surfaces for smoothness and crack intensity.

04-19-13

Add to the list in the 1st paragraph of section 51-1.01D(4)(b):

3. Completed deck surfaces, including ramps and landings of POCs

04-19-13

Replace the 4th paragraph in section 51-1.01D(4)(b) with:

Except for POCs, surface smoothness is tested using a bridge profilograph under California Test 547. Two profiles are obtained in each lane approximately 3 feet from the lane lines and 1 profile is obtained in each shoulder approximately 3 feet from the curb or rail face. Profiles are taken parallel to the direction of traffic.

04-19-13

Add between the 5th and 6th paragraphs of section 51-1.01D(4)(b):

POC deck surfaces must comply with the following smoothness requirements:

04-19-13

1. Surfaces between grade changes must not vary more than 0.02 foot from the lower edge of a 12-foot-long straightedge placed parallel to the centerline of the POC
2. Surface must not vary more than 0.01 foot from the lower edge of a 6-foot-long straightedge placed perpendicular to the centerline of the POC

Add to section 51-1.01D(4)(d):

The Engineer measures crack intensity of POC deck surfaces after curing, before prestressing, and before falsework release. Clean the surface for the Engineer to measure surface crack intensity.

04-19-13

In any 100 sq ft portion of a new POC deck surface, if there are more than 10 feet of cracks having a width at any point of over 0.02 inch, treat the deck with methacrylate resin under section 15-5.05. Treat the entire deck width between the curbs to 5 feet beyond where the furthest continuous crack emanating from the 100 sq ft section is 0.02 inch wide. Treat the deck surface before grinding.

Replace the 2nd paragraph of section 51-1.02B with:

Except for minor structures, the minimum required 28-day compressive strength for concrete in structures or portions of structures is the compressive strength described or 3,600 psi, whichever is greater.

07-19-13

Add to section 51-1.03C(2)(c)(i):

Permanent steel deck forms are only allowed where shown or if specified as an option in the special provisions.

04-20-12

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX
Replace the 3rd paragraph of section 51-1.03C(2)(c)(ii) with:

04-20-12

Compute the physical design properties under AISI's *North American Specification for the Design of Cold-Formed Steel Structural Members*.

Replace the 8th paragraph of section 51-1.03D(1) with:

10-19-12

Except for concrete placed as pipe culvert headwalls and endwalls, slope paving and aprons, and concrete placed under water, consolidate concrete using high-frequency internal vibrators within 15 minutes of placing concrete in the forms. Do not attach vibrators to or hold them against forms or reinforcing steel. Do not displace reinforcement, ducts, or prestressing steel during vibrating.

Add to section 51-1.03E(5):

08-05-11

Drill the holes without damaging the adjacent concrete. If reinforcement is encountered during drilling before the specified depth is attained, notify the Engineer. Unless coring through the reinforcement is authorized, drill a new hole adjacent to the rejected hole to the depth shown.

Add to section 51-1.03F(5)(a):

04-19-13

For approach slabs, sleeper slabs, and other roadway surfaces of concrete structures, texture the roadway surface as specified for bridge deck surfaces in section 51-1.03F(5)(b).

Replace "Reserved" in section 51-1.03F(5)(b) with:

51-1.03F(5)(b)(i) General

07-18-14

Except for bridge widenings, texture roadway surfaces of bridge decks, approach slabs, and sleeper slabs, and other roadway surfaces of concrete structures longitudinally by grinding and grooving or by longitudinal tining.

For bridge widenings, texture the roadway surfaces longitudinally by longitudinal tining.

In freeze-thaw areas, do not texture PCC surfaces of bridge decks.

51-1.03F(5)(b)(ii) Grinding and Grooving

04-20-12

When texturing the deck surface by grinding and grooving, place a 1/4 inch of sacrificial concrete cover on the bridge deck above the finished grade shown. Place items to be embedded in the concrete based on the final profile grade elevations shown. Construct joint seals after completing the grinding and grooving.

Before grinding and grooving, deck surfaces must comply with the smoothness and deck crack treatment requirements.

Grind and groove the deck surface as follows:

1. Grind the surface to within 18 inches of the toe of the barrier under section 42-3. Grinding must not reduce the concrete cover on reinforcing steel to less than 1-3/4 inches.
2. Groove the ground surfaces longitudinally under section 42-2. The grooves must be parallel to the centerline.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

51-1.03F(5)(b)(iii) Longitudinal Tining

When texturing the deck surface by longitudinal tining, perform initial texturing with a burlap drag or broom device that produces striations parallel to the centerline. Perform final texturing with spring steel tines that produce grooves parallel with the centerline.

The tines must:

1. Be rectangular in cross section
2. Be from 3/32 to 1/8 inch wide on 3/4-inch centers
3. Have enough length, thickness, and resilience to form grooves approximately 3/16 inch deep

Construct grooves to within 6 inches of the layout line of the concrete barrier toe. Grooves must be from 1/8 to 3/16 inch deep and 3/16 inch wide after concrete has hardened.

For irregular areas and areas inaccessible to the grooving machine, you may hand construct grooves. Hand-constructed grooves must comply with the specifications for machine-constructed grooves.

Tining must not cause tearing of the deck surface or visible separation of coarse aggregate at the surface.

Add to section 51-1.03F:

04-19-13

51-1.03F(6) Finishing Pedestrian Overcrossing Surfaces

Construct deck surfaces, including ramps and landings of POCs to the grade and cross section shown. Surfaces must comply with the specified smoothness, surface texture, and surface crack requirements.

The Engineer sets deck elevation control points for your use in establishing the grade and cross section of the deck surface. The grade established by the deck elevation control points includes all camber allowances. Except for landings, elevation control points include the beginning and end of the ramp and will not be closer together than approximately 8 feet longitudinally and 4 feet transversely to the POC centerline. Landing elevation control points are at the beginning and the end of the landing.

Broom finish the deck surfaces of POCs. Apply the broom finish perpendicular to the path of travel. You may apply water mist to the surface immediately before brooming.

Clean any discolored concrete by abrasive blast cleaning or other authorized methods.

Replace the paragraphs of section 51-1.04 with:

10-19-12

If concrete involved in bridge work is not designated by type and is not otherwise paid for under a separate bid item, the concrete is paid for as structural concrete, bridge.

The payment quantity for structural concrete includes the volume in the concrete occupied by bar reinforcing steel, structural steel, prestressing steel materials, and piling.

The payment quantity for seal course concrete is the actual volume of seal course concrete placed except the payment quantity must not exceed the volume of concrete contained between vertical planes 1 foot outside the neat lines of the seal course shown. The Department does not adjust the unit price for an increase or decrease in the seal course concrete quantity.

Structural concrete for pier columns is measured as follows:

1. Horizontal limits are vertical planes at the neat lines of the pier column shown.
2. Bottom limit is the bottom of the foundation excavation in the completed work.
3. Upper limit is the top of the pier column concrete shown.

The payment quantity for drill and bond dowel is determined from the number and depths of the holes shown.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Replace section 51-2.01B(2) with:

51-2.01B(2) Reserved

04-19-13

Delete the 4th paragraph of section 51-2.01C.

04-19-13

Replace "SSPC-QP 3" in the 1st paragraph of section 51-2.02A(2) with:

AISC-420-10/SSPC-QP 3

10-19-12

Replace the 2nd and 3rd paragraphs of section 51-2.02B(3)(b) with:

04-20-12

Concrete saws for cutting grooves in the concrete must have diamond blades with a minimum thickness of 3/16 inch. Cut both sides of the groove simultaneously for a minimum 1st pass depth of 2 inches. The completed groove must have:

1. Top width within 1/8 inch of the width shown or ordered
2. Bottom width not varying from the top width by more than 1/16 inch for each 2 inches of depth
3. Uniform width and depth

Cutting grooves in existing decks includes cutting any conflicting reinforcing steel.

Replace "sets" in the 1st and 2nd paragraphs of section 51-2.02D(1)(c)(ii) with:

copies

04-19-13

Replace "set" in the 7th paragraph of section 51-2.02D(1)(c)(ii) with:

copy

04-19-13

Add to the 1st paragraph of section 51-2.02D(3):

POC deck surfaces must comply with section 51-1.03F(6) before placing and anchoring joint seal assemblies.

04-19-13

Replace "sets" in the 2nd paragraph of section 51-2.02E(1)(c) with:

copies

04-19-13

Replace "set" in the 6th paragraph of section 51-2.02E(1)(c) with:

copy

04-19-13

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Replace the 2nd paragraph of section 51-2.02E(1)(e) with:

08-05-11

Except for components in contact with the tires, the design loading must be the AASHTO LRFD Bridge Design Specifications Design Truck with 100 percent dynamic load allowance. Each component in contact with the tires must support a minimum of 80 percent of the AASHTO LRFD Bridge Design Specifications Design Truck with 100 percent dynamic load allowance. The tire contact area must be 10 inches measured normal to the longitudinal assembly axis by 20 inches wide. The assembly must provide a smooth-riding joint without slapping of components or tire rumble.

Replace "sets" in the 1st and 2nd paragraphs of section 51-2.02F(1)(c) with:

04-19-13

copies

Add between the 1st and 2nd paragraphs of section 51-4.01A:

10-19-12

Prestressing concrete members must comply with section 50.

Delete the 2nd paragraph of section 51-4.01A.

04-20-12

Replace the 3rd paragraph of section 51-4.01C(2) with:

04-20-12

For segmental or spliced-girder construction, shop drawings must include the following additional information:

1. Details showing construction joints or closure joints
2. Arrangement of bar reinforcing steel, prestressing tendons, and pressure-grouting pipe
3. Materials and methods for making closures
4. Construction joint keys and surface treatment
5. Other requested information

For segmental girder construction, shop drawings must include concrete form and casting details.

Replace "sets" in the 1st paragraph of section 51-4.01C(3) with:

04-19-13

copies

Delete the 1st and 2nd paragraphs of section 51-4.02A.

10-19-12

Replace the 3rd paragraph of section 51-4.02B(2) with:

04-20-12

For segmental or spliced-girder construction, materials for construction joints or closure joints at exterior girders must match the color and texture of the adjoining concrete.

Add to section 51-4.02B(2):

04-20-12

At spliced-girder closure joints:

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CTA Contract No. XXX

1. If shear keys are not shown, the vertical surfaces of the girder segment ends must be given a coarse texture as specified for the top surface of PC members.
2. Post-tensioning ducts must extend out of the vertical surface of the girder segment closure end sufficiently to facilitate splicing of the duct.

For spliced girders, pretension strand extending from the closure end of the girder segment to be embedded in the closure joint must be free of mortar, oil, dirt, excessive mill scale and scabby rust, and other coatings that would destroy or reduce the bond.

Add to section 51-4.03B:

04-20-12

The specifications for prestressing force distribution and sequencing of stressing in the post-tensioning activity in 50-1.03B(2)(a) do not apply if post-tensioning of spliced girders before starting deck construction is described. The composite deck-girder structure must be post-tensioned in a subsequent stage.

Temporary spliced-girder supports must comply with the specifications for falsework in section 48-2.

Before post-tensioning of spliced girders, remove the forms at CIP concrete closures and intermediate diaphragms to allow inspection for concrete consolidation.

Add to section 51-5.01A:

07-19-13

Structure excavation and backfill must comply with section 19-3.

Treated permeable base must comply with section 29.

Replace the paragraph in section 51-5.02G with:

04-18-14

HMA for a temporary roadway structural section must comply with the specifications for minor HMA in section 39.

Delete the 1st paragraph of section 51-5.03B(3).

07-19-13

Delete the 2nd paragraph of section 51-5.03D(1).

07-19-13

Add between the 1st and 2nd paragraphs of section 51-7.01A:

10-19-12

Minor structures include:

1. Pipe culvert headwalls and endwalls for a pipe with a diameter less than 5 feet
2. Drainage inlets
3. Other structures described as minor structures

Delete the 4th paragraph of section 51-7.01A.

10-19-12

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX
Add to section 52-5.01D:

07-18-14

52-5.01D(4) Quality Assurance Testing

Secure, identify, and transport QA headed bar reinforcement test samples to METS as specified for splice test samples in section 52-5.01D(3)(b).

The Department tests headed bar reinforcement as specified for QC testing in section 52-5.01D(3)(b).

The Department will notify you of the QA test results for each bundle of 4 test samples of splices within 3 business days after METS receives the bundle unless more than 1 bundle is received on the same day, in which case allow 2 additional business days for each additional bundle received.

Replace the 6th paragraph of section 52-6.01D(4)(a) with:

01-18-13

Before performing service splice or ultimate butt splice testing, perform total slip testing on the service splice or ultimate butt splice test samples under section 52-6.01D(4)(b).

Replace section 52-6.02D with:

10-21-11

52-6.02D Ultimate Butt Splice Requirements

When tested under California Test 670, ultimate butt splice test samples must demonstrate necking as either of the following:

1. For "Necking (Option I)," the test sample must rupture in the reinforcing bar outside of the affected zone and show visible necking.
2. For "Necking (Option II)," the largest measured strain must be at least:
 - 2.1. Six percent for no. 11 and larger bars
 - 2.2. Nine percent for no. 10 and smaller bars

Replace the 2nd and 3rd paragraphs of section 52-6.03B with:

01-18-13

Do not splice the following by lapping:

1. No. 14 bars
2. No. 18 bars
3. Hoops
4. Reinforcing bars where you cannot provide a minimum clear distance of 2 inches between the splice and the nearest adjacent bar

AA

53 SHOTCRETE

07-19-13

Replace the 2nd and 3rd paragraphs of section 53-2.01D(1) with:

07-19-13

Obtain and test all cores for compressive strength under ASTM C 42/C 42M at an authorized laboratory. The compressive strength is the average strength of the 3 cores.

Shotcrete must have a minimum compressive strength of 3,600 psi, unless otherwise described. The shotcrete must attain the minimum compressive strength at 28 days, except 42 days are allowed for shotcrete with a described minimum compressive strength greater than 3,600 psi.

Revised Standard Specifications

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Replace the list in the 2nd paragraph of section 55-1.01C(2) with:

07-19-13

1. Sequence of shop and field assembly and erection. For continuous members, include proposed steel erection procedures with calculations that show girder capacity and geometry will be correct.
2. Welding sequences and procedures.
3. Layout drawing of the entire structure with locations of butt welded splices.
4. Locations of temporary supports and welds.
5. Vertical alignment of girders at each stage of erection.
6. Match-marking diagrams.
7. Details for connections not shown or dimensioned on the plans.
8. Details of allowed options incorporated in the work.
9. Direction of rolling of plates where orientation is specified.
10. Distortion control plan.
11. Dimensional tolerances. Include measures for controlling accumulated error to meet overall tolerances.
12. Material specification and grade listed on the bill of materials.
13. Identification of tension members and fracture critical members.
14. Proposed deviations from plans, specifications, or previously submitted shop drawings.
15. Contract plan sheet references for details.

Replace items 2 and 3 in the list in the 1st paragraph of section 55-1.01C(3) with:

07-19-13

2. Tension flanges and webs of horizontally curved girders
3. Hanger plates

Replace the 2nd paragraph of section 55-1.01C(3) with:

07-19-13

Furnish plates, shapes, or bars with extra length to provide for removal of check samples.

Delete the 1st and 2nd sentences in the 3rd paragraph of section 55-1.01C(3).

07-19-13

Replace the 4th paragraph of section 55-1.01C(3) with:

07-19-13

Remove material for test samples in the Engineer's presence. Test samples for plates over 24 inches wide must be 10 by 12 inches with the long dimension transverse to the direction of rolling. Test samples for other products must be 12 inches long taken in the direction of rolling with a width equal to the product width.

Replace the 1st sentence of the 6th paragraph in section 55-1.01C(3) with:

07-19-13

Results of check testing are delivered to you within 20 days of receipt of samples at METS.

Delete the 2nd paragraph of section 55-1.01D(1).

07-19-13

Replace the 2nd sentence of the 4th paragraph in section 55-1.01D(1) with:

07-19-13

The calibration must be performed by an authorized repair and calibration center approved by the tool manufacturer.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Add to section 55-1.01D(1):

07-19-13

For bolts installed as snug tight, rotational capacity testing and installation tension testing are not required.

In addition to NDT requirements in AWS D1.5, ultrasonically test 25 percent of all main member tension butt welds in material over 1/2 inch thick.

Perform NDT on 100 percent of each pin as follows:

1. MT under ASTM A 788, S 18, with no linear indication allowed exceeding 3 mm
2. UT under ASTM A 788, S 20, level S and level DA in two perpendicular directions

The Engineer determines the location of all NDT testing for welding.

Delete the 2nd paragraph of section 55-1.01D(3)(a).

07-19-13

Replace section 55-1.01D(4)(b) with:

07-19-13

Perform rotational capacity testing on each rotational capacity lot under section 55-1.01D(3)(b) at the job site before installation.

Replace the 1st sentence of the 2nd paragraph in section 55-1.01D(4)(c) with:

07-19-13

Test 3 representative HS fastener assemblies under section 8 of *Specification for Structural Joints Using High-Strength Bolts* of the RCSC.

Replace the 1st paragraph in section 55-1.01D(4)(d) with:

07-19-13

Perform fastener tension testing to verify minimum tension in HS bolted connections no later than 48 hours after all fasteners in a connection have been tensioned.

Replace the 3rd paragraph in section 55-1.01D(4)(d) with:

07-19-13

Test 10 percent of each type of fastener assembly in each HS bolted connection for minimum tension using the procedure described in section 10 of *Specification for Structural Joints Using High-Strength Bolts* of the RCSC. Check at least 2 assemblies per connection. For short bolts, determine the inspection torque using steps 1 through 7 of "Arbitration of Disputes, Torque Method-Short Bolts" in *Structural Bolting Handbook* of the Steel Structures Technology Center.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Replace the 1st table in the 1st paragraph of section 55-1.02A(1) with:

07-19-13

Structural Steel

Material	Specification
Carbon steel	ASTM A 709/A 709M, Grade 36 or {ASTM A36/A36M} ^a
HS low alloy columbium vanadium steel	ASTM A 709/A 709M, Grade 50 or {ASTM A 992/A 992M or ASTM A 572/A 572M, Grade 50} ^a
HS low alloy structural steel	ASTM A 709/A 709M, Grade 50W or Grade HPS 50W, or {ASTM A 588/A 588M} ^a
HS low alloy structural steel plate	ASTM A 709/A 709M, Grade HPS 70W
High-yield strength quenched and tempered alloy steel plate suitable for welding	ASTM A 709/A 709M, Grade 100, Grade 100W, or Grade HPS 100W, or {ASTM A 514/A 514M} ^a

^aGrades you may substitute for the equivalent ASTM A 709 steel subject to the modifications and additions specified and to the requirements of ASTM A 709.

Replace the 2nd table in the 1st paragraph of section 55-1.02A(1) with:

07-19-13

Fasteners

Material	Specification
Steel fastener components for general applications:	
Bolts and studs	ASTM A 307
Anchor bolts	ASTM F 1554 ^a
HS bolts and studs	ASTM A 449, Type 1 ^a
HS threaded rods	ASTM A 449, Type 1 ^a
HS nonheaded anchor bolts	ASTM F 1554, Grade 105, Class 2A ^a
Nuts	ASTM A 563, including appendix X1 ^b
Washers	ASTM F 844
Hardened Washers	ASTM F 436, Type 1, including S1 supplementary requirements
Components of HS steel fastener assemblies for use in structural steel joints:	
Bolts	ASTM A 325, Type 1
Tension control bolts	ASTM F 1852, Type 1
Nuts	ASTM A 563, including appendix X1 ^b
Hardened washers	ASTM F 436, Type 1, Circular, including S1 supplementary requirements
Direct tension indicators	ASTM F 959, Type 325, zinc-coated

^aUse hardened washers.

^bZinc-coated nuts tightened beyond snug or wrench tight must be furnished with a dry lubricant complying with supplementary requirement S2 in ASTM A 563.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Replace the 3rd table in the 1st paragraph of section 55-1.02A(1) with:

07-19-13

Other Materials

Material	Specification
Carbon steel for forgings, pins, and rollers	ASTM A 668/A 668M, Class D
Alloy steel for forgings	ASTM A 668/A 668M, Class G
Pin nuts	ASTM A 709/A 709M or ASTM A 563, including appendix X1 ^a
Carbon-steel castings	ASTM A 27/A 27M, Grade 65-35, Class 1
Malleable iron castings	ASTM A 47/A 47M, Grade 32510
Gray iron castings	ASTM A 48, Class 30B
Carbon steel structural tubing	ASTM A 500/A 500M, Grade B, ASTM A 501, ASTM A 847/A 847M, or ASTM A 1085
Steel pipe ^b	ASTM A 53, Type E or S, Grade B; ASTM A 106, Grade B; or ASTM A 139, Grade B
Stud connectors	ASTM A 108

^aZinc-coated nuts tightened beyond snug or wrench tight must be furnished with a dry lubricant complying with supplementary requirement S2 in ASTM A 563.

^bHydrostatic testing will not apply.

Replace the table in the 1st paragraph in section 55-1.02A(2) with:

07-19-13

Material complying with ASTM A 709/A 709M	CVN impact value (ft-lb at temperature)
Grade 36	15 at 40 °F
Grade 50 ^a (Thickness up to 2 inches)	15 at 40 °F
Grade 50W ^a (Thickness up to 2 inches)	15 at 40 °F
Grade 50 ^a (Thickness over 2 inches up to 4 inches)	20 at 40 °F
Grade 50W ^a (Thickness over 2 inches up to 4 inches)	20 at 40 °F
Grade HPS 50W ^a (Thickness up to 4 inches)	20 at 10 °F
Grade HPS 70W (Thickness up to 4 inches)	25 at -10 °F
Grade 100 (Thickness of 2-1/2 inches or less)	25 at 0 °F
Grade 100W (Thickness over 2-1/2 inches up to 4 inches)	35 at 0 °F
Grade HPS 100W (Thickness of 2-1/2 inches or less)	25 at -30 °F
Grade HPS 100W (Thickness over 2-1/2 inches up to 4 inches)	35 at -30 °F

^aIf the material yield strength is more than 65,000 psi, reduce the temperature for the CVN impact value 15 degrees F for each increment of 10,000 psi above 65,000 psi.

Replace the 1st sentence of the 1st paragraph in section 55-1.02A(5) with:

07-19-13

Steel, gray iron, and malleable iron castings must have continuous fillets cast in place in reentrant angles.

Delete the 3rd and 4th sentences in the 2nd paragraph in section 55-1.02A(5).

07-19-13

Replace the 1st paragraph of section 55-1.02B(1) with:

Section 55-1.02B(1) applies to work performed at the source and at the job site.

07-19-13

Replace the 4th paragraph in section 55-1.02B(1) with:

Ends of girder stiffeners shown as tight-fit must bear on the girder flange with at least point bearing. Local clearances between the end of the stiffener and the girder flange must be at most 1/16 inch.

07-19-13

Replace the 1st sentence of the 5th paragraph in section 55-1.02B(1) with:

Fabricate floor beams, stringers, and girders having end connection angles to exact length back to back of connection angles.

07-19-13

Add to the 7th paragraph in section 55-1.02B(1):

Use low-stress stamps for fracture critical members and tension members.

07-19-13

Replace the 2nd sentence of the 9th paragraph in section 55-1.02B(1) with:

Slightly round edges and sharp corners, including edges marred, cut, or roughened during handling or erection.

07-19-13

Replace the 3rd paragraph in section 55-1.02B(2) with:

Instead of machining, you may heat straighten steel not in contact with other metal bearing surfaces if the above tolerances are met.

07-19-13

Replace item 2 in the list in the 1st paragraph of section 55-1.02B(3) with:

2. Radius of bend measured to the concave face must comply with *Manual of Steel Construction* of the AISC

07-19-13

Replace the 1st sentence of the 2nd paragraph in section 55-1.02B(3) with:

Plates to be bent to a smaller radius than specified in *Manual of Steel Construction* of the AISC must be bent hot.

07-19-13

Replace the introductory clause of the 2nd paragraph of section 55-1.02B(4) with:

Threads for pin ends and pin nuts 1-1/2 inches or more in diameter must comply with the following:

07-19-13

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Replace the 3rd paragraph in section 55-1.02B(5) with:

07-19-13

Holes for pins must be:

1. True to the diameter specified.
2. At right angles to the member axis.
3. Parallel with each other except for pins where nonparallel holes are required.
4. Smooth and straight with the final surface produced by a finishing cut.

Replace the 1st paragraph in section 55-1.02B(6)(c) with:

07-19-13

Bolted connections using HS fastener assemblies must comply with *Specification for Structural Joints Using High-Strength Bolts* of the RCSC.

Replace the 7th paragraph in section 55-1.02B(6)(c) with:

07-19-13

For all bolts, thread stickout after tensioning must be at least flush with the outer nut face. At least 3 full threads must be located within the grip of the connection.

Delete the 3rd paragraph in section 55-1.02B(7)(a).

07-19-13

Add to section 55-1.02B(7)(a):

07-19-13

For welds indicated to be subject to tensile forces that are to receive RT, grind smooth and flush on both sides of welds before testing.

For groove weld surface profiles that interfere with NDT procedures, grind welds smooth and blend with the adjacent material.

For fillet weld surface profiles that interfere with NDT procedures, grind welds and blend the toes smoothly with the adjacent base metal.

Add to section 55-1.02B(7):

07-19-13

55-1.02B(7)(c) Steel Pedestrian Bridges

Reserved

Replace the 1st paragraph in section 55-1.02B(9) with:

07-19-13

Prepare and paint contact surfaces of HS bolted connections before assembly. Thoroughly clean all other surfaces of metal in contact to bare metal before assembly. Remove all rust, mill scale, and foreign material.

Replace the 1st sentence of the 4th paragraph in section 55-1.02B(9) with:

07-19-13

Preassemble truss work in lengths of at least 3 abutting panels and adjust members for line and camber.

04-19-13

07-20-12

07-19-13

04-19-13

04-19-13

10-19-12

04-19-13

10-19-12

Revised Standard Specifications

Replace the 1st paragraph of section 58-2.01D(5)(a) with:

You must employ a special inspector and an authorized laboratory to perform Level 1 inspections and structural tests of masonry to verify the masonry construction complies with section 1704, "Special Inspections," and section 2105, "Quality Assurance," of the 2007 CBC.

10-19-12

04-19-13

copies

11-15-13

10-19-12

SSPC-SP 10/NACE no. 2

10-19-12

SSPC-SP 6/NACE no. 3

10-19-12

SSPC-CS 23.00/AWS C 2.23M/NACE no. 12

07-19-13

Specification for Structural Joints Using High-Strength Bolts

10-19-12

AISC-420-10/SSPC-QP 3 (Enclosed Shop)

07-19-13

Specification for Structural Joints Using High-Strength Bolts

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Replace the paragraphs in section 59-2.03A with:

10-19-12

Clean and paint all exposed structural steel and other metal surfaces.

You must provide enclosures for cleaning and painting structural steel. Cleaning and painting of new structural steel must be performed in an Enclosed Shop as defined in AISC-420-10/SSPC-QP 3. Maintain atmospheric conditions inside enclosures within specified limits.

Except for blast cleaning within closed buildings, perform blast cleaning and painting during daylight hours.

Add to section 59-2.03B:

07-19-13

59-2.03B(3) Containment Systems

59-2.03B(3)(a) General

Construct containment systems when disturbing existing paint systems during bridge rehabilitation.

The containment system must be one of the following:

1. Ventilated containment system
2. Vacuum-shrouded surface preparation equipment and drapes and ground covers
3. Equivalent containment system if authorized

The containment system must contain all water, resulting debris, and visible dust produced when the existing paint system is disturbed.

Properly maintain the containment system while work is in progress and do not change the containment system unless authorized.

Containment systems over railroad property must provide the minimum clearances as specified in section 5-1.20C for the passage of railroad traffic.

59-2.03B(3)(b) Ventilated Containment Systems

59-2.03B(3)(b)(i) General

If flexible framing is used, support and fasten it to (1) prevent the escape of abrasive and blast materials due to whipping from traffic or wind and (2) maintain clearances.

If the wind speed reaches 50 mph or greater, relieve the wind pressure on the containment system using an authorized method.

59-2.03B(3)(b)(ii) Design Criteria

Scaffolding or supports for the ventilated containment system must not extend below the vertical clearance level nor to the ground line at locations within the roadbed.

For truss-type bridges, all connections of the ventilated containment system to the existing structure must be made through the deck, girder, stringer, or floor beam system. No connections are allowed that will cause bending stresses in a truss member.

The ventilated containment system must comply with section 7-1.02K(6)(e).

The minimum total design load for the ventilated containment system must consist of the sum of the dead and live vertical loads.

Dead and live loads are as follows:

1. Dead load must consist of the actual load of the ventilated containment system
2. Live loads for bridges with only spot blast cleaning work must consist of:
 - 2.1. Uniform load of at least 25 psf applied over the supported area
 - 2.2. Moving concentrated load of 1000 lb to produce maximum stress in the main supporting elements of the ventilated containment system

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

3. Live loads for bridges with 100 percent blast cleaning to bare metal must consist of:
 - 3.1. Uniform load of at least 45 psf, which includes 20 psf of sand load, applied over the supported area
 - 3.2. Moving concentrated load of 1000 lb to produce maximum stress in the main supporting elements of the ventilated containment system

Assumed horizontal loads do not need to be included in the design of the ventilated containment system.

Maximum allowable stresses must comply with section 48-2.01D(3)(c).

59-2.03B(3)(b)(iii) Ventilation

The ventilation system in the ventilated containment system must be of the forced input airflow type with fans or blowers.

Negative air pressure must be employed within the ventilated containment system and will be verified by visual methods by observing the concave nature of the ventilated containment system while taking into account wind effects or by using smoke or other visible means to observe airflow. The input airflow must be properly balanced with the exhaust capacity throughout the range of operations.

The exhaust airflow of the ventilation system in the ventilated containment system must be forced into wet or dry dust collectors or bag houses.

Replace item 1 in the list in the 2nd paragraph of section 59-2.03C(1) with:

10-19-12

1. Apply a stripe coat of undercoat paint on all edges, corners, seams, crevices, interior angles, junctions of joining members, weld lines, and similar surface irregularities. The stripe coat must completely hide the surface being covered. If spot blast cleaning portions of the bridge, apply the stripe coat of undercoat paint before each undercoat and follow with the undercoat as soon as practical. If removing all existing paint from the bridge, apply the undercoat first as soon as practical and follow with the stripe coat of undercoat paint for each undercoat.

Replace the heading of section 59-2.03C(2) with:

04-19-13

Zinc Coating System

Add to section 59-2.03C(2)(a):

04-19-13

Coatings for new structural steel and connections between new and existing structural steel must comply with the requirements shown in the following table:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Zinc Coating System

Description	Coating	Dry film thickness (mils)
All new surfaces:		
Undercoat	Inorganic zinc primer, AASHTO M 300 Type I or II	4–8
Finish coat ^a	Exterior grade latex ^b , 2 coats	2 minimum each coat, 4–8 total
Total thickness, all coats		8–14
Connections to existing structural steel: ^c		
Undercoat	Inorganic zinc primer, AASHTO M 300 Type I or II	4–8
Finish coat ^a	Exterior grade latex ^b , 2 coats	2 minimum each coat, 4–8 total
Total thickness, all coats		8–14

^aIf no finish coats are described, a final coat of inorganic zinc primer is required.

^bExterior grade latex must comply with section 91-2.02 unless otherwise specified.

^cIncludes the following locations:

1. New and existing contact surfaces
2. Existing member surfaces under new HS bolt heads, nuts, or washers
3. Bare surfaces of existing steel after trimming, cutting, drilling, or reaming
4. Areas within a 4-inch radius from the point of application of heat for welding or flame cutting

Replace "*Specification for Structural Joints Using ASTM A325 or A 490 Bolts*" in the 7th paragraph of section 59-2.03C(2)(b)(i) with:

Specification for Structural Joints Using High-Strength Bolts

07-19-13

Add to section 59-2.03C:

59-2.03C(3) Moisture-Cured Polyurethane Coating System

Reserved

04-19-13

59-2.03C(4) State Specification Paint Waterborne Coating System

59-2.03C(4)(a) General

The State Specification PWB coating system for existing structural steel must comply with the requirements shown in the following table:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

State Specification PWB Coating System

Surface	Description	State Specification PWB Coating	Dry film thickness (mils)
Surfaces cleaned to bare metal ^a :	1st undercoat	145	2-3
	2nd undercoat	146	2-3
	1st finish coat	171	1.5-3
	2nd finish coat	172	1.5-3
	Total thickness, all coats	--	7-12
Existing painted surfaces to be topcoated:	Undercoat	146	2-3
	1st finish coat	171	1.5-3
	2nd finish coat	172	1.5-3
	Total thickness, new coats	--	5-9

^aIncludes locations of spot blast cleaning

59-2.03C(4)(b) Finish Coats

11-15-13

Reserved

Add to section 59-5.01:

04-19-13

Where specified, prepare and paint sign structures under sections 59-2 and 59-3.

Instead of submitting proof of the certification complying with SSPC-QP 1, you may submit documentation with the painting quality work plan showing compliance with the requirements in section 3 of SSPC-QP 1.

Instead of submitting proof of the certification complying with SSPC-QP 2, you may submit documentation with the painting quality work plan showing compliance with the requirements in sections 4.2 through 4.4 of SSPC-QP 2, Category A.

Instead of submitting proof of the certification complying with AISC-420-10/SSPC-QP 3 (Enclosed Shop), you may submit documentation with the painting quality work plan showing compliance with the requirements in sections 5 through 18 of AISC-420-10/SSPC-QP3.

Replace the paragraphs of section 59-5.03 with:

04-19-13

59-5.03A General

You may prepare and paint sign structures before or after erection. After erection, repair damaged paint to the satisfaction of the Engineer.

The total dry film thickness of finish coats on contact surfaces of galvanized HS bolted connections (1) must be from 1 to 4 mils and (2) may be applied in 1 application.

59-5.03B Undercoating of Ungalvanized Surfaces

Blast-cleaned surfaces must receive a single undercoat consisting of an inorganic zinc coating as specified in AASHTO M 300, Type I or Type II, except:

1. The first 2 sentences of section 5.6 do not apply
2. Section 5.6.1 does not apply

If you propose to use a coating that is not on the Authorized Material List, submit the required documentation specified in section 5.6 of AASHTO M 300. Allow 30 days for the Engineer's review.

59-5.03C Testing of Inorganic Zinc Coating

Perform adhesion and hardness testing no sooner than 72 hours after application of the single undercoat of inorganic zinc coating.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

59-5.03D Finish Coating

The exposed area of inorganic zinc coating must receive a minimum of 2 finish coats of exterior grade latex paint.

The 1st finish coat color must match no. 24558 of FED-STD-595. The 2nd finish coat color must match no. 24491 of FED-STD-595. The total dry film thickness of the applications of the 2nd finish coat must be not less than 2 mils.

Replace section 59-7 with:

07-19-13

59-7 STAINING CONCRETE AND SHOTCRETE

59-7.01 GENERAL

59-7.01A General

59-7.01A(1) Summary

Section 59-7.01 includes specifications for preparing and staining concrete and shotcrete surfaces using an acid stain.

59-7.01A(2) Definitions

Reserved

59-7.01A(3) Submittals

Submit stain manufacturer's product data and application instructions at least 7 days before starting staining activities.

59-7.01A(4) Quality Control and Assurance

Reserved

59-7.01B Materials

59-7.01B(1) General

Reserved

59-7.01B(2) Stain

Stain must:

1. Be a water-based solution of inorganic metallic salts
2. Contain dilute acid that penetrates and etches the concrete or shotcrete surface
3. Be a commercial quality product designed specifically for exterior applications
4. Produce abrasion-resistant color deposits

59-7.01B(3) Sealer

Reserved

59-7.01B(4) Joint Sealing Compound

Reserved

59-7.01C Construction

59-7.01C(1) General

Seal joints between concrete and shotcrete surfaces to be stained and adjacent metal with joint sealing compound before applying the stain.

Test surfaces for acceptance of the stain before applying the stain. Clean surfaces that resist accepting the stain and retest until passing.

Apply the stain under the manufacturer's instructions.

Before staining, the concrete or shotcrete surfaces must be:

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

1. At least 28 days old
2. Prepared under SSPC-SP 13/NACE no. 6
3. Thoroughly dry

Apply the stain uniformly to avoid excessive rundown. Work the stain into the concrete using a nylon bristle brush in a circular motion.

After the last coat of stain has dried, rinse stained surfaces with water and wet scrub with a stiff bristle nylon brush until the rinse water runs clear. Collect all rinse water.

Protect adjacent surfaces during staining.

Thoroughly cure each application of the stain and correct skips, holidays, thin areas, or other deficiencies before the next application.

Drips, puddles, or other irregularities must be worked into the concrete or shotcrete surface.

59-7.01C(2) Test Panel

For staining concrete or shotcrete, stain a test panel complying with section 51-1.01D(3).

For staining sculpted shotcrete, stain a test panel complying with section 53-3.01D(3).

The test panel must be:

1. Stained using the same personnel, materials, equipment and methods to be used in the work
2. Accessible for viewing
3. Displayed in an upright position near the work
4. Authorized for staining before starting the staining work

If ordered, construct additional test panels until a satisfactory color is attained.

The Engineer uses the authorized stained test panel to determine the acceptability of the stained surface.

Dispose of the test panels after the staining work is complete and authorized. Notify the Engineer before disposing of the test panels.

59-7.01D Payment

Not Used

59-7.02 SCULPTED SHOTCRETE AND TEXTURED CONCRETE

59-7.02A General

59-7.02A(1) Summary

Section 59-7.02 includes specifications for preparing and staining sculpted shotcrete and textured concrete surfaces using an acid stain.

59-7.02A(2) Definitions

Reserved

59-7.02A(3) Submittals

59-7.02A(3)(a) General

Reserved

59-7.02A(3)(b) Experience Qualifications

Submit the following documentation of the staining subcontractor's experience at least 10 days before the preconstruction meeting:

1. Summary of the staining subcontractor's experience that demonstrates compliance with section 59-7.02A(4)(b).
2. List of at least 3 projects completed in the last 5 years that demonstrate the staining subcontractor's ability to stain textured concrete or sculpted shotcrete surfaces similar to the textured concrete or sculpted shotcrete for this project. For each project include:

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

- 2.1. Project description
- 2.2. Name and phone number of the owner
- 2.3. Staining completion date
- 2.4. Color photos of the completed stained surface

59-7.02A(3)(c) Installation Plan

Submit an installation plan at least 10 days before the preconstruction meeting. The installation plan must include details for preparing and staining the textured concrete or sculpted shotcrete to achieve the required color, including:

1. Number of applications that will be used to apply the stain
2. For each application of the stain, a description of:
 - 2.1. Manufacturer, color, finish, and percentage strength mixture of the stain that will be applied
 - 2.2. Methods and tools that will be used to apply the stain
3. Methods for protecting adjacent surfaces during staining
4. Rinse water collection plan for containing all liquid, effluent, and residue resulting from preparing and staining textured concrete or sculpted shotcrete

59-7.02A(4) Quality Control and Assurance

59-7.02A(4)(a) General

Reserved

59-7.02A(4)(b) Contractor Qualifications

The staining subcontractor must:

1. Have experience in staining textured concrete or sculpted shotcrete surfaces to simulate the appearance of natural rock formations or stone masonry
2. Have successfully completed at least 3 projects in the past 5 years involving staining of concrete or sculpted shotcrete surfaces similar to the textured concrete or sculpted shotcrete for this project

59-7.02A(4)(c) Preconstruction Meeting

Before starting staining activities, conduct a meeting to discuss the installation plan. Meeting attendees must include the Engineer and all staining subcontractors.

59-7.02B Materials

Not Used

59-7.02C Construction

Not Used

59-7.02D Payment

Prepare and stain concrete and prepare and stain shotcrete are measured by the area of the vertical or sloped wall face stained.

Replace "solider" in the 5th paragraph of section 59-9.03 with:

soldier

04-19-13

Replace section 59-11 with:

59-11 STAINING GALVANIZED SURFACES

07-19-13

Reserved

Replace section 59-12 with:

07-19-13

59-12 ROCK STAINING

59-12.01 GENERAL

59-12.01A Summary

Section 59-12 includes specifications for applying stain to the exterior surface of landscape boulders, native rock that has been damaged or scarred, rock energy dissipaters, rock slope protection and gabion surfaces.

59-12.01B Submittals

Submit the following:

1. Work plan showing methods to control overspray and spillage, and to protect adjacent surfaces
2. Product data including the manufacturer's product sheet and the instructions for the application of the stain

59-12.01C Quality Control and Assurance

59-12.01C(1) General

Reserved

59-12.01C(2) Test Plot

Apply the stain to a test plot rock area of at least 3 by 3 feet at a location designated by the Engineer. Notify the Engineer at least 7 days before staining the test plot. Prepare and stain the test plot with the same materials, tools, equipment, and methods to be used in staining the final surfaces. Separate test plots are required for staining rock slope protection and native rock.

If ordered, prepare additional test plots. Additional test plots are change order work.

Obtain authorization of the test plot before starting the staining work. Use the authorized test plot as the standard for comparison in determining acceptability of staining. If the test plot is not incorporated into the work and the Engineer determines it is no longer needed, dispose of it.

59-12.02 MATERIALS

59-12.02A General

Reserved

59-12.02B Stain

Reserved

59-12.03 CONSTRUCTION

59-12.03A General

Reserved

59-12.03B Preparation

Before applying the stain:

1. Identify and obtain authorization for the areas to be stained
2. Remove oils, dirt, and other contaminants from the surfaces to be stained
3. Dry all surfaces to be stained

59-12.03C Application

After the areas to be stained have been identified, prepared, and the test plot authorized, stain the exposed surfaces under the manufacturer's instructions to achieve a color consistent with, or as close as possible to, the authorized test area color.

Control overspray and protect adjacent surfaces.

Keep stained surfaces dry for at least 20 days following the application of the stain.

DIVISION VIII MISCELLANEOUS CONSTRUCTION
72 SLOPE PROTECTION

11-15-13

Replace the table in the 3rd paragraph of section 72-2.02A with:

11-15-13

Rock Material Properties

Property	California Test	Value
Apparent specific gravity	206	2.5 minimum
Absorption	206	4.2% maximum
Durability Index	229	52 minimum

Notes:

Durability absorption ratio (DAR) = course durability index/(% absorption + 1)

If the DAR is greater than 10, the absorption may exceed 4.2%

If the DAR is greater than 24, the durability index may be less than 52

Replace the row under "Class" in the table in the 1st paragraph of section 72-3.02B with:

01-20-12

1/2 T	1/4 T	Light	Facing	Cobble
-------	-------	-------	--------	--------

Replace the table in the 2nd paragraph of section 72-3.02B with:

11-15-13

Rock Material Properties

Property	California Test	Value
Apparent specific gravity	206	2.5 minimum
Absorption	206	4.2% maximum
Durability index	229	52 minimum

Notes:

Durability absorption ratio (DAR) = course durability index/(% absorption + 1)

If the DAR is greater than 10, the absorption may exceed 4.2%

If the DAR is greater than 24, the durability index may be less than 52

Replace the row under "Rock class" in the table in the 2nd paragraph of section 72-3.03E with:

01-20-12

1/2 T	1/4 T	Light	Facing	Cobble
-------	-------	-------	--------	--------

Delete the 5th and 6th paragraphs of section 72-11.01B.

07-19-13

Add to section 72-11.01B:

01-18-13

Expanded polystyrene and premolded expansion joint filler must comply with section 51-2.

07-19-13

07-19-13

07-19-13

Schedule the construction of the slope paving such that the work, including placing and finishing concrete and applying curing compound, is completed on the same day that the work is started.

07-19-13

If the Engineer determines that the size of the slope paving is too large to be constructed without an intermediate construction joint, place a joint at an authorized location. Complete a section of concrete bounded by permissible construction joints within the same day.

01-18-13

Construct and finish minor concrete slope paving under section 51-1.

07-19-13

After striking-off to grade, hand float the concrete with floats that are at least 4 inches wide and 30 inches long. Broom the entire surface with a stiff-bristled broom to produce a uniform surface. Brooming must be done when the surface is sufficiently set to prevent deep scarring and must be accomplished by drawing the broom down the slope, leaving marks parallel to the slope. The Engineer may order you to apply a fine spray of water to the surface immediately before brooming.

07-19-13

AA

07-19-13

07-19-13

Section 73-1 includes general specifications for constructing minor concrete items including concrete curbs, sidewalks, gutter depressions, driveways, island paving, and curb ramps; for installing detectable warning surfaces and precast parking bumpers; and for texturing and coloring concrete surfaces.

AA

Replace the 1st paragraph of section 74-1.01C(3) with:

Submit at least 5 copies of product data to OSD, Documents Unit. Each copy must be bound together and include an index stating equipment names, manufacturers, and model numbers. Two copies will be returned. Notify the Engineer of the submittal. Include in the notification the date and contents of the submittal.

Drainage pumps must be factory certified under ANSI/HI 14.6.

75 MISCELLANEOUS METAL

Fabricate expansion joint armor from steel plates, angles, or other structural shapes. Shape the armor to the section of the concrete deck and match-mark it in the shop. Straighten warped sections of expansion joint armor before placing. Secure the expansion joint armor in the correct position during concrete placement.

AISC-420-10/SSPC-QP3

guardrail

78 INCIDENTAL CONSTRUCTION

Section 78 includes specifications for incidental bid items that are not closely associated with other sections.

AA

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

80 FENCES

07-18-14

Add to section 80-2.02D:

10-19-12

Vertical stays must:

1. Comply with ASTM A641
2. Be 12-1/2 gage
3. Have a Class 3 zinc coating

Replace item 1 in the list in section 80-2.02E with:

10-19-12

Comply with ASTM A 116, Type Z, Grade 60, Class 1

Add after "galvanized wire" in the 1st paragraph of section 80-2.02F:

10-19-12

complying with ASTM A 641

Replace the 3rd and 4th paragraphs of section 80-2.02F with:

10-19-12

Each staple used to fasten barbed wire and wire mesh fabric to wood posts must:

1. Comply with ASTM F 1667
2. Be at least 1-3/4 inches long
3. Be manufactured from 9-gage galvanized wire

Wire ties used to fasten barbed wire and wire mesh to metal posts must be at least 11-gage galvanized wire complying with ASTM F 626. Clips and hog rings used for metal posts must be at least 9-gage galvanized wire complying with ASTM F 626.

Replace the 8th through 14th paragraphs of section 80-2.03 with:

10-19-12

Attach the wire mesh and barbed wire to each post.

Securely fasten tension wires to wood posts. Make a single or double loop around each post at each attachment point and staple the wire to the post. Use wire ties, hog rings, or wire clips to fasten the wires to the metal posts.

Connect each wood brace to its adjacent post with a 3/8 by 4-inch steel dowel. Twist the tension wires until the installation is rigid.

Stretch barbed wire and wire mesh fabric and fasten to each wood or steel end, corner, or gate post. Apply tension according to the manufacturer's instructions using a mechanical stretcher or other device designed for such use. If no tension is specified by the manufacturer, use 250 pounds for the required tension. Evenly distribute the pull over the longitudinal wires in the wire mesh such that no more than 50 percent of the original depth of the tension curves is removed. Do not use a motorized vehicle, truck, or tractor to stretch the wire.

Attach barbed wire and wire mesh fabric to the private-property side of posts. On curved alignments, place the wire mesh and barbed wire on the face of the post against which the normal pull of the wire mesh and wire will be exerted. Terminate the wire mesh and barbed wire at each end, corner, pull, and gate post in the new fence line. Attach wire mesh and barbed wire to each wood or steel end, corner, pull, or gate post by wrapping each horizontal strand around the post and tying it back on itself with at least 4 tightly-wound wraps.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

At line posts, fasten the wire mesh to the post at the top and bottom and at intermediate points not exceeding 10 inches apart. Fasten each line of barbed wire to each line post. Use wire ties or clips to fasten the wires to metal posts under the post manufacturer's instructions. Drive staples crosswise with the grain of the wood and pointed slightly downward. Drive staples just short of actual contact with the wires to allow free longitudinal movement of those wires and to prevent damage to the wire's protective coating. Secure all wires to posts to maintain horizontal alignment.

Splices in barbed wire and wire mesh are allowed provided there are no more than 2 splices per 50 feet of fence. Use commercially-available galvanized mechanical wire splices or a wire splice created by tying off wire. Install mechanical wire splices with a tool designed for that purpose under the manufacturer's instructions. Tie off the wire as follows:

1. Carry the ends of each wire 3 inches past the tied-off knot location and wrap around the wire for at least 6 turns in opposite directions.
2. Remove the splice tool and close the space by pulling the end of the wires together.
3. Cut the unused ends of the wire close and neat.

Delete "resisting moment" and its definition in section 80-3.01B.

07-18-14

Add to section 80-3.01B:

07-18-14

posts and braces: Framework that supports the metal fabric for chain link fence. Posts and braces include round and roll-formed cross sections used as line, end, latch, or corner posts and braces.

Add to section 80-3.01C:

07-18-14

Submit a certificate of compliance for posts and braces that includes the information specified in ASTM F1043, section 9.

Delete section 80-3.01D.

07-18-14

Replace the 1st paragraph of section 80-3.02B with:

07-18-14

The base metal for posts and braces must be commercial-quality, weldable steel complying with AASHTO M 181, Type 1, except for the protective coating requirements.

Posts and braces must comply with the strength requirements in ASTM F1043:

1. Group IA, regular grade, for round posts
2. Group II-L for roll-formed posts and braces

Delete the 4th through 8th paragraphs of section 80-3.02B.

07-18-14

Add between "coating" and "unless" in the 1st sentence of section 80-3.02C:

07-18-14

or ASTM F1345, Class 2,

AA

DIVISION IX TRAFFIC CONTROL FACILITIES

83 RAILINGS AND BARRIERS

07-18-14

Replace "metal beam guard railing" at each occurrence in sections 83-1.02 and 83-1.03 with:

07-19-13

midwest guardrail system

Replace "guard rail" and "guard railing" at each occurrence in sections 83-1.02A and 83-1.02B with:

07-19-13

guardrail

Replace the heading of section 83-1.02B with:

07-19-13

Midwest Guardrail System

Add between "splices at" and "posts" in the 5th paragraph of section 83-1.02B:

07-19-13

midspan between

Replace "Metal rail posts, box spacers, and" in item 1 in the list in the 25th paragraph of section 83-1.02B with:

07-19-13

Metal box spacers and

Replace item 4 in the list in the 25th paragraph of section 83-1.02B with:

07-18-14

4. For the connection of guard railing to new bridge railing or barriers, anchor bolt holes must be drilled in the concrete parapet or formed using metal or PVC sleeves.

Delete items 6 and 7 in the list in the 25th paragraph of section 83-1.02B.

07-19-13

Replace "Type WB" at each occurrence in section 83-1.02B(2) with:

07-19-13

Type WB-31

Replace the heading of section 83-1.02B(3) with:

07-19-13

Temporary Midwest Guardrail System

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

84 TRAFFIC STRIPES AND PAVEMENT MARKINGS

05-30-14

Replace section 84-1.01C with:

05-30-14

84-1.01C Submittals

For glass beads used in drop-on applications and in thermoplastic formulations, submit a certificate of compliance and test results for each lot of beads specifying the EPA test methods used and tracing the lot to the specific test sample. The testing for lead and arsenic content must be performed by an independent testing laboratory.

Submit retroreflectivity readings for traffic stripes and pavement markings at locations with deficient retroreflectivity determined by the Engineer.

84-1.01D Quality Control and Assurance

Test each lot of glass beads for arsenic and lead under EPA Test Method 3052 and 6010B or 6010C.

Applied traffic stripes and pavement markings must be retroreflective. Within 30 days of applying traffic stripes and pavement markings, the retroreflectivity of the stripes and markings must be a minimum of 250 mcd·m⁻²·lx⁻¹ for white and 125 mcd·m⁻²·lx⁻¹ for yellow when measured under ASTM E1710.

The Engineer will perform a nighttime, drive-through, visual inspection of the retroreflectivity of the traffic stripes and pavement markings and notify you of any locations with deficient retroreflectivity. Measure the retroreflectivity of the deficient areas using a retroreflectometer under ASTM E1710 and the sampling protocol specified in ASTM D7585.

Replace the paragraph in section 84-1.02 with:

05-30-14

Glass beads applied to paint must comply with State Specification 8010-004.

Glass beads applied to molten thermoplastic material must be Type 2 beads complying with AASHTO M 247. The glass beads must have a coating that promotes adhesion of the beads to thermoplastic.

At least 75 percent of the beads by count must be true spheres that are colorless and do not exhibit dark spots, air inclusions, or surface scratches when viewed under 20X magnification.

Each lot of glass beads used in pavement markings must contain less than 200 ppm each of arsenic and lead when tested under EPA Test Method 3052 and 6010B or 6010C.

Replace the 1st paragraph in section 84-2.04 with:

01-20-12

A double extruded thermoplastic traffic stripe consisting of two 4-inch wide yellow stripes is measured as 2 traffic stripes.

A double sprayable thermoplastic traffic stripe consisting of two 4-inch wide yellow stripes is measured as 1 traffic stripe.

Add to section 84:

01-20-12

84-6 THERMOPLASTIC TRAFFIC STRIPES AND PAVEMENT MARKINGS WITH ENHANCED WET NIGHT VISIBILITY

Reserved

84-7-84-10 RESERVED

86 ELECTRICAL SYSTEMS

11-15-13

Replace the paragraphs in section 86-1.01 with:

07-19-13

Section 86 includes general specifications for constructing and rehabilitating electrical systems.

Electrical systems must comply with the material and installation specifications in section 86-2.

Section 86-3 includes specifications for constructing controller assemblies.

Section 86-4 includes specifications for constructing traffic signal faces, programmed visibility signal faces, pedestrian signal faces, flashing beacons, ramp metering signs, and signal mounting assemblies.

Section 86-5 includes specifications for constructing vehicle detectors and pedestrian push button assemblies.

Section 86-6 includes specifications for constructing lighting systems.

Section 86-7 includes specifications for constructing rehabilitating electrical equipment.

Comply with Part 4 of the *California MUTCD*. Nothing in section 86 is to be construed as to reduce the minimum standards in this manual.

The locations shown for electrical systems are approximate; the Engineer determines the final locations.

Replace the paragraphs in section 86-1.015 with:

07-19-13

actuation: Actuation as defined in the *California MUTCD*.

channel: Discrete information path.

controller assembly: Assembly for controlling a system's operations, consisting of a controller unit and auxiliary equipment housed in a rainproof cabinet.

controller unit: Part of the controller assembly performing the basic timing and logic functions.

detector: Detector as defined in the *California MUTCD*.

electrolier: Assembly of a lighting standard and luminaire.

flasher: Device for opening and closing signal circuits at a repetitive rate.

flashing beacon control assembly: Assembly of switches, circuit breakers, terminal blocks, flasher, wiring, and other necessary electrical components housed in a single enclosure for operating a beacon.

inductive loop detector: Detector capable of being actuated by an inductance change caused by a vehicle passing or standing over the loop.

lighting standard: Pole and mast arm supporting the luminaire.

luminaire: Assembly that houses the light source and controls the light emitted from the light source.

magnetic detector: Detector capable of being actuated by an induced voltage caused by a vehicle passing through the earth's magnetic field.

powder coating: Coating applied electrostatically using exterior-grade UV-stable polymer powder.

pretimed controller assembly: Assembly operating traffic signals under a predetermined cycle length.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

pull box: A box with a cover that is installed in an accessible place in a run of conduit to facilitate the pulling in of wires or cables.

signal face: Signal face as defined in the *California MUTCD*.

signal head: Signal head as defined in the *California MUTCD*.

signal indication: Signal indication as defined in the *California MUTCD*.

signal section: Signal section as defined in the *California MUTCD*.

signal standard: Pole and mast arm supporting 1 or more signal faces with or without a luminaire mast arm.

traffic-actuated controller assembly: Assembly for operating traffic signals under the varying demands of traffic as registered by detector actuation.

traffic phase: Signal phase as defined in the *California MUTCD*.

vehicle: Vehicle as defined in the *California Vehicle Code*.

Replace the paragraphs in section 86-1.02 with:

07-19-13

Comply with 8 CA Code of Regs § 2299 et seq.

Electrical equipment must comply with one or more of the following standards:

1. ANSI
2. ASTM
3. EIA
4. NEMA
5. NETA
6. UL
7. Public Utilities Commission, General Order No. 95, "Rules for Overhead Electrical Sign Construction"
8. Public Utilities Commission, General Order No. 128, "Rules for Construction of Underground Electric Supply and Communication Systems"

Materials and workmanship must comply with:

1. FCC rules
2. ITE standards
3. NEC
4. California Electrical Code

Electrical equipment and materials must be NRTL certified wherever applicable.

Replace the paragraphs in section 86-1.03 with:

07-19-13

Submit a schedule of values within 15 days after Contract approval.

Determine the quantities required to complete the work. Submit the quantities as part of the schedule of values.

Provide a schedule of values for each lump sum bid item.

Do not include costs for the traffic control system in the schedule of values.

The schedule of values must include the type, size, and installation method for:

1. Foundations
2. Standards and poles

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

3. Conduit
4. Pull boxes
5. Conductors and cables
6. Service equipment enclosures
7. Telephone demarcation cabinets
8. Vehicle signal heads and hardware
9. Pedestrian signal heads and hardware
10. Push buttons
11. Loop detectors
12. Luminaires and lighting fixtures
13. Materials shown in the quantity tables on plan sheets labeled *E*

Replace the paragraphs in section 86-1.04 with:

07-19-13

Within 15 days of Contract approval, submit a list of equipment and materials that you propose to install. Submit the list before shipping equipment or materials to the job site. The list must include the following information:

1. Manufacturer's name
2. Make and model number
3. Month and year of manufacture
4. Lot and serial numbers
5. Dimensions
6. List of components
7. Manufacturer's installation instructions
8. Contract number
9. Your contact information

Supplement the list with 2 copies of the following data:

1. Schematic wiring diagrams
2. Scale drawings of cabinets showing location and spacing of shelves, terminal blocks, and equipment, including dimensions
3. Operation manual

Electrical equipment constructed as shown does not require detailed drawings and diagrams.

Submit 3 sets of computer-generated schematic wiring diagrams for the cabinet.

Place the schematic wiring diagram in a heavy-duty plastic envelope and attach it to the inside of the cabinet door.

Prepare diagrams, plans, and drawings using graphic symbols in IEEE 315, "Graphic Symbols for Electrical and Electronic Diagrams."

Replace the 5th paragraph of section 86-2.04B(2) with:

07-19-13

HS bolts, nuts, and flat washers used to connect slip base plates must comply with the requirements for HS fastener assemblies for use in structural steel joints in section 55-1.02A(1) except rotational capacity testing and tension testing are not required.

07-19-13

Delete the row for standard Type 36-20A in the table in the 6th paragraph of section 86-2.04B(2).

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Replace the 10th paragraph of section 86-2.04B(2) with:

07-19-13

Bolted connections attaching signal or luminaire arm to the pole must be considered slip critical. Galvanized faying surfaces of plates on luminaire arm, signal arm, and pole must be roughened by hand using a wire brush before assembly and must comply with requirements for Class C surface conditions for slip-critical connections in *Specification for Structural Joints Using High-Strength Bolts* of the RCSC. Coatings for faying surfaces must comply with the RCSC specification for Class B coatings.

Replace the 1st sentence of item 8 in the list in the 1st paragraph of section 86-2.04B(3) with:

07-19-13

During manufacturing, longitudinal seams on vertical tubular members of cantilevered support structures must be within 90 degrees circumferentially of the center of the longest mast arm connection.

Delete item 15.3 in the list in the 1st paragraph of section 86-2.04B(3).

07-19-13

Add between "Exposed" and "conduit" in the 2nd paragraph of section 86-2.05B:

07-19-13

Type 1

Replace the 1st sentence of the 10th paragraph of section 86-2.05C with:

07-19-13

After installing conduit, install the pull tape.

Replace the 1st sentence of the 15th paragraph of section 86-2.05C with:

11-15-13

Conduit runs shown to be located behind curbs may be installed in the street within 3 feet of and parallel to the face of the curb by the trenching in pavement method.

Replace the 1st and 2nd sentences of the 2nd paragraph of section 86-2.05D with:

07-19-13

Install an expansion-deflection fitting for expansion joints with a 1-1/2-inch movement rating. The fitting must be watertight and include a molded neoprene sleeve, a bonding jumper, and 2 silicon bronze or zinc-plated iron hubs.

Replace section 86-2.06 with:

07-19-13

86-2.06 PULL BOXES

86-2.06A General

86-2.06A(1) Cover Marking

The cover marking must be clearly defined, uniform in depth, and parallel to either the long or short sides of the cover.

Marking letters must be 1 to 3 inches high.

Before galvanizing steel or cast iron cover, apply marking by one of the following methods:

1. Use cast iron strip at least 1/4 inch thick with letters raised a minimum of 1/16 inch. Fasten strip to cover with 1/4-inch flathead stainless steel machine bolts and nuts. Peen bolts after tightening.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

2. Use sheet steel strip at least 0.027 inch thick with letters raised a minimum of 1/16 inch. Fasten strip to cover by spot welding, tack welding, or brazing, with 1/4-inch stainless steel rivets or 1/4-inch roundhead stainless steel machine bolts and nuts. Peen bolts after tightening.
3. Bead weld the letters on cover such that the letters are raised a minimum of 3/32 inch.

86-2.06A(2) Installation and Use

Space pull boxes no more than 200 feet apart. You may install additional pull boxes to facilitate the work.

You may use a larger standard size pull box than that shown on the plans or specified.

A pull box in ground or sidewalk area must be installed as follows:

1. Embed bottom of the pull box in crushed rock.
2. Place a layer of roofing paper on the crushed rock.
3. Place grout over the layer of roofing paper. Grout must be 0.50 to 1 inch thick and sloped toward the drain hole.
4. Make a 1-inch drain hole in the center of the pull box through the grout and roofing paper.
5. Place grout between the pull box and the pull box extension, and around conduits.

The top of the pull box must be flush with the surrounding grade or the top of an adjacent curb, except in unpaved areas where the pull box is not immediately adjacent to and protected by a concrete foundation, pole, or other protective construction. Place the pull box 1-1/4 inches above the surrounding grade. Where practical, place a pull box shown in the vicinity of curbs or adjacent to a standard on the side of the foundation facing away from traffic. If a pull box is installed in a sidewalk area, adjust the depth of the pull box so that the top of the pull box is flush with the sidewalk.

Reconstruct the sump of an existing pull box if disturbed by your activities. Remove old grout and replace with new if the sump was grouted.

86-2.06B Non-Traffic Pull Boxes

Reserved

86-2.06C Traffic Pull Boxes

The traffic pull box and cover must comply with ASTM C857, "Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures," for HS20 loading. You must be able to place the load anywhere on the box and cover for 1 minute without causing cracks or permanent deformations.

Frame must be anchored to the box with 1/4 by 2-1/4 inch concrete anchors. Four concrete anchors must be included for No. 3-1/2(T) pull box; one placed in each corner. Six concrete anchors must be included for No. 5(T) and No. 6(T) pull boxes; one placed in each corner and one near the middle of each of the longer sides.

Nuts must be zinc-plated carbon steel, vibration resistant, and have a wedge ramp at the root of the thread.

After installation of traffic pull box, install the steel cover and keep it bolted down when your activities are not in progress at the pull box. When the steel cover is placed for the final time, the cover and Z bar frame must be cleaned of debris and tightened securely.

Steel cover must be countersunk approximately 1/4 inch to accommodate the bolt head. When tightened, the bolt head must not exceed more than 1/8 inch above the top of the cover.

Concrete placed around and under traffic pull boxes must be minor concrete.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Replace the 11th row in the table in the 1st paragraph of section 86-2.08B with:

07-19-13

Grounded circuit conductor	Pedestrian push buttons	Wht	Blk	NBR	14
	Signals and multiple lighting	Wht	None	NBR	10
	Flashing beacons and sign lighting	Wht	None	NBR	12
	Lighting control	Wht	None	C-3	14
	Service	Wht	None	NBR	14

Replace the 1st sentence of the 1st paragraph of section 86-2.08C with:

07-19-13

Circuit conductors, connectors, and terminals must be UL or NRTL listed and rated for 600 V(ac) operation.

Add to the beginning of section 86-2.09A:

07-19-13

Provide enough traffic signal light conductors for functional operation of the signal. Provide 3 spare conductors in all conduits containing traffic signal light conductors.

Replace the paragraphs in section 86-2.09C with:

07-19-13

Connectors must be crimp type. Use a manufacturer-recommended tool for connectors and terminals to join conductors. Comply with SAE-AS7928.

Terminate stranded conductors smaller than no. 14 in crimp style terminal lugs.

Terminate field conductors no. 12 and smaller with spade type terminals. Terminate field conductors no. 10 and larger with spade type or ring type terminals.

Replace the value for resistivity in the table in the 6th paragraph of section 86-2.09E with:

07-19-13

25 x 10¹³ Ω per inch, minimum

Add between "the" and "head" in the 3rd sentence of the 2nd paragraph of 86-2.09F:

07-19-13

connector

Replace "project" in the 3rd paragraph of section 86-2.11A with:

10-19-12

work

Replace "Contract" in item 2 in the list in the 11th paragraph of section 86-2.11A with:

10-19-12

work

Delete the 12th paragraph of section 86-2.11A.

07-19-13

Replace section 86-2.11C with:

07-19-13

86-2.11C Electrical Service for Booster Pumps

Provide electrical service from the service point to the booster pump.

Furnish conductors, conduit, and pull boxes from the service point to the booster pump.

Do not use Type 3 conduit unless shown otherwise.

Replace section 86-2.14A with:

07-19-13

86-2.14A General

Deliver material and equipment for acceptance testing to either METS or a testing location as ordered.

Allow 30 days for testing. The Department notifies you when testing is complete. You must pick up the material or equipment from the test site and deliver it to the job site.

If material or equipment is rejected, allow 30 days for retesting. The retesting period starts when replacement material or equipment is delivered to the test site.

If material or equipment submitted for testing does not comply with the specifications, remove it within 5 business days after you are notified that the equipment is rejected. If equipment is not removed within that period, the Department may ship it to you and deduct the shipping cost.

Testing and quality control procedures for traffic signal controller assemblies must comply with NEMA TS standards for traffic control systems.

Replace the 2nd paragraph of section 86-3.02A(1) with:

07-19-13

The Department furnishes the BBS components under section 6-2.03.

Replace the 9th paragraph of section 86-3.02B with:

07-19-13

The couplings between the external cabinet and Model 332L cabinet must include a conduit for power connections between the 2 cabinets. Couplings must include:

1. 2-inch nylon-insulated steel chase nipple
2. 2-inch sealing steel locknut
3. 2-inch nylon-insulated steel bushing

Delete item 1.3 in the list in the 7th paragraph of section 86-3.04A.

07-19-13

Replace the 2nd paragraph of section 86-4.01A with:

07-19-13

The housing must not fail structurally as described in the following table:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Housing Structural Failure

Housing type	Test method	Description of structural failure
Metal	California Test 666	Fracture within the housing assembly or deflection of more than half the lens diameter of the signal section during the wind load test
Plastic	California Test 605	Fracture within the housing assembly or deflection of more than 10 degrees in either the vertical or horizontal plane after the wind load has been removed from the front of the signal face or deflection of more than 6 degrees in either the vertical or horizontal plane after the wind load has been removed from the back of the signal face

Replace the 1st sentence of section 86-4.01A(1) with:

07-19-13

Each metal housing must have a metal visor.

Replace the 1st sentence of section 86-4.01A(2) with:

07-19-13

Each plastic housing must be molded in 1 piece or fabricated from 2 or more pieces and joined into a single piece.

Delete item 1 in the list in section 86-4.01D(1)(b).

07-19-13

Replace the paragraphs in section 86-4.01D(1)(c)(i) with:

07-19-13

LED signal modules must be on the Authorized Material List for LED traffic signals.

The Department tests modules under section 86-2.14A, ANSI/ASQ Z1.4, and:

1. California Test 604 for LED and circular LED signal modules
2. California Test 3001 for arrow, U-turn, and bicycle LED signal modules

The LED signal modules submitted for testing must be typical production units. LEDs must be spread evenly across the module.

The Department may test the modules on all parameters specified in section 86-4.01D.

Replace the 1st and 2nd sentences of the 3rd paragraph of 86-4.01D(2)(b) with:

07-19-13

The electrical connection for each flashing LED signal module must be 4 secured, color-coded, jacketed copper wires. The wire must comply with the NEC.

Replace the heading of section 86-4.02 with:

07-19-13

PROGRAMMED VISIBILITY VEHICLE SIGNAL SECTION

Replace "face" in the 1st paragraph of section 86-4.02 with:

07-19-13

section

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Add before the 1st sentence in section 86-4.03A:

07-19-13

The pedestrian signal face must be Type A.

Replace the 1st sentence of the 2nd paragraph of section 86-4.03B with:

07-19-13

The Department tests the pedestrian signal's front screen in a horizontal position with its edges supported.

Delete items 1 and 4 in the list in section 86-4.03I(1)(b).

07-19-13

Replace the paragraphs of section 86-4.03I(1)(c)(i) with:

07-19-13

The LED PSF module must be on the Authorized Material List for LED traffic signals.

The Department tests LED PSF modules under section 86-2.14A, ANSI/ASQ Z1.4, and California Test 606.

The LED PSF modules submitted for testing must be representative of typical production units.

The Department may test the modules on all parameters specified in section 86-4.03I.

Replace item 1 in the list in the 1st paragraph of section 86-4.03I(2) with:

07-19-13

1. Not include reflectors.

Replace item 6 in the list in the 1st paragraph of section 86-4.03I(2) with:

07-19-13

6. Be able to replace signal lamp optical units and pedestrian signal faces with LEDs.

Replace the table titled "Chromaticity Standards (CIE Chart)" in the 16th paragraph of section 86-4.03I(2) with:

07-19-13

Chromaticity Standards (CIE Chart)

Upraised hand	X: not greater than 0.659 or less than 0.600 Y: not greater than 0.390 or less than 0.331 Y= 0.990-X
Walking person	X: not greater than 0.440 or less than 0.280 Y: not greater than 0.0483 + 0.7917(X) or less than 0.0983 + 0.7917(X)

Add between "beacon" and "must" in the 1st sentence of section 86-4.05:

07-19-13

signal face

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Delete "face" in item 1 in the list in the 1st paragraph of section 86-4.05.

07-19-13

Replace the row for viscosity in the table in the 2nd paragraph of section 86-5.01A(3)(c) with:

07-19-13

Viscosity, Brookfield Thermosel, no. 27 Spindle, 20 rpm, 190 °C	D 4402	2.5–3.5 Pa·s
--	--------	--------------

Replace the paragraph in section 86-5.01A(3)(d) with:

07-19-13

Use epoxy sealant for repair work in and around sawcuts housing inductive loops.

Replace "all loop conductors" in the 3rd paragraph of section 86-5.01A(4) with:

07-19-13

the detector lead-in cable

**Replace "Encase the loop wires" in the 1st sentence of the 3rd paragraph of section 86-5.01A(5)
with:**

07-19-13

The loop wires must be encased

Replace section 86-5.02 with:

07-19-13

86-5.02 PUSH BUTTON ASSEMBLIES

The housing for a push button assembly must be die-cast or permanent mold-cast aluminum. The assembly must be rainproof and shockproof in any weather condition.

The push button's switch must be a single-pole, double-throw switching unit with screw-type terminals rated 15 A at 125 V(ac). The switch must have:

1. Plunger actuator and a U frame to allow recessed mounting in the push button housing
2. Operating force of 3.5 lb
3. Maximum pretravel of 5/64 inch
4. Minimum overtravel of 1/32 inch
5. Differential travel from 0.002 to 0.04 inch
6. 2-inch minimum diameter actuator

Where a push button is attached to a pole, the housing must be shaped to fit the pole's curvature. Use saddles if needed to make a neat and secure fit.

Where a push button is mounted on top of a 2-1/2-inch-diameter post, fit the housing with a slip fitter and use screws to rigidly secure it to the post.

Install the push button and the sign on the crosswalk side of the pole.

Attach the sign on a Type B push button assembly.

For a Type C push button assembly, mount the instruction sign on the same standard as the assembly using 2 straps and saddle brackets.

86-5.03 ACCESSIBLE PEDESTRIAN SIGNAL

Replace "lthe amp" in item 2 in the list in the 1st paragraph of section 86-6.01 A(2) with:

the lamp

07-19-13

Geosynthetics must be on the DataMine list for geotextiles and geosynthetics at the National Transportation Product Evaluation Program Web site. The product name, manufacturing source, and date of manufacture must be printed every 5 meters along the edge of the material.

Exceptions are:

1. Paving mat
2. Paving grid, Class 2 and 3
3. Biaxial geogrid

Puncture strength, lb min	ASTM D 6241	310
Trapezoid tearing strength, lb min	ASTM D 4533	56

Replace the 3rd paragraph in section 88-1.02C with:

Geocomposite wall drain must be from 0.25 to 2 inches thick.

Replace the value for permittivity of woven fabric in the table in the 1st paragraph of section 88-1.02E with:

0.05

Replace the value for apparent size opening of nonwoven fabric in the table in the 1st paragraph of section 88-1.02E with:

0.012

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Replace the table in the 1st paragraph of section 88-1.02G with:

01-20-12

Sediment Filter Bag

Property	Test	Values	
		Woven	Nonwoven
Grab breaking load, lb, 1-inch grip min, in each direction	ASTM D 4632	200	250
Apparent elongation, percent min, in each direction	ASTM D 4632	10	50
Water flow rate, gal per minute/sq ft min and max average roll value	ASTM D 4491	100-200	75-200
Permittivity, sec ⁻¹ min	ASTM D 4491	1.0	1.0
Apparent opening size, inches max average roll value	ASTM D 4751	0.023	0.012
Ultraviolet resistance, % min retained grab breaking load, 500 hr.	ASTM D 4355	70	70

Replace the table in the 1st paragraph of section 88-1.02H with:

01-20-12

Temporary Cover

Property	Test	Values	
		Woven	Nonwoven
Grab breaking load, lb, 1-inch grip min, in each direction	ASTM D 4632	200	200
Apparent elongation, percent min, in each direction	ASTM D 4632	15	50
Water flow rate, gal per minute/sq ft min and max average roll value	ASTM D 4491	4-10	80-120
Permittivity, sec ⁻¹ min	ASTM D 4491	0.05	1.0
Apparent opening size, inches max average roll value	ASTM D 4751	0.023	0.012
Ultraviolet resistance, % min retained grab breaking load, 500 hr.	ASTM D 4355	70	70

Replace section 88-1.02P with:

01-18-13

88-1.02P Biaxial Geogrid

Geosynthetics used for biaxial geogrid must be a punched and drawn polypropylene material formed into an integrally formed biaxial grid. When tested under the referenced test methods, properties of biaxial geogrid must have the values shown in the following table:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Biaxial Geogrid

Property	Test	Value
Aperture size, inch ^a min and max	Calipered	0.8-1.3 x 1.0-1.6
Rib thickness, inch min	Calipered	0.04
Junction thickness, inch min	Calipered	0.150
Tensile strength, 2% strain, lb/ft ^a min	ASTM D 6637	410 x 620
Tensile strength at ultimate, lb/ft ^a min	ASTM D 6637	1,310 x 1,970
Ultraviolet resistance, percent min retained tensile strength, 500 hours	ASTM D 4355	100
Junction strength, lb/ft ^a min	ASTM D 7737	1,220 x 1,830
Overall flexural rigidity, mg-cm min	ASTM D 7748	750,000
Torsional rigidity at 20 cm-kg, mm-kg/deg ^b min	GRI:GG9	0.65

^aMachine direction x cross direction

^bGeosynthetic Research Institute, Test Method GG9, *Torsional Behavior of Bidirectional Geogrids When Subjected to In-Plane Rotation*

Replace section 88-1.02Q with:

07-19-13

88-1.02Q Geosynthetic Bond Breaker

Geosynthetic bond breaker must be nonwoven; needle punched; not heat treated; polypropylene, polyethylene material.

When tested under the referenced test methods, properties of geosynthetic bond breaker material must have the values shown in the following table:

Geosynthetic Bond Breaker

Property	Test	Value
Mass per unit area, oz/sq yd min	ASTM D 5261	14.7
Thickness at 29 psi, mm min	ASTM D 5199	1.0
Tensile strength at ultimate, lbs/ft min	ASTM D 4595	685
Elongation, percent max	ASTM D 4595	130
Permittivity at 2.9 psi, m/s min	ASTM D 5493	0.0001
Hydraulic transmissivity at 29 psi, m/s min	ASTM D 6574	0.0002
Ultraviolet resistance, percent min retained grab breaking load, 500 hours	ASTM D 4355	60

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

90 CONCRETE

07-19-13

Replace the 3rd paragraph of section 90-1.01C(7) with:

08-05-11

Submit weighmaster certificates in printed form or, if authorized, in electronic media. Present electronic media in a tab-delimited format on a CD or DVD. Captured data for the ingredients represented by each batch must be line feed carriage return and one line separate record with sufficient fields for the specified data.

Replace the 3rd paragraph of section 90-3.01C(5) with:

08-05-11

Production data must be input by hand into a pre-printed form or captured and printed by the proportioning device. Present electronic media containing recorded production data in a tab-delimited format on a CD or DVD. Each capture of production data must be followed by a line feed carriage return with sufficient fields for the specified data.

Replace the 1st paragraph of section 90-4.01A with:

07-19-13

Section 90-4 includes specifications for fabricating PC concrete members.

Replace the paragraphs in section 90-4.01C with:

07-19-13

90-4.01C(1) General

For reports and logs, type or clearly print the name next to the signature of the person signing the report or log.

Submit expansion test data under section 90-4.02, if required.

90-4.01C(2) Certificates of Compliance

Submit a certificate of compliance for the cementitious material used in PC concrete members. The certificate must be signed by the PC concrete product manufacturer.

Submit a certificate of compliance for each PC concrete member. The certificate of compliance for tier 1 and tier 2 members must be signed by the QC manager. The certificate of compliance for tier 3 members must be signed by the QC Inspector.

90-4.01C(3) Precast Concrete Quality Control Plan

Before performing any precasting activities for tier 1 and tier 2 PC concrete members, submit 3 copies of the project-specific QC plan for the PC plant. The QC plan must supplement the information from the authorized facility audit. Submit a separate QC plan for each plant. Allow 25 days for review.

Each project-specific QC plan must include:

1. Name of the precasting plant, concrete plants, and any testing laboratory to be used.
2. Manual prepared by the precasting plant that includes:
 - 2.1. Equipment description
 - 2.2. Testing procedures
 - 2.3. Safety plan
 - 2.4. Personnel names, qualifications, and copies of certifications
3. QC manager and QC inspector names, qualifications, and copies of certifications.
4. Organizational chart showing QC personnel and their assigned QC responsibilities.
5. Methods and frequencies for performing QC procedures including inspections, material testing, and any survey performed for all components of PC concrete members. Components include prestressing, concrete, grout, reinforcement, steel, miscellaneous metal, and formwork.
6. System for reporting noncompliant PC concrete members to the Engineer.

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CTA Contract No. XXX

7. System for identification and tracking repairs and repair methods.
8. Procedure for the reinspection of repaired PC concrete members.
9. Forms for certificates of compliance, daily production logs, and daily reports.

Submit a revised QC plan for any changes to:

1. Concrete plants
2. Material sources
3. Material testing procedures
4. Testing laboratory
5. Procedures and equipment
6. Updated systems for tracking and identifying PC concrete members
7. QC personnel

After authorization, submit 7 copies of each authorized QC plan and make 1 copy available at each location where work is performed.

Allow 7 days for review of a revised QC plan.

90-4.01C(4) Daily Production Log

The QC inspector must provide reports to the QC manager for each day that precasting activities are performed.

The QC manager must maintain a daily production log of PC activities for each day's precasting. PC activities include setting forms, placing reinforcement, setting prestressing steel, casting, curing, post tensioning, and form release. This daily log must be available at the precasting plant. The daily log must include:

1. Plant location
2. Specific description of casting or related activities
3. Any problems or deficiencies discovered
4. Any testing or repair work performed
5. Names of QC inspectors and the specific QC inspections they performed that day
6. Reports for that day's precasting activities from each QC inspector including before, during, and after precast inspections

Immediately notify the Engineer when any precasting problems or deficiencies are discovered, and submit the proposed repair or process changes necessary to correct them.

90-4.01C(5) Precast Concrete Report

Before shipping PC concrete members, submit a PC concrete report. The report must include:

1. Reports of all material tests and any survey checks
2. Documentation that:
 - 2.1. You have evaluated all tests
 - 2.2. You corrected all rejected deficiencies
 - 2.3. Repairs have been reexamined with the required tests and found acceptable
3. Daily production logs
4. Certificates of compliance
5. Documentation of inspections

Each person who performs a material test or survey check must sign the corresponding report and submit the report directly to the QC manager.

Replace the paragraphs in section 90-4.01D with:

90-4.01D(1) General

Quality control and assurance for PC concrete includes:

07-19-13

Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX

1. Your QC program
2. Department's acceptance of PC concrete members

PC concrete members are categorized into the following 4 tiers:

1. Tier 1 consists of:
 - 1.1. Components of bridge structures, including girders, deck panels, bent caps, abutments, slabs, closure wall panels, and piling
 - 1.2. Prestressed pavement
2. Tier 2 consists of:
 - 2.1. Components of earth retaining systems
 - 2.2. Wingwalls
 - 2.3. Types A, B, and C pipe culvert headwalls, endwalls, and wingwalls
 - 2.4. Pavement
 - 2.5. Box culverts
 - 2.6. Sound wall panels and supports
3. Tier 3 consists of:
 - 3.1. Pipes
 - 3.2. Pipe drainage facilities
 - 3.3. Straight and "L" pipe culvert headwalls except those listed under tier 2
 - 3.4. Drainage Inlets
 - 3.5. Flared end sections
4. Tier 4 consists of any member not described as tier 1, tier 2, or tier 3

90-4.01D(2) Quality Control

90-4.01D(2)(a) General

For tier 1 and tier 2 PC concrete members:

1. Fabricate PC concrete members at a plant on the Authorized Facility Audit List
2. Assign a PC concrete QC manager to the plant
3. Assign a QC inspector who is either registered as a civil engineer in the State or:
 - 3.1. For tier 1, has a Plant Quality Personnel Level II certification from the Precast/Prestressed Concrete Institute
 - 3.2. For tier 2, has a Plant Quality Personnel Level I certification from the Precast/Prestressed Concrete Institute
4. Prepare a PC concrete QC plan
5. Perform PC concrete materials testing
6. Maintain a daily production log
7. Prepare a PC concrete report
8. Prepare a certificate of compliance

For tier 3 PC concrete members:

1. Assign a QC inspector who has one of the following qualifications:
 - 1.1. Registration as a civil engineer in the State.
 - 1.2. Plant Quality Personnel, Level I certification from the Precast/Prestressed Concrete Institute.
 - 1.3. Competency to perform inspection of PC operations. An inspector is competent if the individual has completed training or has experience in PC operations and inspection.
2. Prepare a certificate of compliance

For tier 4 PC concrete members, prepare a certificate of compliance.

For each ASTM test method specified in this section, the material's test result must comply with the requirement specified for the comparable test in section 90 unless otherwise specified.

If curing compound is used, provide certificate of compliance as specified in section 90-1.01C(5).

If PC concrete is manufactured at an established PC concrete plant, a trial batch and prequalification of the materials, mix proportions, mixing equipment, and procedures under section 90-1.01D(5)(b) are not required.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

90-4.01D(2)(b) Quality Control Meeting

After submitting the PC concrete QC plan, hold a meeting to discuss the requirements for PC concrete QC. The meeting attendees must include the Engineer, the PC concrete QC manager, and a representative from each plant performing PC concrete activities for the Contract.

90-4.01D(2)(c) Sampling, Testing, and Inspecting

The QC laboratory testing personnel or the QC inspector must witness sampling. The QC laboratory testing personnel must perform testing.

QC laboratory testing personnel must have the following certifications, as applicable:

1. ACI Strength Testing Technician
2. ACI Concrete Laboratory Testing Technician Level 1
3. ACI Aggregate Testing Technician Level 2

The QC Inspector must perform inspections before, during, and after casting is complete.

QC field testing and inspection personnel must have an ACI Concrete Field Testing Technician, Grade I certification.

For each mix design used for tier 1 and tier 2 PC concrete members, perform sampling and testing at the minimum frequencies shown in the following tables:

Aggregate QC Tests

Property	Test method	Minimum testing frequency
Aggregate gradation	ASTM C136	Once per 400 cu yd of concrete cast or once a week, whichever is more frequent
Sand equivalent	ASTM D2419	
Percent fines under 75 microns ^a	ASTM C117	
Moisture content of fine aggregate	ASTM C566, or electronically actuated moisture meter ^b	1–2 times per each day of pour, depending on conditions

^aPercent fines under 75 microns test replaces the cleanness test in section 90-1.02C with the requirements of 1.5 percent maximum for "Operating Range" and 2.0 percent maximum for "Contract Compliance." The 5th paragraph of section 90-1.02C(2) does not apply.

^bElectronically actuated moisture meter must be calibrated once per week per ASTM C566.

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Concrete QC Tests

Property	Test method	Minimum testing frequency
Compressive strength ^b	ASTM C172/C172M, ASTM C31/C31M, and ASTM C39/C39M	Once per 100 cu yd of concrete cast, or every day of casting, whichever is more frequent
Slump	ASTM C143/C143M	
Temperature	ASTM C1064/C1064M	
Density	ASTM C138	Once per 600 cu yd of concrete cast or each week of batching, whichever is more frequent
Air content	ASTM C231/C231M or ASTM C173/C173M ^a	If concrete is air entrained, once for each set of cylinders, and when conditions warrant

^aASTM C173/C173M must be used for lightweight concrete.

^bCylinders must be 6 by 12 inches.

If concrete is batched at more than 1 plant, perform the tests at each plant.

Cure test cylinders for determining time of prestressing loading in the same manner as the concrete in the member.

Cure test cylinders for determining compliance with 28-day strength requirements in the same manner as the member until completion of the steam curing process followed by a water bath or moist room at 60 to 80 degrees F until tested.

For PC concrete that is steam cured, concrete designated by compressive strength is acceptable if its compressive strength reaches the described 28-day compressive strength in no more than the maximum number of days specified or allowed after the concrete is cast.

90-4.01D(3) Quality Assurance

For PC concrete that is steam cured, the Engineer evaluates the compressive strength based on individual tests representing specific portions of production.

Add between the 1st and 2nd paragraphs of section 90-4.02:

07-19-13

PC portland cement based repair material must be on the Authorized Material List.

If municipally supplied potable water is used for PC concrete, the testing specified in section 90-1.02D is waived unless requested.

Add to section 90-4.03:

07-19-13

For dimensional tolerances of PC concrete members, comply with the Precast/Prestressed Concrete Institute Concrete Institute's *Tolerance Manual for Precast and Prestressed Concrete Construction*, MNL 135-00.

For tier 1 and tier 2 PC concrete members, apply curing compound using power-operated spraying equipment. You may request application by hand spraying for small quantities of PC concrete members. For tier 3 and tier 4 PC concrete members, the application of curing compound may be hand sprayed.

07-19-13

- AA

10-19-12

10-19-12

10-19-12

AA

07-19-13

07-19-13

01-20-12

Dynamic shear, Test temperature at 10 rad/s, °C	T 315	58	64	64	64	70
min G*/sin(delta), kPa		1.00	1.00	1.00	1.00	1.00
max G*/sin(delta), kPa		2.00	2.00	2.00	2.00	2.00

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

Replace 2nd paragraph of section 92-1.02B with:

07-19-13

PG modified asphalt binder must comply with the requirements shown in the following table:

**Contra Costa Transportation Authority
BALFOUR INTERCHANGE PROJECT CCTA Contract No. XXX**

PG Modified Asphalt Binder

Property	AASHTO Test Method	Grade		
		PG 58–34 M	PG 64–28 M	PG 76–22 M
Original Binder				
Flash point, min °C	T 48	230	230	230
Solubility, min %	T 44 ^a	97.5	97.5	97.5 ^b
Viscosity at 135 °C ^c , max, Pa·s	T 316	3.0	3.0	3.0
Dynamic shear, Test temperature at 10 rad/s, °C min G*/sin(delta), kPa	T 315	58 1.00	64 1.00	76 1.00
RTFO test ^d , Mass loss, max, %	T 240	1.00	1.00	1.00
RTFO Test Aged Binder				
Dynamic shear, Test temperature at 10 rad/s, °C min G*/sin(delta), kPa	T 315	58 2.20	64 2.20	76 2.20
Dynamic shear, Test temperature at 10 rad/s, °C max (delta), degree	T 315	80 ^e	80 ^e	80 ^e
Elastic recovery ^f , Test temperature °C min recovery, %	T 301	25 75	25 75	25 65
PAV ^g , temperature, °C	R 28	100	100	110
RTFO Test and PAV Aged Binder				
Dynamic shear, Test temperature at 10 rad/s, °C max G* sin(delta), kPa	T 315	16 5000	22 5000	31 5000
Creep stiffness, Test temperature, °C max S-value, MPa min M-value	T 313	-24 300 0.300	-18 300 0.300	-12 300 0.300

^aThe Department allows ASTM D 5546 or ASTM D 7753 instead of AASHTO T 44. Particles recovered from ASTM D 5546 or ASTM D 7753 or AASHTO T 44 must be less than 250 µm.

^bReport only for spray application.

^cThe Engineer waives this specification if the supplier provides written certification the asphalt can be adequately pumped and mixed at temperatures meeting applicable safety standards.

^d"RTFO Test" means the asphaltic residue obtained using the Rolling Thin Film Oven Test, AASHTO Test Method T 240 or ASTM D 2872. The residue from mass change determination may be used for other tests.

^eTest temperature is the temperature at which G*/sin(delta) is 2.2 kPa. A graph of log G*/sin(delta) plotted against temperature may be used to determine the test temperature when G*/sin(delta) is 2.2 kPa. A graph of (delta) versus temperature may be used to determine delta at the temperature when G*/sin(delta) is 2.2 kPa. The graph must have at least two points that envelope G*/sin(delta) of 2.2 kPa and the test temperature must not be more than 6 degree C apart. The Engineer also accepts direct measurement of (delta) at the temperature when G*/sin(delta) is 2.2 kPa.

^fTests without a force ductility clamp may be performed.

^g"PAV" means "Pressure Aging Vessel."

Do not modify PG modified asphalt binder using polyphosphoric acid.

