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September 3, 2009

04-CC,Ala-24-8.2/10.0,0.0/2.7
04-294914
SARRA-P024(030)N
HPLUL-6204(083)N

Addendum No. 4

Dear Contractor:

This addendum is being issued to the contract for CONSTRUCTION ON STATE HIGHWAY IN ALAMEDA AND CONTRA COSTA COUNTIES FROM EAST TEMESCAL SEPARATION TO 0.8 KM EAST OF GATEWAY BLVD.

Submit bids for this work with the understanding and full consideration of this addendum. The revisions declared in this addendum are an essential part of the contract.

Bids for this work will be opened on Wednesday, September 16, 2009.

This addendum is being issued to revise the Project Plans, the Notice to Bidders and Special Provisions, the Federal Minimum Wage Rates No. 34 dated 07/31/09, and provide a copy of the Information Handout.

Project Plan Sheets 9, 12, 19, 23, 104, 121, 125, 147, 151, 157, 158, 252, 255, 414, 415, 416, 417, 418, 439, 651, 655, 656, 666, 798, 800, 806, 807, 810, 817, 865, 969, 984, 1052, 1081, 1093, 1094, 1099, 1105, 1106, 1108, 1112, 1117, 1121, 1129, 1157, 1158, 1159, 1160, 1161, 1162, 1163, 1164, 1165, 1167, 1168, 1169, 1171, 1192, 1196, 1200, 1202, 1203, 1222, 1223, 1224, 1226, 1229, 1230, 1231, 1232, 1233, 1234, 1235, 1236, 1237, 1277, 1282, 1283, 1360, 1373, and 1374 are revised. A copy of the revised sheets are attached for substitution for the like-numbered sheets.

Project Plan Sheets 142A and 324A are added. Copies of the added sheets are attached for addition to the project plans.

In the Special Provisions, Section 5-1.21, "TUNNEL SAFETY ORDERS," item A of the first paragraph is revised as follows:

- "A. In addition to all other gas testing requirements continuous monitoring for flammable and combustible gas shall be provided for the face and associated tunnel heading area. All excavation equipment shall comply with the requirements of the Tunnel Safety Orders Section 8425(g) at a minimum. For the purpose of this contract, all equipment that removes or otherwise disturbs the native ground shall be considered excavation equipment per the Special Conditions and shall comply with the requirements of the Tunnel Safety Orders Section 8425(g) at a minimum."

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In the Special Provisions, Section 5-1.23, "PHOTOGRAPHY," is added as follows:

"5-1.23 PHOTOGRAPHY

The Contractor shall document pre-construction conditions, and progress and completion of the work with photography. Photography includes time-lapse video, still photography, and other monitoring services as directed by the Engineer.

Photography will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications, and will not be considered a special service as specified in Section 9-1.03B of the Standard Specifications."

In the Special Provisions, Section 8.301, "WELDING," subsection "GENERAL," is revised as attached.

In the Special Provisions, Section 8.301, "WELDING," subsection "WELDING QUALITY CONTROL," is revised as attached.

In the Special Provisions, Section 10-1.01, "ORDER OF WORK," the following paragraph is added after the last paragraph:

"Attention is directed to the requirements for temporary power and for power transfer from the existing power supply to temporary power and from temporary power to permanent power supply as shown on drawing ET-466. Power transfers will result in temporary loss of power to Bores 1 and 2 tunnel ventilation and lighting. During power transfers, Bore 1 or Bore 2 will be closed. Traffic control and emergency and safety personnel and equipment will be arranged by the Engineer to be on site during power transfer outages for the maintenance of eastbound traffic through the open tunnel bore. Attention is directed to "Maintaining Traffic" of these special provisions for times when full bore closures are permitted. The Contractor shall provide two weeks advance notice to the Engineer of any power outage required for power transfers. Power transfers shall not be initiated until approved by the Engineer."

In the Special Provisions, Section 10-1.05, "TEMPORARY STORM WATER RUN-ON BYPASS AND EXCAVATION DEWATERING," subsection "TEMPORARY STORM WATER RUNOFF FROM HIGH RISK AREAS," the following paragraph is added after the first paragraph:

"On-site Material Classification Area (MCA) as defined in "Disposal of Excavated Materials" of these Special Provisions shall also be considered as a high risk area."

In the Special Provisions, Section 10-1.05, "TEMPORARY STORM WATER RUN-ON BYPASS AND EXCAVATION DEWATERING," subsection "COLLECTION, CONVEYANCE, AND TREATMENT," subheading "Disposal," the following sentence is added to the second paragraph:

"The Contractor may propose to reuse treated non-storm water from the TNSWTS as a water supply source for the tire wash system described in "Disposal of Excavated Material" of these Special Provisions."

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In the Special Provisions, Section 10-1.21, "COOPERATION," the table following the first paragraph is revised as follows:

Contract No.	Co-Rte-KP	Location	Type of Work
04-294924	Ala-13,24 - 15.4, 8.6 KP	Oakland	Ramp Realignment
04-294934	Ala-24 - 8.6 KP	Oakland	Widening and Traffic Signal Installation
04-1A4604	Ala-24-R5.9/6.2 CC-24-R0.0/0.5	Caldecott Tunnel	Replace Ventilation Fan Motor & Control System
04-1L7004	Ala-24-R5.9/6.2	Caldecott Tunnel	Grind Pavement #3 Bore
04-4A3064 Minor B	CC-24-R0.0/0.5	Caldecott Tunnel	Grind Pavement #3 Bore
04-265504	Ala-24 - R5.9/6.2, R0.0/0.4	Oakland	Upgrade AM/FM Rebroadcast System in Caldecott Tunnel
04-0E9504	Ala - 24	Various Locations	Replace Joint Seals and Methacrylate Bridge Deck
04-265504	Ala - 24-1.8/2.8	Oakland	Resurface Ramps - 580/24 Separation to 52 nd St UC
Encroachment Permit 0409- 6D1136	CC - 24-R0.8/1.0	On WB Fish Ranch Rd. off-ramp from State Rt. 24	Relocation of Sprint-Nextel facility behind K-rail
	CC - 24 -R0.4/1.0	On WB Fish Ranch Rd. on- ramp to State Rt. 24	Relocation of PG&E poles

In the Special Provisions, Section 10-1.29, "MAINTAINING TRAFFIC," Chart No. 4b is revised as attached.

In the Special Provisions, Section 10-1.37, "EXISTING HIGHWAY FACILITIES," subsection "REMOVE POSITIVE BARRIER," is added after subsection "REMOVE POP-UP SYSTEM," as follows:

"REMOVE POSITIVE BARRIER

Existing positive barrier, where shown on the plans to be removed, shall be removed and disposed of.

Full compensation for removing shall be considered as included in the contract lump sum price paid for positive barrier and no separate payment will be made therefor.

Full compensation for concrete backfill shall be considered as included in the contract price paid per cubic meter for minor concrete (backfill) and no separate payment will be made therefor."

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In the Special Provisions, Section 10-1.68, "PILING," subsection "MEASUREMENT AND PAYMENT (PILING)," the seventh paragraph is revised as follows:

"The contract prices paid per meter for steel soldier pile of the types shown in the Engineer's Estimate shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing the steel soldier piles and appurtenances at the site to the required depth, including securing the piling to maintain accurate alignment prior to and during encasing the pile with concrete, shaping pile tops, cutting holes for pile anchors, cleaning and preparing heat affected areas of piles for splicing and welding concrete anchors to the piles, splicing steel soldier piles, furnishing pile anchors, and furnishing, cleaning, and welding reinforcing plates, angled steel beams on steel soldier piles, tie plates and concrete anchors to the piles complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer."

In the Special Provisions, Section 10-1.75, "SHOTCRETE," subsection "ARCHITECTURAL TREATMENT (TEXTURED SHOTCRETE)," is added after subsection "TESTING AND ACCEPTANCE," as attached.

In the Special Provisions, Section 10-1.75, "SHOTCRETE," subsection "MEASUREMENT AND PAYMENT," the following paragraph is added after the first paragraph:

"The contract price paid per square meter for architectural treatment (textured shotcrete) of the types listed in the Engineer's Estimate shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in architectural treatment (textured shotcrete), complete in place, as shown on the plans, including test panels, as specified in the Standard Specifications, these special provisions, and as directed by the Engineer."

In the Special Provisions, Section 10-1.755 "PREPARE AND STAIN SHOTCRETE," is added as attached.

In the Special Provisions, Section 10-1.795, "MICROWAVE TOWER STRUCTURE," is added as attached.

In the Special Provisions, Section 12-17.202, "TUNNEL EXCAVATION AND SUPPORT," subsection "PART 1 - GENERAL," sub-subsection "SUBMITTALS," subheading "Schedule of Values," the fourth paragraph is revised as follows:

"The sum of the items listed in the Schedule of Values for the Bore No. 4 mined tunnel shall equal the sum of contract prices paid per meter for tunnel excavation and support of the locations and categories listed in the Engineer's Estimate. The sum of the items listed in the Schedule of Values for cross passages shall equal the sum of contract prices paid per meter for cross passage excavation and initial support of the categories listed in the Engineer's Estimate. Bond premiums, overhead and profit shall not be listed as separate items in the schedule of values but may be included in the various items listed."

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In the Special Provisions, Section 12-17.202, "TUNNEL EXCAVATION AND SUPPORT," subsection "PART 3 - EXECUTION," sub-subsection "INSTALLATION," subheading "SEM Tunnel Excavation and Support" the third paragraph is revised as follows:

"Shotcrete initial lining and smoothing shotcrete shall be relieved of groundwater pressure by coring, drilling, installation of drain pipes, or other means. A fan of drain holes shall be drilled every 6 meter (longitudinally) along the length of the tunnel. The circumferential spacing of the holes shall be 3 meters. Drain holes shall be a minimum of 50 mm in diameter and extend a minimum of 50 mm into rock. No hydrostatic pressure buildup behind the shotcrete lining shall be permitted. Probe and drain hole ends at the face shall be protected during shotcrete application."

In the Special Provisions, Section 12-17.202, "TUNNEL EXCAVATION AND SUPPORT," subsection "PART 4 – MEASUREMENT AND PAYMENT," the third paragraph is revised as follows:

"The contract prices paid per meter for tunnel excavation and support of the locations and categories listed in the Engineer's Estimate shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in tunnel excavation and support, complete in place, including excavation, over-excavation, geologic overbreak, niches, widening and breakthroughs at the cross passages from the Bore No. 4 mined tunnel, excavation and support of multiple ground class conditions, rock dowels, spiles, face dowels, grouted steel pipes, lattice girders, bore holes for probing ahead, drain holes, reinforced shotcrete, bench excavation face support, mud mats, water control, geologic mapping, swell potential testing, tunnel scanning survey, removal of grouted anchors and providing safety training program and personnel protective equipment to State personnel, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer."

In the Special Provisions, Section 12-17.202, "TUNNEL EXCAVATION AND SUPPORT," subsection "PART 4 – MEASUREMENT AND PAYMENT," the sixth paragraph is revised as follows:

"The contract prices paid per meter for cross passage excavation and initial support of the categories listed in the Engineer's Estimate shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in cross passage excavation and initial support, complete in place, including excavation, blasting, excavation and support of multiple ground class conditions, over-excavation, geologic overbreak, niches, rock dowels, spiles, lattice girders, reinforced shotcrete, mud mats, water control, geologic mapping, and tunnel scanning survey, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer."

In the Special Provisions, Section 12-17.206, "BLASTING," subsection "PART 1 - GENERAL," sub-subsection "SYSTEM DESCRIPTION," the ninth paragraph is deleted.

In the Special Provisions, Section 12-17.206, "BLASTING," subsection "PART 1 - GENERAL," sub-subsection "SUBMITTALS," the eleventh item of the second subparagraph of the first paragraph is deleted.

In the Special Provisions, Section 12-17.206, "BLASTING," subsection "PART 1 - GENERAL," sub-subsection "SUBMITTALS," the fourth subparagraph of the first paragraph is deleted.

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In the Special Provisions, Section 12-17.206, "BLASTING," subsection "PART 1 - GENERAL," sub-subsection "SCHEDULING AND SEQUENCING," the second paragraph is revised as follows:

"Blasting in Bore No. 4 shall be scheduled to allow closure of Bore No. 3 in conformance with "Closure Requirements and Conditions" of these special provisions."

In the Special Provisions, Section 12-17.206, "BLASTING," subsection "PART 1 - GENERAL," sub-subsection "SCHEDULING AND SEQUENCING," the third paragraph is deleted.

In the Special Provisions, Section 12-17.206, "BLASTING," subsection "PART 3 - EXECUTION," sub-subsection "PREPARATION," the second, third and fourth paragraphs are deleted.

In the Special Provisions, Section 12-17.301, "TUNNEL FINAL LINING," subsection "PART 1 - GENERAL," sub-subsection "SYSTEM DESCRIPTION," subheading "Formwork," the sixth paragraph is revised as follows:

"Formwork supporting the crown arch and sidewalls of the tunnel final lining shall not be moved sooner than 12 hours after completing placement of concrete within formwork or before a concrete compressive strength of 7 MPa has been reached. When a minimum concrete compressive strength of 7 MPa is achieved and when requested by the Contractor and approved by the Engineer, formwork supporting the crown arch and sidewalls of the tunnel final lining may be moved before the minimum 12 hour period."

In the Special Provisions, Section 12-17.502, "STAINLESS STEEL HANDRAIL (TUNNEL)," subsection "PART 2 - PRODUCTS," sub-subsection "MATERIALS," subheading "Formwork," the first paragraph is revised as follows:

"Railing Elements: Railing elements shall conform to ASTM Designation: A 312, Grade TP 316L pipe, 3 mm wall thickness and 33.4 mm diameter."

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In the Special Provisions, Section 12-17.902, "METAL PANELS," subsection "PART 2 – PRODUCTS," sub-subsection "SPARE METALS," the table following the first paragraph is revised as follows:

Metal Panel Type	Panel Finish	No. of Spare Panels	Panel Gage
1	Porcelain Enamel	50	11
2	Porcelain Enamel	4	11
3	Porcelain Enamel	4	11
4	Porcelain Enamel	4	11
5	Porcelain Enamel	4	11
6	Porcelain Enamel	4	11
7	Porcelain Enamel	4	11
8	Porcelain Enamel	4	11
9	Porcelain Enamel	4	11
10	Porcelain Enamel	4	11
11	Porcelain Enamel	4	11
12	Porcelain Enamel	4	11
13	Porcelain Enamel	4	11
14	Porcelain Enamel	4	11
15	Porcelain Enamel	4	11
16	Porcelain Enamel	4	11
17	Porcelain Enamel	4	11
18	Porcelain Enamel	4	11
19	Porcelain Enamel	4	11
20	Porcelain Enamel	50	11
21	Porcelain Enamel	4	11
Green panels (305 x 2400 mm)	Porcelain Enamel	25	11
Green panels (305 mm high x varying lengths)	Porcelain Enamel	4 of each	11
Vertical Closure	Porcelain Enamel	100 full height pieces	16
Top & Bottom Closure	Stainless Steel	100 lineal meters	16

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In the Special Provisions, Section 12-17.1503, "HANGERS AND SUPPORTS," subsection "PART 2 - PRODUCTS," sub-subsection "MISCELLANEOUS MATERIALS," the second paragraph is revised as follows:

"Concrete and masonry anchor bolts and studs: insert-type attachments with pull-out and shear capacities appropriate for supported loads and building materials where used, as follows:

1. Dry locations: steel-expansion wedge type.
2. Tunnel cross passages, FTC niches, and fire pump room anchor bolts: anchor bolts in the tunnel cross passage, FTC niches, and fire pump room shall be stainless steel mechanical anchor type anchor bolts rated for dynamic loading.
3. Mechanical anchor bolts: mechanical anchor bolts shall be stainless steel hex head finished bolt with a longitudinally tapered threaded end and a spring loaded multi-part conforming threaded zinc expander nut. Anchor shall meet Fed. Spec. FF-S-325, Group II, Type 2 Class 2, Style 1, be heat treated to SAE Grade 5 and zinc plated in accordance with ASTM B633-78, Type III, Class Fe/Zn 5, SC-I."

In the Special Provisions, Section 12-17.1604, "1500/2250 KVA SECONDARY UNIT SUBSTATION, 500 KVA AND 300 KVA SECONDARY UNIT SUBSTATIONS," subsection "PART 3 - EXECUTION," sub-subsection "DEMONSTRATION AND TRAINING," the first paragraph is revised as follows:

"The Contractor shall engage a factory-authorized service representative to train Department's maintenance personnel to adjust, operate, and maintain unit substation, switching controls, overcurrent protective devices, instrumentation, and accessories. The Contractor shall provide up to 2 training classes of 8 hours each, including instruction materials."

In the Special Provisions, Section 12-17.1605, "2000/3000 KVA SECONDARY UNIT SUBSTATION," subsection "PART 3 - EXECUTION," sub-subsection "DEMONSTRATION AND TRAINING," the first paragraph is revised as follows:

"The Contractor shall engage a factory-authorized service representative to train Department's maintenance personnel to adjust, operate, and maintain unit substation, switching controls, overcurrent protective devices, instrumentation, and accessories. The Contractor shall provide up to 2 training classes of 8 hours each, including instruction materials."

In the Special Provisions, Section 12-17.1609, "MEDIUM VOLTAGE CABLES," subsection "PART 1 - GENERAL," the first paragraph is revised as follows:

"Scope: The work shall consist of furnishing and installing medium voltage cables, Type EPR, including single-conductor 15 kV shielded power cables, and multi-conductor 5 kV shielded power cables, and related splices terminations, and accessories for use in wet or dry locations, in conduit, and underground ducts, conforming to these special provisions."

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In the Special Provisions, Section 12-17.1609, "MEDIUM VOLTAGE CABLES," subsection "PART 1 - GENERAL," sub-subsection "SUMMARY," the first and second paragraphs are revised as follows:

"15 kV power cables shall be installed from PG&E manholes to the Substation Buildings S1 and S2 switchgear utility metering cubicle termination compartments; from switchgear S1 12 kV feeder circuit breaker 152-T1 load side terminals to switchgear S2 12 kV feeder circuit breaker 152-T2 load side terminals; from switchgear S1 12 kV feeder circuit breaker 152-F1 to secondary unit substation W4 incoming line cubicle; from switchgear S1 12 kV feeder circuit breaker 152-F2 to secondary unit substation W123 incoming line cubicle; from switchgear S1 12kV feeder circuit breaker 152-F3 to line side of 600A interrupter switch; from switchgear S1 auxiliary compartment 1A to line side of 600A interrupter switch; from switchgear S2 12 kV feeder circuit breaker 152-F1 to secondary unit substation E4 incoming line cubicle; and from switchgear S2 12 kV feeder circuit breaker 152-F2 to secondary unit substation E1234 incoming line cubicle as shown on the plans. One PG&E manhole is located on the west side of the tunnel and the other manhole is on the east side of the tunnel. The 15 kV power cables shall be installed in concrete encased ductbanks.

5 kV power cables shall be installed from the 4.16 kV motor controllers W4 starter load terminals to each 150 KW (200 HP) jet fan motor terminals and from the 4.16 kV motor controllers E4 starter load terminals to each 150 KW (200 HP) jet fan motor terminals as shown on the plans."

In the Special Provisions, Section 12-17.1609, "MEDIUM VOLTAGE CABLES," subsection "PART 2 - PRODUCTS," sub-subsection "CABLES," the second subparagraph of the first paragraph is revised as follows:

"Single and multi-conductor copper conductor."

In the Special Provisions, Section 12-17.1610, "MEDIUM VOLTAGE MOTOR CONTROLLERS," subsection "PART 1 - GENERAL," the following sub-section "OPERATION AND MAINTENANCE MANUALS," is added after sub-subsection "QUALITY ASSURANCE."

"OPERATION AND MAINTENANCE MANUALS

The Contractor shall provide ten copies of the equipment operation and maintenance manuals."

In the Special Provisions, Section 12-17.1610, "MEDIUM VOLTAGE MOTOR CONTROLLERS," subsection "PART 3 - EXECUTION," sub-subsection "DEMONSTRATION AND TRAINING," the first paragraph is revised as follows:

"A factory-authorized service representative of the manufacturer shall provide equipment demonstration and training for the Department's maintenance personnel to adjust, operate, and maintain motor controllers. The Contractor shall provide up to 2 training classes of 8 hours each, including instruction materials."

In the Special Provisions, Section 12-17.1611, "MEDIUM VOLTAGE SWITCHGEAR," subsection "PART 1 - GENERAL," sub-subsection "OPERATION AND MAINTENANCE MANUALS," is added after sub-subsection "QUALITY ASSURANCE," as follows:

"OPERATION AND MAINTENANCE MANUALS

The Contractor shall provide ten copies of the equipment operation and maintenance manuals."

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In the Special Provisions, Section 12-17.1611, "MEDIUM VOLTAGE SWITCHGEAR," subsection "PART 2 - PRODUCTS," sub-subsection "STRUCTURE," the first subparagraph of the first paragraph is revised as follows:

"Doors and Panels: Each compartment shall be provided with a separate hinged door for servicing without exposing circuits in adjacent compartments."

In the Special Provisions, Section 12-17.1611, "MEDIUM VOLTAGE SWITCHGEAR," subsection "PART 3 - EXECUTION," sub-subsection, "FIELD QUALITY CONTROL," the following paragraph is added after the last paragraph:

"The Contractor shall provide up to 2 training classes of 8 hours each, including instruction materials."

In the Special Provisions, Section 12-17.1613, "BATTERY AND CHARGER," subsection "PART 1 - GENERAL," sub-subsection, "OPERATION AND MAINTENANCE MANUALS," is added after sub-subsection "WARRANTY," as follows:

"OPERATION AND MAINTENANCE MANUALS

The Contractor shall provide ten copies of the equipment operation and maintenance manuals."

In the Special Provisions, Section 12-17.1614, "AUTOMATIC TRANSFER SWITCH," subsection "PART 1 - GENERAL," sub-subsection, "OPERATION AND MAINTENANCE MANUALS," is added after sub-subsection "QUALITY ASSURANCE," as follows:

"OPERATION AND MAINTENANCE MANUALS

The Contractor shall provide ten copies of the equipment operation and maintenance manuals."

In the Special Provisions, Section 12-17.1614, "AUTOMATIC TRANSFER SWITCH," subsection "PART 3 - EXECUTION," sub-subsection, "START-UP AND TRAINING," the fourth paragraph is revised as follows:

"Train Department's maintenance personnel for a period no less than eight hours in regard to start-up, operation, and maintenance of the transfer switch and its components."

In the Special Provisions, Section 12-17.1615, "EMERGENCY STANDBY GENERATOR," subsection "PART 1 - GENERAL," sub-subsection, "SUBMITTALS," the following paragraph is added after the last paragraph:

"The Contractor shall provide ten copies of the equipment operation and maintenance manuals."

In the Special Provisions, Section 12-17.1615, "EMERGENCY STANDBY GENERATOR," subsection "PART 3 - EXECUTION," sub-subsection, "FIELD QUALITY CONTROL," the following paragraph is added after the last paragraph:

"Demonstration and Training:

The factory-authorized service representative shall perform the demonstration and train Department's maintenance personnel to adjust, operate, and maintain Emergency Standby Generators and its ancillary equipment.

The Contractor shall provide up to 2 training classes of 8 hours each, including instruction material."

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In the Special Provisions, Section 12-17.1616, "UNINTERRUPTIBLE POWER SUPPLY," subsection "PART 1 - GENERAL," sub-subsection, "OPERATION AND MAINTENANCE MANUALS," is added after sub-subsection "QUALITY ASSURANCE," as follows:

"OPERATION AND MAINTENANCE MANUALS

The Contractor shall provide ten copies of the equipment operation and maintenance manuals."

In the Special Provisions, Section 12-17.1616, "UNINTERRUPTIBLE POWER SUPPLY," subsection "PART 3 - EXECUTION," the following subparagraph is added after the last subparagraph of the seventh paragraph:

"The Contractor shall provide eight hours training including instruction materials."

In the Special Provisions, Section 12-17.1617, "SEISMIC CONTROLS FOR ELECTRICAL WORK," subsection "PART 2 - PRODUCTS," sub-subsection, "ANCHORAGE AND STRUCTURAL ATTACHMENT COMPONENTS," the second paragraph is revised as follows:

"Concrete and Masonry Anchor Bolts and Studs:

Dry locations: Zinc plated steel-expansion wedge type.

Tunnel anchor bolts: Anchor bolts supporting strut and conduit supports shall be AISI Type 304 stainless steel mechanical anchor type anchor bolts rated for dynamic loading.

1. Mechanical anchor bolts shall be stainless steel hexagon head finished bolt with a longitudinally tapered treaded end and a spring loaded multi-part conforming threaded zinc expander nut. Anchor shall meet Federal Spec FF-S-325, Group II, Type 4 Class I, be heat treated to SAE Grade 5 and zinc plated in accordance with ASTM B633-78, Type III, Class Fe/Zn 5, SC-1. Anchors shall be Taper Bolt."

In the Special Provisions, Section 12-17.1618, "SYSTEM STUDIES AND FIELD TESTING," is revised as attached.

In the Special Provisions, Section 12-17.1619, "TUNNEL LIGHTING," is revised as attached.

In the Special Provisions, Section 12-17.1620, "RELOCATE EQUIPMENT FROM EXISTING TO NEW OMC BUILDING," subsection, "PART 3 - EXECUTION," sub-subsection, "RELOCATION," the following paragraph is after the last paragraph:

"Relocated equipment shall be tested after installation to ensure they function properly with the new systems."

In the Special Provisions, Section 12-17.1620, "RELOCATE EQUIPMENT FROM EXISTING TO NEW OMC BUILDING," subsection "PART 4 – MEASUREMENT AND PAYMENT," the following paragraph is after the last paragraph:

"The lump sum price shall also include disposal of the unused material from the existing OMC building to the off-site."

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In the Special Provisions, Section 12-17.1621, "TUNNEL SCADA/PLC CONTROL AND MONITORING SYSTEM," subsection "PART 1 – GENERAL," sub-subsection, "TRAINING," the following paragraph is after the last paragraph.

"The Contractor shall provide up to 2 training classes of 8 hours each, including instruction manuals."

In the Special Provisions, Section 12-17.1621, "TUNNEL SCADA/PLC CONTROL AND MONITORING SYSTEM," subsection "PART 1 – GENERAL," sub-subsection "OPERATION AND MAINTENANCE MANUALS," is added after sub-subsection, "QUALITY ASSURANCE," as follows:

"OPERATION AND MAINTENANCE MANUALS

The Contractor shall provide ten copies of the equipment operation and maintenance manuals."

In the Special Provisions, Section 12-17.1622, "PUBLIC ADDRESS SYSTEM," subsection "PART 1 – GENERAL," sub-subsection, "OPERATION AND MAINTENANCE MANUALS," is added before sub-subsection "DESIGN WORK," as follows:

"OPERATION AND MAINTENANCE MANUALS

"The Contractor shall provide ten copies of the equipment operation and maintenance manuals."

In the Special Provisions, Section 12-17.1622, "PUBLIC ADDRESS SYSTEM," subsection "PART 3 – EXECUTION," sub-subsection, "TESTING," the following paragraph is added after the last paragraph:

"The Contractor shall provide eight hours of training including instruction materials."

In the Special Provisions, Section 12-17.1624, "TUNNEL CALL BOX," subsection "PART 1 – GENERAL," sub-subsection, "OPERATION AND MAINTENANCE MANUALS," is added after sub-subsection, "SUBMITTALS," as follows:

"OPERATION AND MAINTENANCE MANUALS

The Contractor shall provide ten copies of the equipment operation and maintenance manuals."

In the Special Provisions, Section 12-17.1624, "TUNNEL CALL BOX," subsection "PART 3 – EXECUTION," sub-subsection "FIELD QUALITY CONTROL," the following paragraph is added after the last paragraph:

"The Contractor shall provide eight hours of training including instruction materials."

In the Special Provisions, Section 12-17.1626, "ENVIRONMENTAL MONITORING SYSTEM," subsection "PART 1 – GENERAL," sub-subsection, "SUBMITTALS," the following paragraph is added after the last paragraph:

"The Contractor shall provide ten copies of the equipment operation and maintenance manuals."

In the Special Provisions, Section 12-17.1626, "ENVIRONMENTAL MONITORING SYSTEM," subsection "PART 3 – EXECUTION," sub-subsection, "DEMONSTRATION AND TRAINING," the following paragraph is added after the last paragraph:

"The Contractor shall provide eight hours of training including instruction materials."

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In the Special Provisions, Section 12-17.1627, "FIRE ALARM AND DETECTION SYSTEM (TUNNEL)," subsection "PART 1 – GENERAL," sub-subsection, "SUBMITTALS," the sixth subparagraph of the second paragraph is revised as follows:

"Maintenance data to include in the maintenance manuals in conformance with the provisions in "Basic Materials and Methods (Tunnel)" of these special provisions. The Contractor shall provide ten copies of the equipment operation and maintenance manuals."

In the Special Provisions, Section 12-17.1627, "FIRE ALARM AND DETECTION SYSTEM (TUNNEL)," subsection "PART 3 – EXECUTION," sub-subsection, "DEMONSTRATION AND TRAINING," the fourth subparagraph of the first paragraph is revised as follows:

"The Contractor shall provide eight hours of training including instruction materials."

In the Bid book, in the "Bid Item List," Items 62, 70, 77, 139, 144, 146, 150, 154, 157, 184, 190, 198, 200, and 204 are revised, Items 330, 331, 332, 333, 334, 335 and 336 are added and Item 204 and 329 are deleted as attached.

To Bid book holders:

Replace pages 6, 9, 10, 12, 13 and 19 of the "Bid Item List" in the Bid book with the attached revised pages 6, 9, 10, 12, 13, 19 and 19A of the Bid Item List. The revised Bid Item List is to be used in the bid.

Attached is a revised copy of the Information Handout Caldecott Geotechnical Interpretation Memo Plate A.

Inquiries or questions in regard to this addendum must be communicated as a bidder inquiry and must be made as noted in the Notice to Bidders section of the Notice to Bidders and Special Provisions.

Indicate receipt of this addendum by filling in the number of this addendum in the space provided on the signature page of the Bid book.

Submit bids in the Bid book you now possess. Holders who have already mailed their book will be contacted to arrange for the return of their book.

Inform subcontractors and suppliers as necessary.

This addendum, attachments and the modified wage rates are available for the Contractors' download on the Web site:

http://www.dot.ca.gov/hq/esc/oe/project_ads_addenda/04/04-294914

If you are not a Bid book holder, but request a book to bid on this project, you must comply with the requirements of this letter before submitting your bid.

Sincerely,

ORIGINAL SIGNED BY

REBECCA D. HARNAGEL
Chief, Office of Plans, Specifications & Estimates
Office Engineer
Division of Engineering Services

Attachments

GENERAL

Unless otherwise noted in these special provisions, Section 8-3, "Welding", applies to all welded materials associated with this project.

Flux cored welding electrodes conforming to the requirements of AWS A5.20 E6XT-4 or E7XT-4 shall not be used to perform welding for this project.

Wherever reference is made to the following AWS welding codes in the Standard Specifications, on the plans, or in these special provisions, the year of adoption for these codes shall be as listed:

AWS Code	Year of Adoption
D1.1	2008
D1.3	2008
D1.4	2005
D1.5	2008
D1.6	2007
D1.8	2009

Requirements of the AWS welding codes shall apply unless otherwise specified in the Standard Specifications, on the plans, or in these special provisions. Wherever the abbreviation AWS is used, it shall be equivalent to the abbreviations ANSI/AWS or AASHTO/AWS.

Inspection and approval of all joint preparations, assembly practices, joint fit-ups, welding techniques, and the performance of each welder, welding operator, and tack welder shall be documented by the QC Inspector on a daily basis for each day welding is performed. For each inspection, including fit-up, Welding Procedure Specification (WPS) verification, and final weld inspection, the QC Inspector shall confirm and document compliance with the requirements of the AWS or other specified code criteria and the requirements of these special provisions on all welded joints before welding, during welding, and after the completion of each weld.

The Engineer shall have the authority to verify the qualifications or certifications of any welder, QC Inspector, or NDT personnel to specified levels by retests or other means approved by the Engineer.

When joint weld details that are not prequalified to the details of Clause 3 of AWS D1.1 or to the details of Figure 2.4 or 2.5 of AWS D1.5 are proposed for use in the work, the joint details, their intended locations, and the proposed welding parameters and essential variables, shall be approved by the Engineer. The Contractor shall allow the Engineer 15 days to complete the review of the proposed joint detail locations. In the event the Engineer fails to complete the review within the time allowed, and if, in the opinion of the Engineer, completion of the work is delayed or interfered with by reason of the Engineer's delay in completing the review, the Contractor will be compensated for any resulting loss, and an extension of time will be granted, in the same manner as provided for in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

In addition to the requirements of AWS D1.1, welding procedure qualifications for work welded in conformance with the code shall conform to the following:

When a nonstandard weld joint is to be made using a combination of WPSs, a single test may be conducted combining the WPSs to be used in production, provided the essential variables, including weld bead placement, of each process are limited to those established in Table 4.5.

Upon approval of the proposed joint detail locations and qualification of the proposed joint details, welders and welding operators using these details shall perform a qualification test plate using the WPS variables and the joint detail to be used in production. The test plate shall have the maximum thickness to be used in production and a minimum length of 18 inches. The test plate shall be mechanically and radiographically tested. Mechanical and radiographic testing and acceptance criteria shall be as specified in the applicable AWS codes.

The Engineer will witness all qualification tests for WPSs that were not previously approved by the Department. Unless otherwise specified, an approved independent third party will witness the qualification tests for welders or welding operators. The independent third party shall be a current CWI and shall not be an employee of the contractor performing the welding.

In addition to the requirements specified in the applicable code, the period of effectiveness for a welder's or welding operator's qualification shall be a maximum of 3 years for the same weld process, welding position, and weld type. If welding will be performed without gas shielding, then qualification shall also be without gas shielding. Excluding welding of fracture critical members, a valid qualification at the beginning of work on a contract will be acceptable for the entire period of the contract, as long as the welder's or welding operator's work remains satisfactory. The Contractor shall allow the Engineer 15 days to review the qualifications and copy of the current certification of the independent third party. In the event the Engineer fails to complete the review within the time allowed, and if, in the opinion of the Engineer, completion of the

work is delayed or interfered with by reason of the Engineer's delay in completing the review, the Contractor will be compensated for any resulting loss, and an extension of time will be granted, in the same manner as provided for in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

The Contractor shall notify the Engineer 7 days prior to performing any procedure qualification tests. Witnessing of qualification tests by the Engineer shall not constitute approval of the intended joint locations, welding parameters, or essential variables. The Contractor shall notify the Engineer using the "Standard TL-38 Inspection Form" located at:

<http://www.dot.ca.gov/hq/esc/Translab/OSM/smbforms.htm>

Clause 6.14.6, "Personnel Qualification," of AWS D1.1, Section 7.8, "Personnel Qualification," of AWS D1.4, and Clause 6.1.3.4, "Personnel Qualification," of AWS D1.5 are replaced with the following:

Personnel performing nondestructive testing (NDT) shall be qualified and certified in conformance with the requirements of the 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 shall meet 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 shall be either:

- A. Certified NDT Level II technicians, or;
- B. Level III technicians who hold a current ASNT Level III certificate in that discipline and are authorized and certified to perform the work of Level II technicians.

Clause 6.6.5, "Nonspecified NDT Other than Visual," of AWS D1.1, Section 7.6.5 of AWS D1.4 and Clause 6.6.5 of AWS D1.5 shall not apply.

For any welding, the Engineer may direct the Contractor to perform NDT that is in addition to the visual inspection or NDT specified in the AWS or other specified welding codes, in the Standard Specifications, or in these special provisions. Except as provided for in these special provisions, additional NDT required by the Engineer, and associated repair work, will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications. Prior to release of welded material by the Engineer, if testing by NDT methods other than those originally specified discloses an attempt to defraud or reveals a gross nonconformance, all costs associated with the repair of the deficient area, including NDT of the weld and of the repair, and any delays caused by the repair, shall be at the Contractor's expense. A gross nonconformance is defined as the sum of planar type rejectable indications in more than 20 percent of the tested length.

When less than 100 percent of NDT is specified for any weld, it is expected that the entire length of weld meet the specified acceptance-rejection criteria. Should any welding deficiencies be discovered by additional NDT directed or performed by the Engineer that utilizes the same NDT method as that originally specified, all costs associated with the repair of the deficient area, including NDT of the weld and of the weld repair, and any delays caused by the repair, shall be at the Contractor's expense.

Repair work to correct welding deficiencies discovered by visual inspection directed or performed by the Engineer, and any associated delays or expenses caused to the Contractor by performing these repairs, shall be at the Contractor's expense.

WELDING QUALITY CONTROL

Welding quality control shall conform to the requirements in the AWS or other specified welding codes, the Standard Specifications, and these special provisions.

Unless otherwise specified, welding quality control shall apply when any work is welded in conformance with the provisions in Section 49, "Piling," Section 52, "Reinforcement," or Section 55, "Steel Structures," of the Standard Specifications or structural steel for building work.

In addition, welding quality control shall apply when welding is performed for the following work:

- A. PTFE spherical bearings.
- B. Seismic joints.

The Contractor shall designate in writing a welding Quality Control Manager (QCM). The QCM shall be responsible directly to the Contractor for the quality of welding, including materials and workmanship, performed by the Contractor and subcontractors.

The QCM shall be the sole individual responsible to the Contractor for submitting, receiving, reviewing, and approving all correspondence, required submittals, and reports to and from the Engineer. The QCM shall be a registered professional engineer or shall be currently certified as a CWI.

Unless the QCM is hired by a subcontractor providing only QC services, the QCM shall not be employed or compensated by any subcontractor, or by other persons or entities hired by subcontractors, who will provide other services or materials for the project. The QCM may be an employee of the Contractor.

The QCM shall sign and furnish to the Engineer, a Certificate of Compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications for each item of work for which welding was performed. The certificate shall state that all of the materials and workmanship incorporated in the work, and all required tests and inspections of this work, have been performed in conformance with the details shown on the plans, the Standard Specifications, and these special provisions.

Welding inspection personnel or NDT firms to be used in the work shall not be employed or compensated by any subcontractor, or by other persons or entities hired by subcontractors, who will provide other services or materials for the project, except for the following condition:

- A. The work is welded in conformance with AWS D1.5 and is performed at a permanent fabrication or manufacturing facility that is certified under the AISC Quality Certification Program, Category CBR, Major Steel Bridges and Fracture Critical endorsement F, when applicable.

For welding performed at such facilities, the inspection personnel or NDT firms may be employed or compensated by the facility performing the welding provided the facility maintains a QC program that is independent from production.

Prior to submitting the Welding Quality Control Plan (WQCP) required herein, a prewelding meeting between the Engineer, the Contractor's QCM, and a representative from each entity performing welding or inspection for this project, shall be held to discuss the requirements for the WQCP.

Information regarding the contents, format, and organization of a WQCP, is available at the Transportation Laboratory.

The Contractor shall submit to the Engineer, in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications, 2 copies of a separate WQCP for each subcontractor or supplier for each item of work for which welding is to be performed.

The Contractor shall allow the Engineer 15 days to review the WQCP submittal after a complete plan has been received. No welding shall be performed until the WQCP is approved in writing by the Engineer. In the event the Engineer fails to complete the review within the time allowed, and if, in the opinion of the Engineer, completion of the work is delayed or interfered with by reason of the Engineer's delay in completing the review, the Contractor will be compensated for any resulting loss, and an extension of time will be granted, in the same manner as provided for in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

An amended WQCP or any addendum to the approved WQCP shall be submitted to, and approved in writing by the Engineer, for proposed revisions to the approved WQCP. An amended WQCP or addendum will be required for revisions to the WQCP, including but not limited to a revised WPS; additional welders; changes in NDT firms, QC, or NDT personnel or procedures; or updated systems for tracking and identifying welds. The Engineer shall have 7 days to complete the review of the amended WQCP or addendum. Work affected by the proposed revisions shall not be performed until the amended WQCP or addendum has been approved. In the event the Engineer fails to complete the review within the time allowed, and if, in the opinion of the Engineer, completion of the work is delayed or interfered with by reason of the Engineer's delay in completing the review, the Contractor will be compensated for any resulting loss, and an extension of time will be granted, in the same manner as provided for in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

After final approval of the WQCP, amended WQCP, or addendum, the Contractor shall submit 7 copies to the Engineer of the approved documents. A copy of the Engineer approved document shall be available at each location where welding is to be performed.

All welding will require inspection by the Engineer. The Contractor shall request inspection at least 3 business days prior to the beginning of welding for locations within California and 5 business days for locations outside of California. The Contractor shall request inspection at:

<http://www.dot.ca.gov/hq/esc/Translab/OSM/smbforms.htm>

Continuous inspection shall be provided when any welding is being performed. Continuous inspection, as a minimum, shall include having a QC Inspector within such close proximity of all welders or welding operators so that inspections by the QC Inspector of each welding operation at each welding location does not lapse for a period exceeding 30 minutes.

A daily production log for welding shall be kept for each day that welding is performed. The log shall clearly indicate the locations of all welding. The log shall include the welders' names, amount of welding performed, any problems or deficiencies discovered, and any testing or repair work performed, at each location. The daily report from each QC Inspector shall also be included in the log.

The following items shall be included in a Welding Report that is to be submitted to the Engineer within 15 days following the performance of any welding:

- A. A daily production log.
- B. Reports of all visual weld inspections and NDT.
- C. Radiographs and radiographic reports, and other required NDT reports.
- D. A summary of welding and NDT activities that occurred during the reporting period.
- E. Reports of each application of heat straightening.
- F. A summarized log listing the rejected lengths of weld by welder, position, process, joint configuration, and piece number.
- G. Documentation that the Contractor has evaluated all radiographs and other nondestructive tests and corrected all rejectable deficiencies, and that all repaired welds have been reexamined using the required NDT and found acceptable.

The following information shall be clearly written on the outside of radiographic envelopes: name of the QCM, name of the nondestructive testing firm, name of the radiographer, date, contract number, complete part description, and all included weld numbers, report numbers, and station markers or views, as detailed in the WQCP. In addition, all interleaves shall have clearly written on them the part description and all included weld numbers and station markers or views, as detailed in the WQCP. A maximum of 2 pieces of film shall be used for each interleave.

Reports of all visual inspections and NDT shall be signed by the inspector or technician and submitted daily to the QCM for review and signature prior to submittal to the Engineer. Corresponding names shall be clearly printed or typewritten next to all signatures. Reports of all NDT, whether specified, additional, or informational, performed by the Contractor shall be submitted to the Engineer.

The Engineer will review the Welding Report to determine if the Contractor is in conformance with the WQCP. Except for field welded steel pipe piling, the Engineer shall be allowed 15 days to review the report and respond in writing after the complete Welding Report has been received. Prior to receiving notification from the Engineer of the Contractor's conformance with the WQCP, the Contractor may encase in concrete or cover welds for which the Welding Report has been submitted. However, should the Contractor elect to encase or cover those welds prior to receiving notification from the Engineer, it is expressly understood that the Contractor shall not be relieved of the responsibility for incorporating material in the work that conforms to the requirements of the plans and specifications. Material not conforming to these requirements will be subject to rejection. Should the Contractor elect to wait to encase or cover welds pending notification by the Engineer, and in the event the Engineer fails to complete the review within the time allowed, and if, in the opinion of the Engineer, completion of the work is delayed or interfered with by reason of the Engineer's delay in completing the review, the Contractor will be compensated for any resulting loss, and an extension of time will be granted, in the same manner as provided for in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

For field welded steel pipe piling, including bar reinforcement in the piling, the Contractor shall allow the Engineer 2 business days to review the Welding Report and respond in writing after the required items have been received. No field welded steel pipe piling shall be installed, and no reinforcement in the piling shall be encased in concrete until the Engineer has approved the above requirements in writing.

In addition to the requirements in AWS D1.1 and AWS D1.5, third-time excavations of welds or base metal to repair unacceptable discontinuities, regardless of NDT method, and all repairs of cracks require prior approval of the Engineer.

The Engineer shall be notified immediately in writing when welding problems, deficiencies, base metal repairs, or any other type of repairs not submitted in the WQCP are discovered, and also of the proposed repair procedures to correct them. For requests to perform third-time repairs or repairs of cracks, the Contractor shall include an engineering evaluation of the proposed repair. The engineering evaluation, at a minimum, shall address the following:

- A. What is causing each defect?
- B Why the repair will not degrade the material properties?
- C What steps are being taken to prevent similar defects from happening again?

The Contractor shall allow the Engineer 7 days to review these procedures. No remedial work shall begin until the repair procedures are approved in writing by the Engineer. In the event the Engineer fails to complete the review within the time allowed, and if, in the opinion of the Engineer, completion of the work is delayed or interfered with by reason of the Engineer's delay in completing the review, the Contractor will be compensated for any resulting loss, and an extension of time will be granted, in the same manner as provided for in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

Unless otherwise specified, Clauses 6.1.3 through 6.1.4.3 of AWS D1.1, Section 7.1.2 of AWS D1.4, and Clauses 6.1.1.2 through 6.1.3.3 of AWS D1.5 are replaced with the following:

The QC Inspector shall be the duly designated person who acts for and on behalf of the Contractor for inspection, testing, and quality related matters for all welding.

Quality Assurance (QA) is the prerogative of the Engineer. The QA Inspector is the duly designated person who acts for and on behalf of the Engineer.

The QC Inspector shall be responsible for quality control acceptance or rejection of materials and workmanship, and shall be currently certified as an AWS Certified Welding Inspector (CWI) in conformance with the requirements in AWS QC1, "Standard for AWS Certification of Welding Inspectors."

The QC Inspector may be assisted by an Assistant QC Inspector provided that this individual is currently certified as an AWS Certified Associate Welding Inspector (CAWI) in conformance with the requirements in AWS QC1, "Standard for AWS Certification of Welding Inspectors." The Assistant QC Inspector may perform inspection under the direct supervision of the QC Inspector provided the assistant is always within visible and audible range of the QC Inspector. The QC Inspector shall be responsible for signing all reports and for determining if welded materials conform to workmanship and acceptance criteria. The ratio of QC Assistants to QC Inspectors shall not exceed 5 to 1.

When the term "Inspector" is used without further qualification, it shall refer to the QC Inspector.

Clause 6.5.4 of AWS D1.5 is replaced with the following:

The QC Inspector shall inspect and approve each joint preparation, assembly practice, welding technique, joint fit-up, and the performance of each welder, welding operator, and tack welder to make certain that the applicable requirements of this code and the approved Welding Procedure Specification (WPS) are met. The QC Inspector shall examine the work to make certain that it meets the requirements of Clauses 3 and 6.26. The size and contour of all welds shall be measured using suitable gages. Visual inspection for cracks in welds and base metal, and for other discontinuities shall be aided by strong light, magnifiers, or such other devices as may be helpful. Acceptance criteria different from those specified in this code may be used when approved by the Engineer.

In addition to the requirements of AWS D1.5, Clause 5.12 or 5.13, welding procedures qualification for work welded in conformance with that code shall conform to the following requirements:

- A. Unless considered prequalified, fillet welds shall be qualified in each position. The fillet weld soundness test shall be conducted using the essential variables of the WPS as established by the Procedure Qualification Record (PQR).
- B. For qualification of joints that do not conform to Figures 2.4 and 2.5 of AWS D1.5, a minimum of two WPS qualification tests are required. The tests shall be conducted using both Figure 5.1 and Figure 5.3. The test conforming to Figure 5.1 shall be conducted in conformance with AWS D1.5, Clause 5.12 or 5.13. The test conforming to Figure 5.3 shall be conducted using the welding electrical parameters that were established for the test conducted conforming to Figure 5.1. The ranges of welding electrical parameters established during welding per Figure 5.1 in conformance with AWS D1.5, Clause 5.12, shall be further restricted according to the limits in Table 5.3 during welding per Figure 5.3.
- C. Multiple zones within a weld joint may be qualified. The travel speed, amperage, and voltage values that are used for tests conducted per AWS D1.5 Clause 5.13 shall be consistent for each pass in a weld joint, and shall in no case vary by more than ± 10 percent for travel speed, ± 10 percent for amperage, and ± 7 percent for voltage as measured from a predetermined target value or average within each weld pass or zone. The travel speed shall in no case vary by more than ± 15 percent when using submerged arc welding.
- D. For a WPS qualified in conformance with AWS D1.5 Clause 5.13, the values to be used for calculating ranges for current and voltage shall be based on the average of all weld passes made in the test. Heat input shall be calculated using the average of current and voltage of all weld passes made in the test for a WPS qualified in conformance with Clause 5.12 or 5.13.
- E. Macroetch tests are required for WPS qualification tests, and acceptance shall be per AWS D1.5 Clause 5.19.3.
- F. When a nonstandard weld joint is to be made using a combination of WPSs, a test conforming to Figure 5.3 may be conducted combining the WPSs to be used in production, provided the essential variables, including weld bead placement, of each process are limited to those established in Table 5.3.
- G. Prior to preparing mechanical test specimens, the PQR welds shall be inspected by visual and radiographic tests. Backing bar shall be 3 inches in width and shall remain in place during NDT testing. Results of the visual and radiographic tests shall comply with AWS D1.5 Clause 6.26.2, excluding Clause 6.26.2.2. Test plates that do not comply with both tests shall not be used.

**Chart No. 4b
Freeway/Expressway Lane Requirements**

County: : CC/Ala	Route/Direction: Rte 24 Westbound	KP: CC 0.56/ALA 9.41
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Closure Limits: Caldecott Tunnel Bore 3 Closure

FROM HOUR TO 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
Mondays through Thursdays	N	N	N	N	N	N	N	N	N	N	N	X	N	N	N	N	N	N	N	N	N	N	N	N	N
Fridays	N	N	N	N	N	N	N	N	N	N	N	X	N	N	N	N	N	N	N	N	N	N	N	N	N
Saturdays	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Sundays	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

Legend:

X Bore 3 full closure – for a twenty – minute interval.

N No work permitted

REMARKS:

1. Implement with Caldecott Tunnel Maintenance Crew when closing at or close to Caldecott Tunnel.
2. For blasting operations only: Only one blast per day will be allowed in association with tunnel bore #3 shutdown for an inspection period of no more than a maximum of 20 minutes between the hour of 11:00 a.m.-12:00 p.m.; advance 24-hour notification required.

ARCHITECTURAL TREATMENT (TEXTURED SHOTCRETE)

Architectural textures for shotcrete surfaces applied to retaining wall RW-8W shall conform to the details shown on the plans and the provisions in Section 51, "Concrete Structures," and Section 53, "Shotcrete," of the Standard Specifications and these special provisions.

Attention is directed to "Prepare and Stain Shotcrete" of these special provisions.

The architectural texture shall be a sculpted shotcrete finish simulating the strata lines of the local geology.

The architectural texture shall resemble in appearance the texture, pattern, surface relief, and strata line detail of the following wall:

- A. Route 24, in Contra Costa County, in the City of Orinda, on the west side slope of the route before the entrance to the Caldecott Tunnel.

Test Panel

A test panel at least 2-meter by 2-meter in size shall be successfully completed at a location approved by the Engineer before beginning work on architectural textures for shotcrete surfaces. The test panel shall be constructed and finished with the materials, tools, equipment, and methods to be used in constructing, sculpting, and finishing the architectural texture for the finished work. If ordered by the Engineer, additional test panels shall be constructed and finished until the specified finish and texture are obtained, as determined by the Engineer.

The test panel approved by the Engineer shall be used as the standard of comparison in determining acceptability of the architectural texture for shotcrete surfaces.

Shotcrete Sculpting

The layout strata lines shall only be performed on walls fully constructed for the full height and length of the wall. The Contractor shall not perform sectional layout, sculpting, or staining work as the wall is constructed.

Shotcrete sculpting shall be performed in two stages. The first stage shall consist of applying high visibility paint to the wall face to illustrate the strata line patterns as shown on the plans. The same personnel who will sculpt the wall face shall perform the layout of the strata lines.

In the second stage, shotcrete shall be applied and sculpted to provide the desired finished architectural detail and relief. The sculpting personnel shall direct the amount of shotcrete to be applied. The second stage shall not begin until the Engineer accepts the work performed in the first stage.

10-1.755 PREPARE AND STAIN SHOTCRETE

This work shall consist of preparing and staining shotcrete surfaces where shown on the plans in conformance with these special provisions.

The stain shall consist of a base and accent stain material. The base stain shall be an organic based non-toxic iron oxide derivative. The accent stain shall be a water-based solution of metallic salts that penetrate and react with the shotcrete surface to produce insoluble, abrasion-resistant color deposits in the pores of the shotcrete. The stain shall contain dilute acid to etch the shotcrete surfaces so that the staining ingredients can penetrate the shotcrete.

Shotcrete stain shall be formulated and applied so that the final color of the stained shotcrete is in the range of brown and grey earthtones that match existing rock formations on the site.

The Contractor shall submit a copy of the stain manufacturer's recommendations and written application instructions to the Engineer not less than 7 days before applying shotcrete stain. Prior to commencement of shotcrete staining operations, the Contractor shall submit to the Engineer a containment and collection program for liquid and effluent runoff and residue resulting from preparing, staining, and rinsing shotcrete surfaces. The Engineer will notify the Contractor of the approval or rejection of the containment and collection program within 2 weeks of the Contractor's complete submittal. No shotcrete staining work shall be performed until the Engineer has approved the containment and collection program.

The containment and collection system shall contain all liquid and effluent runoff and residue resulting from preparing, staining, and rinsing stained shotcrete surfaces. Samples of the liquid and effluent runoff and residue shall be collected for testing. The samples shall be provided to an authorized hazardous waste testing laboratory to determine proposed disposal procedures. A copy of the test results shall be submitted to the Engineer.

The Department will not be liable to the Contractor for failure to approve all or any portion of an originally submitted or revised containment and collection program, nor for any delays to the work due to the Contractor's failure to submit an acceptable program.

Disposal of liquid and debris collected by the containment system shall be performed in accordance with all applicable Federal, State, and Local hazardous waste laws. Laws that govern this work may include:

- A. Health and Safety Code, Division 20, Chapter 6.5 (California Hazardous Waste Control Act).
- B. Title 22, California Code of Regulations, Division 4.5, (Environmental Health Standards for the Management of Hazardous Waste).
- C. Title 8, California Code of Regulations.

Temporary storage and disposal of liquid and effluent runoff and residue shall be in conformance with the provisions in "Construction Site Management" of these special provisions. New shotcrete surfaces to be stained shall be cured in conformance with the provisions in Section 90-7.07, "Curing Miscellaneous Concrete Work," of the Standard Specifications and these special provisions.

Stain shall be applied to a minimum of two 2-meter by 2-meter test locations designated by the Engineer, and their appearance approved by the Engineer, prior to commencement of staining operations on the remaining textured shotcrete surfaces. The Contractor shall notify the Engineer at least 5 days prior to applying the stain to the test areas. If ordered by the Engineer, additional staining tests shall be performed until the specified finish and color are obtained, as determined by the Engineer.

The Contractor shall apply the shotcrete stain in conformance with the provisions for paint application in Section 59-1.02, "Weather Conditions," of the Standard Specifications, except that applications of stain will not be permitted when the atmospheric or shotcrete surface temperature is at or below 10°C or above 35°C. The stain shall be applied in conformance with the manufacturer's recommendations in a minimum of 3 separate applications of at least 2 multiple stain colors. The first application shall consist of applying a 60 percent strength mixture of base stain. The second application shall consist of applying a 100 percent strength mixture of the same base stain. The third application shall consist of applying accent stain. The stain shall be applied uniformly, working to avoid excessive rundown. The stain shall be worked into the shotcrete surface in circular motions with a nylon-bristled brush. Drips, puddles, or other irregularities shall be worked into the shotcrete.

After the last coat of stain has dried, the Contractor shall rinse stained surfaces with water until the rinse water runs clear. The Contractor shall protect adjacent surfaces during shotcrete staining operations.

MEASUREMENT AND PAYMENT

Prepare and stain shotcrete will be measured by the square meter.

The contract price paid per square meter for prepare and stain shotcrete of the types listed in the Engineer's Estimate shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, including all requirements for collecting, testing, and disposal of waste, and for doing all the work involved in preparing of and applying stain to shotcrete surfaces, complete in place, including construction of test locations, and liquid and debris containment and collection, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.795 MICROWAVE TOWER STRUCTURE

Structure and foundation for microwave tower shall conform to the provisions in Section 56-1, "Overhead Sign Structures," of the Standard Specifications, "Steel Structures" of these special provisions, and the following requirements.

Before commencing fabrication of microwave tower structure, the Contractor shall submit 2 sets of working drawings to the Engineer in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The working drawings shall include post height, anchorage layout, proposed splice locations, a snugging and tensioning pattern for anchor bolts and high-strength bolted connections, and details for permanent steel anchor bolt templates. The working drawings shall be supplemented with a written quality control program that includes methods, equipment, and personnel necessary to satisfy the requirements specified herein.

Working drawings shall be 559 mm x 864 mm or 279 mm x 432 mm in size and each drawing and calculation sheet shall include the District-County-Route-Post Mile and contract number.

The Engineer shall have 30 days to review the microwave tower structure working drawings after a complete submittal has been received. No fabrication or installation of the structure shall be performed until the working drawings are approved in writing by the Engineer.

Should the Engineer fail to complete the review within the time allowance and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the microwave tower structure working drawings, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

Steel bolts not designated on the plans as high strength (HS) or stainless steel shall be for general applications and shall conform to the requirements in ASTM Designation: A 307.

A permanent steel template shall be used to maintain the proper anchor bolt spacing.

One top nut, one leveling nut, and 2 washers shall be provided for the upper threaded portion of each anchor bolt.

Flatness of surfaces for the following shall conform to the requirements in ASTM Designation: A 6/A 6M:

1. Base plates that are to come in contact with concrete, grout, or washers and leveling nuts
2. Plates in high-strength bolted connections

No holes shall be made in members unless the holes are shown on the plans or are approved in writing by the Engineer.

Longitudinal seam welds shall have 60 percent minimum penetration, except that within 150 mm of circumferential welds, longitudinal seam welds shall be complete joint penetration (CJP) groove welds. In addition, longitudinal seam welds on structures having telescopic pole segment splices shall be CJP groove welds on the female end for a length on each end equal to the designated slip fit splice length plus 150 mm.

Steel members used for microwave tower structure shall receive nondestructive testing (NDT) in conformance with AWS D1.1 and the following:

1.

Weld Location	Weld Type	Minimum Required NDT
Splice welds around the perimeter of poles.	CJP groove weld with backing ring	100% UT ^a or RT ^b
Longitudinal seam welds	CJP or PJP ^c groove weld	Random 25% MT ^d
Longitudinal seam welds within 150 mm of a circumferential splice.	CJP groove weld	100% UT or RT
Welds attaching base plates, flange plates, or pole plates, to poles.	CJP groove weld with backing ring and reinforcing fillet	t > 4.5 mm: 100% UT and MT t < 4.5 mm: 100% MT after root weld pass and final weld pass t = pole thickness
	External (top) fillet weld for socket-type connections	100% MT

a ultrasonic testing

b radiographic testing

c partial joint penetration

d magnetic particle testing

2. The acceptance and repair criteria for UT of welded joints where any of the members are less than 8 mm thick shall conform to the requirements in AWS D1.1, Section 6.13.3.1. A written procedure approved by the Engineer shall be used when performing this UT. These written procedures shall conform to the requirements in AWS D1.1, Annex K. The acceptance and repair criteria for other welded joints receiving UT shall conform to the requirements in AWS D1.1, Section 6, Table 6.3 for cyclically loaded nontubular connections.
3. The acceptance and repair criteria for radiographic or real time image testing shall conform to the requirements of AWS D1.1 for tensile stress welds.
4. For longitudinal seam welds, the random locations for NDT will be selected by the Engineer. The cover pass shall be ground smooth at the locations to be tested. If repairs are required in a portion of a tested weld, the repaired portion shall receive NDT, and additional NDT shall be performed on untested portions of the weld. The additional NDT shall be performed on 25 percent of that longitudinal seam weld. After this additional NDT is performed and if more repairs are required, then that entire longitudinal seam weld shall receive NDT.

Circumferential welds and base plate to post welds may be repaired only one time without written permission from the Engineer.

The contract price paid per kilogram for microwave tower structure shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing microwave tower structure, complete in place, including furnishing and installing anchor bolt templates and anchor bolt assemblies, welding, testing of welds, and cleaning and painting, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

12-17.1618 SYSTEM STUDIES AND FIELD TESTING

PART 1 – GENERAL

Scope: The following systems studies and field testing work will be performed by independent firms hired and paid by Caltrans. The Contractor shall cooperate with these independent firms as required to accomplish the work. The work will include furnishing labor and material to perform the following tasks:

Engineering services for the electrical systems studies including short-circuit analysis and protective device coordination;

Electrical Arc Flash Hazard Calculations and Analysis, Personnel Protective Equipment (PPE) and Clothing, and Arc Flash Hazard Training;

Independent field protective device setting and testing services for all electrical equipment and systems; and

Commissioning assistance for final coordinated systems.

SHORT-CIRCUIT AND PROTECTIVE DEVICE COORDINATION STUDIES

Short-circuit and protective device coordination will include the following:

Complete single-line diagram of system studied with all buses identified to report data;

Utility company maximum expected three-phase fault with X/R ratio and utility company maximum expected single-line to ground fault currents with X/R ratio at 12 kV incoming supply location indicated shall be used in short circuit studies.

Short-circuit study including three phase and line to ground short-circuit currents at major buses extended down to system buses. Relay settings and protection device coordination studies shall include:

1. Coordinated composite time-current characteristic curves including recommended ratings and settings of all protective devices in tabulated form; and associated calculations to demonstrate that the power system protection will be selectively coordinated by the use of devices or equipment submitted.
2. Situations where system coordination is not achievable due to device limitations along with inadequate interrupting ratings will be noted.
3. The studies will consider operation during normal conditions, alternate operations, and during emergency power conditions, and will include ground fault protective device settings.
4. A registered Electrical Engineer in the State of California shall perform these studies.
5. Settings of main 12 kV breaker relays on both incoming supply feeders from PG&E shall be coordinated and approved by PG&E.

Data consisting of manufacturer's time-current characteristic curves for individual protective devices, recommended settings of adjustable protective devices, and recommended ratings of non-adjustable protective devices.

The power systems study will be required within 30 days after the electrical equipment submittals by the Contractor have been received for review by the Engineer. The electrical submittals will be reviewed but will not be approved until the power systems studies have been received and reviewed.

ELECTRICAL ARC FLASH HAZARD ANALYSIS, WORKING LABELS AND TRAINING

Work shall be complete in the form of technical reports, PPE recommendations, relay coordination properly adjusted based upon the arc flash hazard analysis and training.

As a minimum the work shall include the following:

1. Electrical Arc Flash Hazard Calculation and Analysis. This includes reviewing tripping time of the protective devices and associated arc energy during arc fault. Any recommendations for equipment modifications or replacement of tripping devices inside the electrical distribution system.
2. Electrical equipment warning labels based upon the arc hazard energy. Labels shall comply with the requirements of NEC NFPA 70
3. Arc Flash Hazard Training by a qualified professional in the field of electric arc hazard with a minimum of three (3) years experience in providing training classes and providing appropriate class room material. Training will be conducted in Oakland, Caltrans District 4 offices and a class of 25 individuals is expected for the training.
4. Instructor will make one site trip to the Caldecott tunnel and will show how to make use of personnel protective clothing recommended by the arc flash hazard study.

Coordinate with Caltrans to obtain up-to-date information on the existing power supply equipment for bore 1 through bore 3. In the event that this information is not adequate for arc flash analysis, the contractor shall gather this information by site inspection of the installed equipment or by contacting suppliers of the installed equipment.

Software program such as SKM, EDSA, EasyPower, etc. shall be used in conducting arc flash hazard study. Study shall be complete including proper list of actual data of the installed equipment and equipment to be installed for the Bore 4 expansion, and any assumption made in case where actual equipment data was not available. Before finalizing the study analysis provide a draft copy to the Engineer for reviews and approval.

SUBMITTALS

Comprehensive report that includes:

Report summary with analysis methodology, findings and recommendations

Summary of input data for Utility source, equipment and cables

Available fault at each equipment location with comparison to equipment rating

Overcurrent device settings (e.g. pick-up, time delay, curve)

Incident energy level (calories/cm²) for each equipment location and PPE

Overcurrent device coordination curves including related section of the single line diagram

Working Labels in accordance with ANSI Z535.4 -2002 which will include as a minimum the following:

Arc hazard boundary, Working distance, Arc flash incident energy at the working distance, PPE category and description of glove rating, Voltage rating of the equipment, Limited approach distance, Prohibitive approach distance, Equipment/bus name, Date prepared, Arc Flash hazard study prepare name and address.

ENGINEER'S QUALIFICATIONS

The power systems studies shall be performed by a registered Professional Engineer with at least five years of current experience in the design of coordinated power system protection and Arc flash hazard calculations and analysis. Experience data shall include at least five references for work of a magnitude comparable to this contract.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

FIELD TESTING

Field testing will be performed by an independent firm which is a recognized electrical testing firm. The field testing firm will furnish all test instruments, materials and labor necessary to perform the following tests. All tests will be performed in the presence of the Engineer. All instruments will have been calibrated within a period of two years preceding testing. Calibrations will be traceable to applicable industry recognized standards. Testing will conform to the following:

All protective devices with field adjustable settings will be set and tested in the field after installation. This work will be performed as part of the testing requirements specified in the individual specification sections, and will be conducted by the approved independent testing agency.

All testing requirements specified in the individual specification sections will be performed in accordance with an approved Test Plan. The Test Plan will consist of complete field test procedures including inspections and tests to be performed, test equipment required, and tolerance limits, including complete testing and verification of protective device settings, ground fault and motor protection equipment.

Performance test reports: Test Reports will be in booklet form showing all field tests performed to adjust each component and all field tests performed to prove compliance with the specified performance criteria, upon completion and testing of the installed system. Each test report will indicate the final positions of controls and a summary of the test results.

Suitability of test equipment, test instrument calibration, and test reports will comply, as a minimum, with NETA ATS, Section 5, latest edition.

Certificates: Certificates will be provided certifying that all devices and equipment meet the requirements of the contract documents.

TESTING AGENCY QUALIFICATIONS

Testing agency will be a member company of the International Electrical Testing Association and acceptable to authorities having jurisdiction.

Testing agency's field supervisor will be a person currently certified by the International Electrical Testing Association or National Institute for Certification in Engineering Technologies to supervise on-site testing specified in these special provisions.

SYSTEMS COMMISSIONING ASSISTANCE

Upon completion of all equipment field testing and protective device setting, the independent testing agency will supply qualified manpower to assist in the complete mechanical and electrical system commissioning conducted by the Contractor. The independent testing agency will also assist the Contractor with commissioning problems which may occur.

QUALITY ASSURANCE

The short circuit and coordination studies will be performed in accordance with applicable ANSI and IEEE Standards. Field testing will be performed per NETA ATS specifications, manufacturer's recommendations, and these special provisions.

The Electrical Arc Flash Hazard will be performed in accordance with NFPA 70, NFPA 70E, OSHA 29 CFR, IEEE 1584 and IEEE 1584a.

The independent testing agency will examine utilization equipment nameplates and installation instructions; install fuses of sizes and with characteristics appropriate for each piece of equipment, and evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings. Proceed with field testing only after unsatisfactory conditions have been corrected. The independent testing agency will perform field testing as specified in these special provisions.

PART 4 – MEASUREMENT AND PAYMENT

Full compensation for system studies and field testing shall be considered as included in the contract lump sum prices paid for various electrical items of work involved and no additional compensation will be allowed therefor.

12-17.1619 TUNNEL LIGHTING

PART 1 – GENERAL

The tunnel lighting system shall consist of furnishing, installing, and testing of tunnel luminaires, including all wire, cable and mounting in conformance with the provisions in these special provisions. The tunnel lighting system shall also include the installation of conduit and raceway in conformance with "Basic Materials and Methods (Tunnel)" of these special provisions.

Tunnel lighting includes miscellaneous lighting including lighting fixtures, lamps, ballasts, exit fixtures, and accessories for installation in the cross passages, portal Substation Building and special fixtures in the roadway tunnels.

SUMMARY

Scope: The tunnel luminaires shall be installed in the tunnel as shown on the plans to provide good visibility for the drivers during day and night.

RELATED WORK

The Contractor's attention is directed to "Tunnel SCADA/PLC Control and Monitoring System" of these special provisions for lighting control system. Testing agency qualifications shall conform to "Systems Studies and Testing" of these special provisions.

DEFINITIONS

Lighting unit: A luminaire or an assembly of luminaires complete with support accessories.

SUBMITTALS

The Contractor shall make submittals in conformance with the requirements specified in "Submittals" in section "Basic Materials and Methods (Tunnel)" of these special provisions and the requirements specified herein.

Product data: The submittals shall include complete details, information, and drawings of each type of lighting unit arranged in order of lighting unit designation as shown on the plans. The submittals shall also include the data on features, accessories, finishes, and the following:

Materials and dimensions of luminaires.

Certified results of laboratory tests for fixtures and lamps for photometric performance.

High-intensity-discharge luminaire ballasts.

Product certificates signed by manufacturers of lighting units certifying that products comply with requirements. A certificate of compliance for each lighting unit shall be furnished to the Engineer in conformance with the following:

1. Certificate of Compliance shall be furnished prior to the use of any materials for which these specifications or the special provisions require that a certificate be furnished. In addition, when so authorized in these specifications or in the special provisions, the Engineer may permit the use of certain materials or assemblies prior to sampling and testing if accompanied by a Certificate of Compliance. The certificate shall be signed by the manufacturer of the material or the manufacturer of assembled materials and shall state that the materials involved comply in all respects with the requirements of the specifications. A Certificate of Compliance shall be furnished with each lot of material delivered to the work and the lot so certified shall be clearly identified in the certificate.

2. Materials used on the basis of a Certificate of Compliance may be sampled and tested at any time. The fact that material is used on the basis of a Certificate of Compliance shall not relieve the Contractor of responsibility for incorporating material in the work which conforms to the requirements of the plans and specifications, and any material not conforming to the requirements will be subject to rejection whether in place or not.
3. The Department reserves the right to refuse to permit the use of material on the basis of a Certificate of Compliance.
4. The form of the Certificate of Compliance and its disposition shall be as directed by the Engineer.

Miscellaneous lighting fixtures: Submit the following:

1. Dimensions of lighting fixtures
2. Data sheets for fluorescent and high intensity-discharge ballast.
3. Operation and Maintenance data for miscellaneous lighting fixtures.

Field test reports that indicate and interpret test results for compliance with performance requirements.

Installation procedures, sequences, schedule, and tolerances.

Maintenance manuals for lighting units.

Warranty for lighting units or components.

1. Specification of light fixture and related components such as housing, latches, fuses, terminal block, lamp housing, ballast, gasket, identification label and anchor plate, if necessary.
2. Product drawings with top, side, and bottom views, and the necessary details, including required clearance.
3. Photometric file in Illuminating Engineering Society (IES) formatting and lighting calculations.

QUALITY ASSURANCE

Luminaires and accessories shall be listed and labeled in conformance with NFPA 70, Article 100, for their intended use, location, and installation conditions.

REFERENCE STANDARDS

Luminaires and accessories shall conform to the following:

ANSI C2.
ANSI/IESNA RP-22-96.
AASHTO 1944, "Information Guide for Roadway Lighting"
FHWA 1994, "Tunnel Lighting Design and Procedures",
ANSI/IES RP-8-00

PART 2 – PRODUCTS

MATERIALS

Lighting unit type tunnel luminaires: All manufacturers shall meet the intended product quality, serviceability, space restraints, and illumination standards as specified in these special provisions. Lamp and ballast technology shall conform to the requirements specified in these special provisions.

Warranty: Manufacturer shall warrant that the factory-installed electrical system (consisting of a coil ballast, starting aid, capacitor, terminal board and wiring) shall be free from defects in material and workmanship for 5 years from the date that the fixtures are shipped from manufacturer's factory.

Description: The Contractor shall furnish lighting fixtures complete with lamps, ballasts, fuses, terminal blocks, capacitors, reflector, gaskets, latches, lenses, hinges, lamp holders, wiring, starters, and all accessories necessary to perform tunnel lighting as a coordinated assembly.

All luminaire components shall meet the requirements of the latest version of UL 1572 40°C High Intensity Discharge Lighting Fixture (wet label) specifications.

The luminaires shall be for use in exterior environments between -18 and +38°C, and zero to 100 percent humidity.

The luminaires shall be rated for the environment encountered in marine and vehicular covered roadways. The following conditions shall be taken into account:

1. Air containing a large percentage of lint and dust particles.
2. Exposure to chemically corrosive solutions from auto emissions, pavement deicing salts, and pavement traction minerals.
3. Concrete leaching onto mounting plates and luminaires.
4. Covered roadway cleaning involving high pressure detergent wash downs.
5. Vibration from large tractor trailer trucks traveling within 620 mm of the luminaires.
6. Fog.

The luminaires shall have the following features to facilitate maintenance:

1. Quick and easy luminaire removal with gloves on for the purpose of repair in shop.
2. Luminaire cleaning using high pressure water and detergent.
3. Luminaire relamping.
4. Quick and easy replacement of modular interior components, including ballasts tray and lens with luminaire housing in fixed, overhead mounting position.

All internal fixture components and wiring shall be capable of operating at the internal temperatures found inside the fixture without affecting component life by accelerating deterioration.

Lamp holders shall be mogul, heavy-duty type, composed of glazed porcelain rated for 4,000 volts pulse voltage. The mogul socket shall be UL listed for 600 volt, 1,500 watt operation.

Each luminaire shall be provided with a grounding terminal rated for a single conductor as shown on the plans with stranded copper wire connection.

All wall-mounted luminaires shall match existing luminaires in bores 1, 2, and 3 and the following requirements. Luminaires shall have a nominal wattage rating according to the plans and comply with Section 86-6.01 "High Pressure Sodium Luminaires" of the Standard Specifications and these requirements.

All lighting fixtures shall be complete with ballasts, ignitors, lamps, and other equipment and operate from a nominal 480V 60 Hertz power source and shall be capable of starting and operating the specified lamp within the limits specified by the lamp manufacturer. The luminaries shall be suitable for wet locations per UL 1598, listed for 40°C Ambient at 100% rated lumen output, and comply with IP 55 for dust and water jet. Overall dimensions shall be 406 mm square x 295 mm deep.

Materials. Materials within the luminaire shall be supplied in accordance with the following requirements:

1. The housing and door shall be die cast copper free aluminum alloy A360 with a minimum thickness of 1.8 mm
2. The reflector assembly shall consist of high purity aluminum of minimum 0.8 mm thick sheet. Aluminum used for the reflector shall be #3002 alloy.
3. All lighting fixtures shall be painted. Painted finishes of fixtures and accessories shall be applied such that the entire assembly is rendered completely corrosion resistant.

4. Where aluminum parts come in contact with bronze or stainless steel parts, apply to both surfaces a coating of corrosion protection material.
5. Components and hangers required shall be Type 316 stainless steel.
6. Fasteners shall be Type 316 stainless steel type.
7. Lampholders and lamp sockets shall hold lamps securely.
8. Gasketing shall be extruded silicone Rubber. All shapes used shall be completely cover flange to which gasket is fixed.

Finish. The luminaire housing shall be finished with a polyester powder paint, which shall be electrostatically applied and cured. The paint shall pass the ASTM D522 flexure test.

Lampholders. The lampholders shall be porcelain keyless medium or mogul construction as required by lamp size and wired with high temperature 16 Gauge wiring minimum. The sockets shall be pulse rated at 4 kV. The screw shell shall be nickel-plated brass and shall incorporate anti-vibration grips.

Ballasts. The ballast shall comply with Section 86.601A "High Pressure Sodium Ballast" of the Standard Specifications with the following modifications. The ballast shall conform to the applicable requirements of UL 1029. The ballasts and all related electrical components shall be removable and replaceable as a single unit without disturbing the aiming.

Wiring. The fixture wires shall be stranded tinned-copper construction not smaller than No. 16 AWG. The insulation shall be cross linked polyolefin (UL style 3321) rated 150° C or higher or type SEO cable rated at 105° C. Wireways and wiring channels shall have rounded edges or bushed holes wherever conductors pass through. Insulated Bushings shall be installed at points of entrance and exit of wiring. Each luminaire shall be fused internally with 2 fast-acting type fuses to disconnect the luminaire from the branch circuit in case of ballast failure or other electrical problem within the luminaire.

Fixture hardware. Screws, bolts, or other assembly and mounting parts shall be Type 316 stainless steel.

Mechanical construction. The housing shall be heavy-duty die-cast copper free aluminum. All electrical components shall have a Molex disconnect plug and shall be hinged or slotted for installation or removal. A quick disconnect terminal block including fuses shall be provided for disconnected power before changing components. The door shall be provided with single point positive acting latch and locking set screw attached the latch. If the door swings downward, it shall be provided with two safety chains, one on each end of the door, to prevent dropping. The conduit connection shall be National Pipe Thread type typical for conduit, and shall be sized to match the attaching conduit. Note that the attaching conduit is of various sizes so that not all conduit connections will be the same. Luminaire housings shall not be field modified.

Lens assembly. The optical assembly shall be fully enclosed and gasketed. It shall include an anodized reflector. The reflector shall have transverse elliptical fluting to minimize re-direction of light energy through the arc tube and to provide even illumination on the lighted surface free from streaks or striations. The lens shall be 3.2 mm minimum thickness minimum impact resistant borosilicate prismatic glass. Refractor is 406 mm square 102 mm deep with internal splitting prisms for glare control.

Optical control/photometric performance. The luminaries shall have asymmetric photometric distribution. The isolux curve of the luminaires shall match those in the plans.

Mounting brackets for fixture supports. If mounting brackets are required, the brackets shall be integral to a bolted metal framing system. The fixture shall fit the mounting bracket without modification.

Ignitors. Luminaires shall be provided with ignitors that have the following characteristics:

1. Be designed to eliminate stress on the ballast due to a missing or burned out tube by directing the high voltage spike directly to the lamp without being directed to the lamp through the ballast windings or by stopping the starting cycle.
2. Be capable of being used with the type of ballasts supplied.
3. Be designed so that a cycling or extinguishing lamp shall not adversely affect the ignitor or ballast.
4. Be UL listed or UL Component Recognized and CSA Certified.
5. Be warranted against defective materials and workmanship for a period of at least five years.

Fuse Block. All luminaires shall have a fuse block installed inside the electrical section of the housing. The fuse block shall comply with Section 86.605G "Fuse Block" of the Standard Specifications with the following modifications:

1. Shall be UL listed and shall have two spaces for fuses.
2. Each terminal lug shall be large enough to accept conductors as depicted on the plans and shall be rated 600 volts.
3. Shall have fuses installed with the amperage rating as shown on the plans.

Installation. The installation of the luminaires shall be according to the plans, the manufacturer's instructions, and adjusted per field conditions with the Engineers approval.

Lamps: Lamps shall be dual-arc type.

PHOTOMETRIC REQUIREMENTS

Lighting performance criteria: The luminaires shown on the plans are positioned to provide a minimum level of photometric performance. The luminaire manufacturer shall submit computer calculations demonstrating that manufacturer's luminaires are in conformance with the following requirements:

West Bound-Daylight Operation Except As Noted				
Tunnel Roadway Area	Average Luminance (cd/square meters)	Average to Minimum Luminance	Maximum to Minimum Luminance	Max to Min Wall Illuminance (up to 3 m high)
Threshold Zone	175	2.0:1	3.5:1	3.5:1
Transition 1	44	2.0:1	3.5:1	3.5:1
Transition 2	14	2.0:1	3.5:1	3.5:1
Interior Level	5	2.0:1	3.5:1	3.5:1
Night Time Interior Level	2.5	3.0:1	5:1	5:1

The Contractor shall submit hard copies and compact discs (CDs) in an Illuminating Engineering Society of North America (IESNA) formatting, of candlepower distribution data for each type of luminaire. A hard copy of photometric candlepower data shall be submitted on 2.5 degree intervals within 10 degrees of the maximum candlepower.

In addition, the Contractor shall submit the following:

Vertical candlepower curves for the maximum candlepower plane at the 0/180-degree plane and 90/270-degree plane.

With the tunnel light fixture at a 4.5 m mounting height from the pavement to the bottom of luminaire:

1. Isocandela plot with a minimum of 7 contours.
2. Lux readings on a 300 mm grid.

Computer calculations shall be done in accordance with IESNA standards, except the point samples for spacing along and across the roadway shall be at 600 mm centers. Spacings across roadway shall begin at the left edge of roadway. The roadway is defined as two 3.66 m travel lane, and does not include the shoulder and sidewalk. A maintenance factor of 0.65 shall be used and a maintained wall reflectance shall be 35 percent. Reflectance shall be designed for pavement type R1 in conformance with ANSI/IES RP-8.

MANUFACTURER'S CERTIFICATION AND TESTING

The Contractor shall submit manufacturer certification that the furnished luminaires meet the requirements of these special provisions including a detailed description of each variance for the Engineer's approval.

The Contractor shall submit to the Engineer with a list of all the electrical components contained in the luminaires.

Before installation, twenty luminaires will be selected at random by the Engineer from the project luminaires at the job site or at the Contractor's storage facility for independent laboratory testing provided by the State.

If any unit fails, the Engineer will require up to five additional tests to estimate the extent of nonconformance.

The test results shall substantiate that the selected luminaires fulfill the specified photometric requirements prior to beginning installation of tunnel luminaires. If test fails to meet any specified requirement, further testing will be required to validate a manufacturer's claim of compliance with these special provisions.

The Contractor shall furnish to the Engineer test results from the independent testing laboratory demonstrating conformance with the following requirement for each type of light fixture.

Data: Complete photometric data for each fixture type including, coefficient of utilization table, horizontal and vertical candle-power tabulation in 5 degree increments, graph of candle-power in maximum plane and maximum cone. The photometric data shall conform to the photometric specification to within 10 percent. The photometric data will then be used to demonstrate conformance with the performance criteria.

Lamp: For a simulated installation, in a 35°C outdoor ambient temperature, demonstrate lamp voltage and temperature conformance with ANSI standards C78.388, C78.1350 and C78.1355 for maximum stabilized fixture temperature. Test shall be run with lamps aged 100 hours. Fixture mounted lamp voltage and temperature shall be compared against performance of a similar but non-enclosed lamp. Test shall be repeated for each type of lamp.

Miscellaneous lighting fixtures shall comply with the following:

Fluorescent fixtures shall conform to UL 1598. Fluorescent lamp ballast shall conform to following requirements:

Designed for type and quantity of lamps at full light output.

Total harmonic distortion rating: Less than 10 percent.

Rapid start, thermally protected, automatic resetting.

UL listed Class P, high power factor (95 minimum).

Instant start ballast.

Sound rating: A

Electronic ballasts for linear lamps shall conform to the following requirements:

Certified ballast manufacturer certification: Indicated by label.

Encapsulation: Without voids in potting compound.

Parallel lamp circuits: Multiple lamp ballasts connected to maintain full light output on surviving lamps if one or more lamps fail.

Temperatures 4°C and above starting temperature.

Full replacement warranty of two years from the date of placing system in service.

Ballasts for compact fluorescent lamps shall be programmed start.

Reflecting surfaces of fluorescent fixtures shall have minimum reflectance as follows:

White surfaces: 85 percent.

Specular surfaces: Not less than 83 percent.

Diffusing specular surfaces: 75 percent.

Laminated silver metallized film: 90 percent.

Lenses, diffusers, covers, and globes shall be 100 percent annealed crystal glass or virgin acrylic plastic with high resistance to yellowing and other changes due to aging, exposure to heat, and ultraviolet radiation. The minimum thickness of lens shall be 3 mm.

Exit signs shall conform to UL 924. The lamps of internally lighted signs for AC operation shall be light-emitting diodes, 70,000 hours minimum rated lamp life.

The fluorescent color temperature index of lamps shall be 4100 K for cool white lamps. Fluorescent lamp life shall be rated average of 20,000 hours at 3 hours per start when used on rapid-start circuits.

Fixture support components including steel strut channel system and fittings for mounting lights shall be galvanized. Beam clamps, wall mount brackets, and channel shall be manufactured by the same manufacturer.

Finishes of fixtures shall conform to the manufacturer's standard. Paint finish shall be applied over corrosion-resistant treatment or primer, free of defects. Metallic finish shall be corrosion resistant.

The interior lighting fixtures shall conform the following:

Fixture Type E1, Exit:

1. Severe duty type, NEMA Type 4X, UL50, UL924.
2. Cast aluminum or polycarbonate housing.
3. Voltage: 120 V (ac).
4. Mounting: End mount.
5. Number of faces: Double-face.
6. Nominal dimensions: 330 mm X 75 mm X 200 mm.
7. Lamps: Low wattage, Green LED, 25 year lamp life.
8. External finish: Aluminum/gray.

Fixture Type E2, Exit:

1. Severe duty type, NEMA Type 4X, UL50, UL924
2. Cast aluminum or polycarbonate housing.
3. Voltage: 120 V (ac).
4. Mounting: End mount.
5. Number of faces: Single-face.
6. Nominal dimensions: 330 mm x 75 mm X 200 mm.
7. Lamps: Low wattage, Green LED, 25 year lamp life.
8. External finish: Aluminum/gray.

Fixture Type E3, Exit:

1. Severe duty type, NEMA Type 4X, UL50, UL924.
2. Cast aluminum or polycarbonate housing.
3. Voltage: 120 V (ac).
4. Mounting: Ceiling mount.
5. Number of faces: Double-face.
6. Nominal dimensions: 330 mm X 75 mm X 200 mm.
7. Lamps: Low wattage, Green LED, 25 year lamp life.
8. External finish: Aluminum/gray.

Fixture Type E4, Exit:

1. Severe duty type, NEMA Type 4X, UL50, UL924.
2. Cast aluminum or polycarbonate housing.
3. Voltage: 120 V (ac).
4. Mounting: Back mount.
5. Number of faces: Single-face.
6. Nominal dimensions: 330 mm X 75 mm X 200 mm.
7. Lamps: Low wattage, Green LED, 25 year lamp life.
8. External finish: Aluminum/gray.

Fixture Type F1, enclosed industrial fluorescent.

1. Gasketed, enclosed, damp label.
2. Voltage: 120 V (ac).
3. Mounting: Ceiling or strut mounted.
4. Nominal dimensions: 1220 mm X 305 mm.
5. Lamps: Two 32W, T8.
6. Ballast types and features: Electronic.
7. Housing: Heavy-duty steel with shatter-resistant acrylic diffuser.

Fixture Type F2, heavy-duty Turret industrial fluorescent;

1. Voltage: 120 V (ac).
2. Mounting: Strut or pendant mounted.
3. Nominal dimensions: 1220 mm X 305 mm.
4. Lamps: Two 32W, T8.
5. Ballast types and features: Electronic.
6. Up-light: 10 to 15 percent.
7. Housing: Heavy steel with die embossed reflector.
8. External finish: High gloss baked white enamel over rust inhibitor.

PART 3 – EXECUTION

INSTALLATION

Installation shall conform to the following requirements:

Luminaire attachment shall be installed to the details as shown on the plans.

Low smoke, flexible conduit connection shall be provided from embedded conduit stub-up and conductors, per schedules shown on the plans, shall be installed to embedded terminal boxes.

Electrical connectors and terminals shall be tightened in accordance with manufacturer's recommendations.

Luminaires shall be installed in accordance with to manufacturer's written instructions. Malfunctioning lamps shall be replaced.

FIELD QUALITY CONTROL

The Contractor shall inspect each installed lighting unit for damage. Damaged lighting units and components shall be replaced by the Contractor at the Contractor's expense.

The testing agency shall provide a minimum of two working days advance notice to the Engineer for the dates and times of the field tests. The testing agency shall provide instruments to record test results.

Normal operation of the lighting units shall be verified after installing luminaires and energizing circuits with normal power source. The following field tests shall be performed:

Light intensities shall be measured at night at each lighting zone to test illumination performance. Luminance meter shall be used with calibration referenced to NIST standards for the photometric measurements. The photometric measurement shall comply with IESNA LM-71-96.

Intensity and uniformity of illumination shall be checked.

Any noticeable noisy ballasts shall be checked and replaced.

Luminaires and components that failed any test shall be repaired or replaced, and then retested.

Within two working days after tests are completed, the testing agency shall submit to the Engineer a written test report, including test procedure, inspections, observations, verifications, test results, repairs made, test date and signature of test person.

Prior to final acceptance of the installation, all luminaires shall be cleaned with methods and materials recommended by manufacturer.

Miscellaneous Lighting Fixtures: The Contractor shall inspect each installed fixture for damage. Damaged fixtures and components shall be replaced by the Contractor. The Contractor shall provide advance notice a minimum of two working days to the Engineer for the dates and times of field tests. The Contractor shall provide instruments to make and record test results.

The testing agency shall conduct following tests:

Verify normal operation of each fixture after installation.

Verify normal transfer to battery source and retransfer to normal.

Report results in writing.

Fixtures and components that failed tests shall be repaired or replaced, and then retested.

The testing agency shall submit to the Engineer a written test report including test procedure, test results, repairs made, test date and signature of test person within 5 working days after tests are completed.

PART 4 – MEASUREMENT AND PAYMENT

The contract lump sum price paid for tunnel lighting shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in testing and integrating the tunnel lighting as a single system, complete in place, as shown on the plans, as specified in these special provisions, and as directed by the Engineer.

**BID ITEM LIST
04-294914**

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity	Unit Price	Item Total
61	153220	REMOVE CONCRETE (CHANNEL)	M3	17		
62	153221	REMOVE CONCRETE BARRIER	M	270		
63	153222	REMOVE CONCRETE ISLAND (PORTIONS)	M3	690		
64	041704	REMOVE TEMPORARY SOUND WALL	LS	LUMP SUM	LUMP SUM	
65	155003	CAP INLET	EA	5		
66	155007	CAP MANHOLE	EA	1		
67	156585	REMOVE CRASH CUSHION	EA	2		
68	160101	CLEARING AND GRUBBING	LS	LUMP SUM	LUMP SUM	
69	170101	DEVELOP WATER SUPPLY	LS	LUMP SUM	LUMP SUM	
70	190101	ROADWAY EXCAVATION	M3	22 500		
71	015822	ROADWAY EXCAVATION (TYPE Z-2) (ADL AND NATURALLY OCCURRING METALS)	M3	2500		
72	015823	ROADWAY EXCAVATION (TYPE Z-3) (ADL AND NATURALLY OCCURRING METALS)	M3	390		
73	015824	SURFACE SOIL MANAGEMENT PLAN	LS	LUMP SUM	LUMP SUM	
74 (F)	192020	STRUCTURE EXCAVATION (TYPE D)	M3	244		
75 (F)	192037	STRUCTURE EXCAVATION (RETAINING WALL)	M3	64		
76 (F)	192049	STRUCTURE EXCAVATION (SOLDIER PILE WALL)	M3	1070		
77 (F)	192055	STRUCTURE EXCAVATION (SOIL NAIL WALL)	M3	1630		
78 (F)	041705	STRUCTURE EXCAVATION (SECANT PILE WALL)	M3	513		
79 (F)	041706	STRUCTURE EXCAVATION (PORTAL NO. 1)	M3	4280		
80 (F)	041707	STRUCTURE EXCAVATION (PORTAL NO. 2)	M3	4740		

BID ITEM LIST
04-294914

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity	Unit Price	Item Total
121	420102	GROOVE EXISTING CONCRETE PAVEMENT	M2	16 400		
122	420201	GRIND EXISTING CONCRETE PAVEMENT	M2	1900		
123	041715	750 MM CAST-IN-DRILLED-HOLE CONCRETE SECANT PILING	M	2476		
124	041716	STEEL SOLDIER PILE (HP 310 X 79) (SOUND WALL)	M	788		
125	041717	STEEL SOLDIER PILE (HP 310 X 93) (SOUND WALL)	M	433		
126	041718	STEEL SOLDIER PILE (HP 360 X 108) (SOUND WALL)	M	245		
127	041719	STEEL SOLDIER PILE (HP 360 X 132) (SOUND WALL)	M	216		
128	041720	STEEL SOLDIER PILE (2-MC 460 X 86) (WITH PLATES)	M	106		
129	041721	STEEL SOLDIER PILE (2-MC 460 X 86)	M	415		
130	041722	STEEL SOLDIER PILE (W 360 X 179)	M	405		
131	041723	STEEL SOLDIER PILE (W 360 X 216)	M	75		
132	041724	STEEL SOLDIER PILE (W 360 X 314)	M	166		
133	041725	STEEL SOLDIER PILE (W 530 X 248)	M	90		
134	041726	600 MM DRILLED HOLE	M	433		
135	041727	750 MM DRILLED HOLE	M	1149		
136	041728	830 DRILLED HOLE	M	196		
137	041729	900 MM DRILLED HOLE	M	181		
138	500050	TIEBACK ANCHOR	EA	154		
139 (F)	510060	STRUCTURAL CONCRETE, RETAINING WALL	M3	1297		
140 (F)	041730	STRUCTURAL CONCRETE, PORTAL FOOTING	M3	222		

**BID ITEM LIST
04-294914**

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity	Unit Price	Item Total
141 (F)	041731	STRUCTURAL CONCRETE, PORTAL	M3	1200		
142 (F)	041732	CLASS 2 CONCRETE (BACKFILL)	M3	1835		
143 (F)	510414	CLASS 1 CONCRETE (BACKFILL)	M3	614		
144 (F)	510502	MINOR CONCRETE (MINOR STRUCTURE)	M3	168		
145	510526	MINOR CONCRETE (BACKFILL)	M3	640		
146 (F)	511064	FRACTURED RIB TEXTURE	M2	38		
147 (F)	041733	ARCHITECTURAL TREATMENT FACADE	M2	2431		
148	518002	SOUND WALL (MASONRY BLOCK)	M2	350		
149	519102	JOINT SEAL (TYPE AL)	M	2104		
150 (F)	520103	BAR REINFORCING STEEL (RETAINING WALL)	KG	122 580		
151 (F)	520106	BAR REINFORCING STEEL (EPOXY COATED)	KG	5440		
152 (F)	041734	BAR REINFORCING STEEL (PORTAL)	KG	174 000		
153 (F)	041735	BAR REINFORCING STEEL (PILE)	KG	105 500		
154 (F)	530100	SHOTCRETE	M3	644		
155 (F)	041736	PORTAL WATERPROOFING	M2	1400		
156 (F)	041737	RETAINING WALL WATERPROOFING	M2	150		
157	015827	MICROWAVE TOWER STRUCTURE	KG	1120		
158 (F)	560218	FURNISH SIGN STRUCTURE (TRUSS)	KG	29 820		
159 (F)	560219	INSTALL SIGN STRUCTURE (TRUSS)	KG	29 820		
160	560233	FURNISH FORMED PANEL SIGN (OVERHEAD)	M2	110		

**BID ITEM LIST
04-294914**

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity	Unit Price	Item Total
181	664084	300 MM BITUMINOUS COATED CORRUGATED STEEL PIPE (1.63 MM THICK)	M	40		
182	041742	250 MM PLASTIC PIPE UNDERDRAIN (PORTAL)	M	24		
183	041743	150 MM PLASTIC PIPE UNDERDRAIN (PORTAL)	M	141		
184	681132	GEOCOMPOSITE DRAIN	M2	406		
185	681501	FURNISH AND INSTALL DRAIN PIPE (HORIZONTAL DRAIN)	M	455		
186	681502	DRILL HOLE (HORIZONTAL DRAIN)	M	455		
187	682049	CLASS 3 PERMEABLE MATERIAL (BLANKET)	M3	5100		
188	685067	200 MM ALTERNATIVE PIPE UNDERDRAIN	M	940		
189	700858	900 MM BITUMINOUS COATED CORRUGATED STEEL PIPE INLET (2.77 MM THICK)	M	6		
190	703543	300 MM WELDED STEEL PIPE (3.40 MM THICK)	M	20		
191	705336	450 MM ALTERNATIVE FLARED END SECTION	EA	2		
192	705648	450 MM SLIDE HEADGATE	EA	2		
193	721009	ROCK SLOPE PROTECTION (FACING, METHOD B)	M3	5		
194	721420	CONCRETE (DITCH LINING)	M3	4		
195	729010	ROCK SLOPE PROTECTION FABRIC	M2	10		
196	731502	MINOR CONCRETE (MISCELLANEOUS CONSTRUCTION)	M3	270		
197	731505	MINOR CONCRETE (CURB AND SIDEWALK)	M3	1290		
198 (F)	731517	MINOR CONCRETE (GUTTER)	M3	40.5		
199	041744	MINOR CONCRETE (CONDUIT AND FIRE WATER PIPE ENCASMENT)	M3	1330		
200 (F)	750001	MISCELLANEOUS IRON AND STEEL	KG	16 400		

**BID ITEM LIST
04-294914**

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity	Unit Price	Item Total
201	800386	CHAIN LINK FENCE (TYPE CL-1.2, VINYL-CLAD)	M	70		
202	800391	CHAIN LINK FENCE (TYPE CL-1.8)	M	460		
203	015829	ANCHORED WIRE MESH SYSTEM	M2	1110		
204	BLANK					
205	820118	GUARD RAILING DELINEATOR	EA	54		
206	820130	OBJECT MARKER	EA	10		
207	015830	CONCRETE BARRIER MARKER	EA	150		
208	832002	METAL BEAM GUARD RAILING (STEEL POST)	M	480		
209	015831	WEED CONTROL MAT (RUBBER)	M2	860		
210 (F)	839521	CABLE RAILING	M	559		
211	839541	TRANSITION RAILING (TYPE WB)	EA	5		
212	839581	END ANCHOR ASSEMBLY (TYPE SFT)	EA	8		
213	839585	ALTERNATIVE FLARED TERMINAL SYSTEM	EA	13		
214	839604	CRASH CUSHION (REACT 9CBB)	EA	1		
215	839605	CRASH CUSHION (REACT 9SCBS)	EA	1		
216	839701	CONCRETE BARRIER (TYPE 60)	M	700		
217	839702	CONCRETE BARRIER (TYPE 60A)	M	90		
218	839703	CONCRETE BARRIER (TYPE 60C)	M	750		
219	839704	CONCRETE BARRIER (TYPE 60D)	M	270		
220	839705	CONCRETE BARRIER (TYPE 60E)	M	220		

**BID ITEM LIST
04-294914**

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity	Unit Price	Item Total
321	041810	TUNNEL AND CROSS PASSAGES FIRE PROTECTION SYSTEM	LS	LUMP SUM	LUMP SUM	
322	041811	FIRE PUMPS AND CONTROLLER	LS	LUMP SUM	LUMP SUM	
323	015854	SYSTEM COMMISSIONING	LS	LUMP SUM	LUMP SUM	
324	015855	TRAFFIC OPERATIONS SYSTEM SOFTWARE	LS	LUMP SUM	LUMP SUM	
325	BLANK					
326	017021	SOUND CONTROL AND MONITORING	LS	LUMP SUM	LUMP SUM	
327	BLANK					
328	017360	REMOVE POP-UP SYSTEM	LS	LUMP SUM		
329	BLANK					
330	017388	ARCHITECTURAL TREATMENT (TEXTURED SHOTCRETE)	M2	116		
331	017389	PREPARE AND STAIN SHOTCRETE	M2	116		
332	017390	REMOVE POSITIVE BARRIER	LS	LUMP SUM	LUMP SUM	
333	270065	ASPHALTIC EMULSION (CURING SEAL)	TONNE	3		
334	404092	SEAL PAVEMENT JOINT	M	360		
335	017391	EXCAVATION PLAN AND TEST SECTION	LS	LUMP SUM	LUMP SUM	
336	999990	MOBILIZATION	LS	LUMP SUM	LUMP SUM	

**TOTAL BID
FOR ITEMS:**

\$ _____

**TOTAL BID
FOR TIME:**

_____ X \$38,200.00
WORKING DAYS BIDS COST PER DAY
(Not to exceed 1,550 Days)

\$ _____

TOTAL BID FOR COMPARISON (COST PLUS TIME):

\$ _____