PART 4

STANDARD MODIFICATIONS

AND SPECIAL PROVISIONS

to the STATE OF ALASKA

STANDARD SPECIFICATIONS
FOR
HIGHWAY CONSTRUCTION

2004

SECTION 101

DEFINITIONS AND TERMS

Standard Modifications

101-1.03 DEFINITIONS. Replace the definitions of SUBGRADE with the following:

SUBGRADE. The soil or embankment upon which the pavement structure is constructed. E22(1/1/06)

Special Provisions

101-1.03 DEFINITIONS.

BASE COURSE. Delete the definition and replace with the following: One or more layers of specified material placed on a subbase or subgrade to support ATB or a surface course. (ANH 11/15/04)

Add the following:

SENSITIVE SOIL. Soils that lose substantial strength upon disturbance.

SECTION 102

BIDDING REQUIREMENTS AND CONDITIONS

Standard Modifications

102-1.04 EXAMINATION OF PLANS, SPECIFICATIONS, SPECIAL PROVISIONS, AND WORK SITE. Replace the second paragraph with the following: The records of geotechnical investigations including boring logs, test results, geology data reports, soil reports, material site reports, and geotechnical reports included in a bid package or made accessible to bidders or Contractors, are for information purposes only. These records are not part of the Contract. These records indicate subsurface conditions only at specific locations and times, and only to the depths penetrated. They do not necessarily reflect variations in soil, rock, or groundwater conditions that may exist between or outside such locations. Actual conditions may differ from what is shown in the records. Material Sources referenced in these records may not contain materials of sufficient quantity or quality to meet project requirements. The accessibility of these records does not constitute approval, nor guarantee suitability of soils or sources, or the rights to use sources for this project, except as specifically provided in subsections 106-1.02.4.b Mandatory Sources and 106-1.02.4.c Designated Sources. The records shall not substitute for independent investigation, interpretation, or judgment of the bidder or Contractor. The Department is not responsible for any interpretation or conclusion drawn from its records by the bidder or Contractor.

Bidders and Contractors shall examine subsection 106-1.02 Material Sources for further information about material source development. E23(1/1/06)

Standard Modification

102-1.05 PREPARATION OF BID. Modify the second sentence in the third paragraph, after: "If a bidder is a corporation, the bid must be signed by a corporate officer," add: or agent. . (06/30/04)E18

SECTION 103

AWARD AND EXECUTION OF CONTRACT

Special Provisions "and" in Std Spec

103-1.03 AWARD OF CONTRACT. Delete the second sentence in the second paragraph and replace with the following: The successful bidder's refusal to sign the Contract or provide the requested documents within the time specified may result in cancellation of the notice of intent to award and forfeiture of the bid security. (ANH 11/15/04)

Add the following subsection:

103-1.11 ESCROW OF BID DOCUMENTATION. Furnish a legible copy of the Bid documentation and an affidavit, as instructed in writing by the Contracting Officer. Bid documentation consists of written documentation of quantity takeoffs, construction schedules on which the bid is based, cost estimates, rates of production and progress, assumptions, calculations, quotes from subcontractors and suppliers, and information used to prepare the Bid for this project.

Obtain and furnish the same level of bid documentation, for each subcontractor, supplier or fabricator with a subcontract or agreement exceeding $200,000, regardless of tier. Seal each entity's documentation in separate envelopes, labeled with the entity's name and address, submission date, and project name and number. Include a cover letter or quote signed by a responsible party.

Meet the following requirements:

1. Submitting Bid Documentation. Place bid documentation in a sealed container clearly marked "Bid Documentation" and labeled with the bidder's name and address, submission date, and project name and number. Deliver the sealed container to the Department designated document depository for safekeeping.

2. Affidavit. Submit directly to the Contracting Officer a signed and certified affidavit attesting that

   a. the affiant has examined the bid documentation and that it includes all documents used to prepare the bid,

   b. the sealed container contains all bid documentation submitted,

   c. the escrow materials were relied on to prepare the bid, and

   d. should a dispute arise, the Contractor's rights to use bid preparation documentation other than those in escrow are waived.

3. Access and Use of Escrow Documents. The bid documentation will remain in escrow, without access by either party, except as otherwise

provided herein. In the event the Contractor (1) provides notice of intent to claim, (2) a claim, (3) a contract change order, or (4) initiates contract related litigation, the Department may obtain copies of the bid documentation as provided herein.

Both parties will submit to the Depository and copy to each other a list of personnel that are authorized to access the escrow documents. Use forms provided by the Depository.

Upon request the Depository will set the time and place for access to escrow documents, will monitor the escrow documents review, and will arrange for a method of copying escrow documents. Access to escrow documents shall require at least 5 days advance written notice so that the other party has the opportunity to witness the escrow review, examination and use. There is no requirement that both parties witness the escrow document review, but if one party is absent then the review must occur in the presence of a neutral third party observer to be designated by the Depository.

Notwithstanding paragraph five below, the Department will be allowed: to make copies of escrow documentation (whether hard copy, electronic, or otherwise); to use and review copies consultants directly involved in the subject dispute.

Distribution is not authorized except as related to resolution of a dispute. The Department will be allowed to incorporate pertinent copies as supporting documentation in significant contract change orders, contractual disputes, and the settlement of disputed claims.

The Department is not liable for any Contractor costs associated with escrow review and use.

4. Failure to Provide Bid Documentation. Refusal or failure to provide bid documentation or affidavit renders the bid nonresponsive. Failure or refusal to provide subcontractor bid documentation will result in subcontract disapproval.

5. Confidentiality of Bid Documentation. Materials held in escrow are the Contractor's property. Except as otherwise provided herein, the escrow materials cannot be released without the Contractor's approval.

6. Cost and Escrow Instruction. The Department pays to store escrowed materials and instructs the depository regarding escrow.

7. Payment. Include within the overall Contract bid price costs to comply with this subsection.

8. Return of Escrow Documentation. The original escrow documents will be returned to the Contractor once litigation is concluded, outstanding claims are resolved, the Contractor has completed the Contract, and the

Department receives an executed Contractor's Release (Form 25D-117) with no exceptions listed.

ES11(1/01/06)

ESCROW OF BID DOCUMENTATION AFFIDAVIT

THE UNDERSIGNED HEREBY CERTIFIES THAT THE ESCROW OF BID DOCUMENTATION CONTAINED HEREIN CONTAINS ALL OF THE INFORMATION WHICH WAS USED TO DEVELOP THE BID AND THAT I HAVE PERSONALLY EXAMINED THESE CONTENTS AND THAT THE DOCUMENTATION IS CORRECT AND COMPLETE IN ACCORDANCE WITH SUBSECTION 103-1.11. SUBMITTAL BY THE CONTRACTOR OF A CLAIM WHICH IS NOT CONSISTENT WITH THE CONTENTS OF THESE BID PREPARATION DOCUMENTS SHALL RESULT IN DENIAL OF THE CLAIM.

By:_____

Title:_____

Firm:_____

Date of Submission: _____

Project Name & Number:_____

SECTION 104

SCOPE OF WORK

Special Provisions

104-1.06 VALUE ENGINEERING PROPOSALS BY CONTRACTOR. Add the following: Value engineering proposals regarding the bridge foundation will not be considered.

SECTION 105

CONTROL OF WORK

Special Provisions

Not in R3

105-1.02 PLANS AND WORKING DRAWINGS. Add the following after the fourth paragraph: Allow at least ~~fifteen (15)~~ working days, or as otherwise indicated in this Contract, for the Department's review of working drawings, shop drawings and other submittals

105-1.06 UTILITIES. Add the following: Request locates from the utilities having facilities in the area. Use the Alaska Digline, Inc. Locate Call Center for the following utilities:

ALASKA DIGLINE, INC.
Locate Call Center Statewide 800-478-3121 who will notify the following:
Eyecom TV/Interior Telephone Mukluk Telephone Association TelAlaska, Inc.

Call the following utilities and agencies directly:

1. City of Unalaska Department of Public Works (Water and Sewer Utility) (907) 581-1260

2. City of Unalaska Electric Department (Electric Utility) (907) 581-1260

There are various utility appurtenances located within the project limits. Utilities scheduled for relocation are addressed in the following utility specific sections. Cooperate with these utilities and coordinate schedule of work to allow them access to the project for their adjustments and/or relocation.

Work around existing or relocated utility facilities following utility specific coordination, unless advised by the utility that the facility is abandoned in place. The Contractor shall bear the expense for changes or additional relocation requests for the Contractor's convenience.

The Contractor shall bear the responsibility for any changes in contract scheduling that result in the conditions in this specification not being met. Additional coordination with the applicable utility will be required.

Schedule and coordinate the utility relocations with project construction as set forth in Section 108, Prosecution and Progress.
Right of Way and/or Construction surveying is required before utility relocation. The utility shall give the Contractor, through the Engineer, fifteen (15) calendar days advance written notice for required staking. (09/01/04)R3

Payment will be made as follows:

1. Subsidiary to Item 642(1), Construction Surveying, if the Contractor is required to provide the surveying as part of the contract and/or

2. Under Item 642(3), Three Person Survey Party, if the construction or Right of Way staking required by the utility is either in advance of the two (2) week work plan, or not required by the contract.

Provide the utility companies fifteen (15) calendar days advance written notice of the relocations described below to begin. The utility companies will not be required to work in more than one location at a time, and will be allowed to complete a specific section of work before beginning with another section.

Relocation or adjustment of underground utility appurtenances will not normally be performed when the ground is frozen. In addition, the utility companies may prohibit the Contractor, through the Engineer, from working near the utility's facilities when the ground is frozen. ~~(04/01/03)~~R3M98 (9/1/04)R3

Specific coordination requirements for each utility is included below:

TELALASKA INC. (TAI). TAI's relocation plan has been broken into two phases. This will enable the Departments Contractor to complete construction of the proposed bridge, roadway, and pathway, and demolish the existing bridge prior to TAI installing all of its proposed facilities. These phases are not the same that are depicted on the K-series drawings.

Summary of work by phase:

1. PHASE I. Phase I relocations at the referenced locations are necessary to provide for uninterrupted service to accommodate its existing customers.

   a. Description of Work.

      (1) Reroute its existing services being fed from Unalaska Island to Amaknak Island using electronic transfer means to accommodate its existing customers.

      (2) This work will require TAI to install three (3) new pedestals (CATV/Fiber/Telecomm) at approximate Station 51+30, 32 L to capture existing cables to existing pedestal at approximate Station 48+00, 15 R then down Henry Swanson Drive. The existing cables and pedestal must remain in service until the new conduit system is installed by the Contractor and TAI has pulled and spliced new cable from the new power and communications pull/splice box at Station 103+17.78, 17.75 R, to new communications vault (MHC-2) at Station 49+66.23, 53.85 R, to the three (3) new pedestals (CATV/Fiber/Telecomm) at approximate Station 51+30, 32 L.

(3) TAI to spool a 6 pair fiber optic cable at existing fiber pedestal on the east side of Captains Bay Road (B-9), approximate Station 33+48, 77 L, long enough to re-establish service across the bridge if the above mentioned cable is damaged before the new facility has been installed. Contractor shall allow for this re-establishment if necessary.

b. Phase I work will allow abandonment of existing cables from existing pedestals on the east side of Captains Bay Road (B-9), approximate Station 33+48, 77 L, across the bridge to existing pedestal at approximate Station 48+00, 15 R.

c. Completion Time. You are required to give TAI fifteen (15) calendar days advance written notification and allow TAI thirty (30) calendar days to complete the Phase I relocation before any blasting occurs on Unalaska Island.

2. PHASE II. Phase II relocations at the referenced locations are necessary to enable the Department's Contractor to complete construction of the new bridge and pathway, and demolish the existing bridge. These relocations are contingent on completion and acceptance of the conduit system by TAI.

a. Description of Work (Part 1):

(1) Place section of new cables (BFC 600, BFO 48, and 750 Trunk) from three (3) new pedestals (CATV/Fiber/Telecomm) at approximate Station 51+30, 32 L to new communications vault (MHC-2) at Station 49+66.23, 53.85 R within new conduit system installed by the Contractor.

(2) Place section of new cables (BFC 50 and 500 Trunk) from new communications vault (MHC-2) at Station 49+66.23, 53.85 R south along the proposed Henry Swanson Drive to the new power and communications pull/splice box at Station 103+17.78, 17.75 R within new conduit system installed by the Contractor.

b. Completion Time (Part 1). TAI will require twelve (12) calendar days to complete this relocation (Phase II, Part 1). This work must be complete before Phase II, Part 2 and abandonment of the existing cables from the three (3) new pedestals at approximate Station 51+30, 32 L, to the existing pedestal at approximate Station 48+00, 15 R, then down Henry Swanson Drive.

c. Description of Work (Part 2):

(1) Place section of new cables (BFC 600, BFO 48, and 750 Trunk) within new conduit system installed by the Contractor from existing pedestals on the east side of Captains Bay Road, approximate Station 33+48, 77 L, north across Airport Beach Road through an existing 24" CMP, then west along the northeast side of Airport Beach Road to new communications vault (MHC-1) at Station 39+58.31, 24.34 R.

(2) Place section of new cables (BFC 600, BFO 48, and 750 Trunk) within new conduit system installed by the Contractor from new communications vault (MHC-1) at Station 39+58.31, 24.34 R west across new bridge to new communications vault (MHC-2) at Sta. 49+66.23, 53.85 R.

d. Completion Time (Part 2): TAI will require twenty (20) calendar days to complete this relocation (Phase II, Part 2).

105-1.07 COOPERATION BETWEEN CONTRACTORS. Add the following:
The following City of Unalaska projects may be under construction concurrently with this project:

1. Powerhouse Renovation Project – possibly 2007
2. Landfill Cell 4 Construction – 2007
3. Lift Station Number 4 – date unspecified
4. Inert Landfill Cell Construction – 2006
5. LSA – Carl E Moses Boat Harbor – possibly 2007

Coordinate traffic control, construction, and material hauling operations with the prime contractor of the above project so as to minimize impact on the traveling public, and to minimize conflicts with the work being performed under the other contract.

(2/1/00)R175M98

105-1.13 MAINTENANCE DURING CONSTRUCTION. Add the following: Inspect and clean all storm drain sumps and petroleum separator manholes during the construction season and prior to winter shutdowns. This inspection and maintenance of the storm drain system will not be paid for directly but will be subsidiary to work paid for under Sections 603 and 604. ~~(2/1/00)R4M98~~

Standard Modification

105-1.16 FINAL ACCEPTANCE AND RECORD RETENTION. Modify the first paragraph, Item 4., after: "DOLWD" add: and State Department of Revenue. (06/30/04)E19

Special Provision

105-1.17 CLAIMS. Add the following Any appeal to the superior court under AS 36.30.685 must be filed in the third judicial district at Anchorage. (3/21/01)R93

SECTION 106

CONTROL OF MATERIAL

Special Provisions

106-1.01 SOURCE OF SUPPLY AND QUALITY REQUIREMENTS. Add the following:

Buy America Provision. Comply with the requirements of 23 CFR 635.410, Buy America Requirements, and shall submit a completed Material Origin Certificate, Form 25D-60, before award of the contract.

Steel and iron products which are incorporated into the work, shall be manufactured in the United States except that minor amounts of steel and iron products of foreign manufacture may be used, provided the aggregate cost of such does not exceed one tenth of one percent (0.001) of the total contract amount, or $2500, whichever is greater. For the purposes of this paragraph, the cost is the value of the products as they are delivered to the project including freight.

"Manufactured in the United States" means that all manufacturing processes starting with the initial mixing and melting through the final shaping, welding, and coating processes must be undertaken in the United States. The definition of "manufacturing process" is smelting or any subsequent process that alters the material's physical form, shape or chemical composition. These processes include rolling, extruding, machining, bending, grinding, drilling, etc. The application of coatings, such as epoxy coating, galvanizing, painting or any other coating that protects or enhances the value of steel or iron materials shall also be considered a manufacturing process subject to the "Buy America Requirements."

Buy America does not apply to raw materials (iron ore), scrap, pig iron, and processed, pelletized and reduced iron ore. It also does not apply to temporary steel items (e.g., temporary sheet piling, temporary bridges, steel scaffolding, and falsework). Further, it does not apply to materials that remain in place at the Contractor's convenience (e.g., sheet pilings, and forms).

The North American Free Trade Agreement (NAFTA) does not apply to the Buy America requirement. There is a specific exemption within NAFTA (article 1001) for grant programs such as the Federal-aid highway program.

When steel and iron products manufactured in the United States are shipped to a foreign country where non-steel or iron products are installed on or in them (e.g., electronic components in a steel cabinet), the steel and iron is considered to meet the requirements of this subsection.

Take whatever steps are necessary to ensure that manufacturing processes for each covered product comply with this provision. Non-conforming products shall be replaced at no expense to the State. Failure to comply may also subject the Contractor to default and/or debarment. False statements may result in criminal penalties prescribed under Title 18 US Code Section 1001 and 1020.

(02/07/05)S13
Standard Modification

106-1.02 MATERIAL SOURCES.

1. a. General. Within Item a. delete text and replace with: Utilize Useable Excavation according to subsection 104-1.04 before using material sources listed in subsection 106-1.02.4. When there is insufficient useable excavation furnish additional required materials from sources of the Contractor's choice, except that the Contractor shall use a mandatory source when identified in the Contract.

4. Type of Sources. Replace the first paragraph with the following: The Contractor shall utilize Useable Excavation according to subsection 104-1.04 before using material sources listed in this subsection. When there is insufficient Useable Excavation, the Contractor shall furnish additional required materials from sources of the Contractor's choice, except that the Contractor shall use a mandatory source when identified in the Contract.

When there is insufficient Useable Excavation, the Contractor shall supply additional required material from the following sources:

4. d. Available Sources. Replace the second paragraph with the following: When the Department furnishes copies of existing boring logs, test results, or other data in its possession concerning Available Sources, the Contractor is responsible for determining the accuracy and completeness of this data, for assumptions the Contractor makes based on this data, and for exploring Available Sources to the Contractor's satisfaction.

4. e. Excluded Material Sources. Replace the paragraph with the following: Some material sources may not be considered acceptable regardless of location or ownership. The bid documents may identify some material sources excluded from use. The Department reserves the right to exclude a material sources or any portion of a material source, at any time after Contract award, that is determined by material testing to be unsuitable for use on the project.

E24(1/1/06)

SECTION 107

LEGAL RELATIONS AND RESPONSIBILITY TO PUBLIC

Special Provisions

107-1.01 LAWS TO BE OBSERVED. Add the following:

Eagle Nest Restrictions. An active bald eagle nest is located 115 feet left of Station 101, adjacent to Henry Swanson Drive. To avoid violations of the Bald Eagle Protection Act, the following measures must be observed:

1. In order to permit eagles to initiate nesting, the use of machinery or other noisy operations shall not take place within 330 feet of the nest from March 1 to May 31. This period shall continue to August 31 if the nest contains a nesting pair of eagles. If the nest is not occupied by May 31, activities may proceed provided the nest and nest support are not jeopardized.

2. Blasting is prohibited within ½ mile of the nest from March 15 to May 31. If the nest is occupied, this prohibition will continue to August 31.

It is possible to conduct blasting operations during the restricted time periods, even if the nest contains a pair of nesting eagles. To do so, notify the Engineer 2 weeks prior to beginning activities. Procure the services of an eagle monitor as specified under Section 651, Eagle Monitoring. The eagle monitor shall observe the nest and determine whether operations cause a disturbance to the nesting eagles. The eagle monitor shall work independently of the Contractor's operation and have reporting authority to the Engineer. If any evidence of disturbance is observed, operations will be stopped or modified to comply with the Bald Eagle Protection Act as directed by the Engineer.

If the Contractor elects to attempt land clearing or heavy equipment operations within 330 feet of the nest or blasting within ½ mile of the nest, during restricted time periods, he shall provide 2 weeks notice to the Department. Nest monitoring by qualified individuals will be conducted for any land clearing, heavy equipment operations or blasting within the normally prescribed distances. Again, if any evidence of disturbance is noted, construction activities will be modified as required to comply with the Act.

It is expected that the eagles will be disturbed less later in the summer than they will be early in the summer. Consequently, it is recommended that the work shown in the vicinity of the eagle nests be executed late in the summer, after the other work is completed.

If additional nest sites are discovered within 660 feet of the project site, the U.S. Fish and Wildlife Service shall be notified by calling (907) 260-2809 or (907) 271-2780, prior to any construction activities, for further site evaluation. You need to do whatever it takes to keep from disturbing a nesting eagle.

In-water work shall not occur between November 1 and April 1, due to Steller Eider bird restrictions unless all of the following conditions are met.

1. In-water work shall be completely isolated from the open waters of Unalaska Bay using a floating boom that is secured to the seafloor along it's length.
2. A qualified on-site monitor shall document the presence of Steller's eiders near the work site. Qualification requirements are given in Section 651. The on-site monitor will provide periodical situation reports to the USFWS representative when contacted.
3. No in-water work shall be conducted when Steller's Eiders are within 1000 feet of the work. Markers shall be located on both shores to assist the monitor in judging the position of Steller's eiders relative to the work. Place markers in the channel as necessary to further define the boundary.
4. The on-site monitor shall document the reaction of Steller's eiders further than 1000' from the in-water work. Reactions include flight or movements away from the work site, changes in behavior (such as cessation of foraging/diving activity), flock size and cohesion (Steller's eiders become more closely-packed together when they are disturbed).
5. The on-site monitor shall provide a copy of all field notes to the USFWS, Gregory Risdahl, (907) 271-2807 within 7 days of the completion of the in-water work.
6. Absolutely no hazing of Steller's eiders by any means is allowed.
7. In-water work during hours of darkness shall be avoided. (ANH, 03/30/06, USF&WS)

Work shall comply with the requirements outlined in the State of Alaska, DNR, Office of Management and Permitting, Alaska Coastal Managmeent Program, Final Consistency Finding, see Appendix D

(12/9/02)R51USC

107-1.02 PERMITS, LICENSES, AND TAXES. Add the following: There is to be no vegetation clearing between May 1 and July 15 to avoid the taking of migratory birds, their eggs, feathers or nests.

Obtain a written statement from the State Historic Preservation Officer stating that material disposal, extraction, stockpiling or staging, on off project site, is not expected to impact cultural resources. The State Historic Preservation Officer is with the Department of Natural Resources in Anchorage, and may be contacted at (907) 269-8715. If cultural resources are discovered during construction activities, stop work at that site and notify the Engineer.

Provide a wetland specialist able to conduct wetlands determinations and delineations according to the Corps of Engineers 1987 Wetland Delineation Manual. The wetland specialist shall conduct the determination and delineations of sites outside the project limits or not previously permitted, impacted by the Contractor's operations. These delineations will be subject to Corps of Engineers approval.

Provide the Engineer a copy of permits or clearances received before using sites outside the project limits. Additionally, provide the Engineer a written statement that permits or clearances have been obtained. Also provide a written statement to the Engineer listing agencies or offices contacted that responded that no additional action is required.

Obtain a Material Sale Permit from the DNR/Division of Mining, Land and Water for material excavated from State owned tidelands that will be disposed of on private uplands. (ANH, 10/1/05, ACMP)

Add the following: The Department has received the following permits on the Contractor's behalf:

Corps of Engineers Nationwide Permit 15
U.S. Coast Guard Section 9 Permit
State of Alaska, DNR, Office of Management and Permitting, Alaska Coastal Managmeent Program, Final Consistency Finding

Copies of the permits are contained in Appendix D.

Provide information to comply with the US Environmental Protection Agency National Pollutant Discharge Elimination System (NPDES) General Permit for Alaska to discharge storm water from the construction site. Refer to Section 641, Erosion, Sediment, and Pollution Control for requirements for this permit. (05/29/02)R7M98

107-1.07 ARCHAEOLOGICAL OR HISTORICAL DISCOVERIES. Change the first sentence to the following: When operations encounters historic or prehistoric artifacts, burials, remains of dwelling sites, paleontological remains, (shell heaps, land or sea mammal bones or tusks, or other items of historical significance), cease operations at that location immediately and notify the Engineer. (05/29/02)R7M98

107-1.09 CONSTRUCTION OVER OR ADJACENT TO WATERS. Add the following: Barges used for construction shall not ground at low tide. Structures shall be lighted in accordance with US Coast Guard navigation standards for visibility in fog, darkness, and inclement weather. (ANH, 10/1/05, ACMP)

107-1.11 PROTECTION AND RESTORATION OF PROPERTY AND LANDSCAPE. Add the following: If you require water for construction purpose from a non-municipal water source, obtain a Temporary Water Use Permit from the Water Resource Manager, and provide a copy to the Engineer. The Water Resource Manager is with the Department of Natural Resources in Anchorage and may be contacted at (907) 269-8624. (05/29/02)R7M98

The Contractor shall report immediately to the Engineer any hazardous material discovered, exposed, or released into the air, ground, or water during construction. The Contractor shall also report any containment, cleanup, or restoration activities anticipated or performed as a result of such release or discovery. Hazardous materials include, but are not limited to, petroleum products, oils,

solvents, paints, and chemicals that are toxic, corrosive, explosive, or flammable. (sw)

107-1.14 OPENING SECTION OF THE PROJECT TO TRAFFIC. In the first sentence of the first paragraph, change the word "their" to "his or her." (ANH 11/15/04)

Add the following subsection:

107-1.21 FEDERAL AFFIRMATIVE ACTION. The Federal Equal Employment Opportunity, Disadvantaged Business Enterprise, and On-the-Job Training affirmative action program requirements that are applicable to this Contract are contained in the project Special Provisions and Contract Forms, and may include:

Disadvantaged Business Enterprise (DBE) Program	Section 120
Training Program	Section 645
Federal EEO Bid Conditions	Form 25A-301
EEO-1 Certification	Form 25A-304
DBE Subcontractable Items	Form 25A-324
ADOT&PF Training Program Request	Form 25A-310
Training Utilization Report	Form 25A-311
Contact Report	Form 25A-321A
DBE Utilization Report	Form 25A-325C
Summary of Good Faith Effort Documentation	Form 25A-332A
Required Contract Provisions, Federal-Aid Contracts	Form 25D-55

In addition to the sanctions provided in the above references, non-compliance with these requirements is grounds for withholding of progress payments. (01/22/02)S80

SECTION 108

PROSECUTION AND PROGRESS

Special Provisions

108-1.03 PROSECUTION AND PROGRESS. Delete the last sentence of the first paragraph and substitute the following: Submit the following at the Preconstruction Conference:

Delete item 1. A progress schedule. and substitute the following:

1. A Critical Path Method (CPM) Schedule is required, in a format acceptable to the Engineer, showing the order the work will be carried out and the contemplated dates the Contractor and subcontractors will start and finish each of the salient features of the work, including scheduled periods of shutdown. Indicate anticipated periods of multiple-shift work in the CPM Schedule. Revise to the proposed CPM Schedule promptly. Promptly submit a revised CPM Schedule if there are substantial changes to the schedule, or upon request of the Engineer. See also Section 646. (12/13/02)R261M98

108-1.04 LIMITATION OF OPERATIONS. Add the following: The midden site located near the intersection of Henry Swanson Drive and Airport Beach Road is being excavated within the slope limits of this project by a team of archeologists. Coordinate traffic control, construction, and material hauling operations with the archeologists so as to minimize impacts to the traveling public and the excavation and transport of midden. No work shall occur within 50 feet of the mapped boundary of the midden site until August 15, 2007 unless authorized in advance by the Engineer.

Demolition of the existing bridge shall not begin until traffic is permanently shifted to the new bridge.

No asphalt concrete shall be placed between September 1st and May 15th. ***delete***

The new pressure reducing valve (PRV) facility shall be operational prior to construction of Pier 5, the demolition of the existing PRV facility on the west side of the South Channel, or the relocation of any water mains west of Captain's Bay Road. See 627-3.01 for additional detail.

Maintain continuous lighting to the existing bridge, and power and communication for the seafood processor on Henry Swanson Drive. Do not begin excavation west of Station 33+15 until authorized by the Engineer and temporary power is in-place for the existing bridge. Do not begin the excavation at the west bridge abutment until authorized by the Engineer and temporary or permanent power and communication is in-place for the seafood processor located on Henry Swanson Drive. (ANH, 09/27/05)

SECTION 109

MEASUREMENT AND PAYMENT

Special Provisions

109-1.02 MEASUREMENT OF QUANTITIES. Under subtitle Electronic Computerized Weighing System item (1) add the following to the end of the first sentence: ", CD, or a USB device."

109-1.05 COMPENSATION FOR EXTRA WORK. Under item 3. Equipment, item a. add the following to the second paragraph: The rental rate area adjustment factors for this project shall be as specified on the adjustment maps for the Alaska - South Region. (4/31/05)R14

109-1.07 PAYMENT FOR MATERIAL ON HAND. Add the following: The location of stockpiled materials for payment in acceptable storage facilities off the project will be in Unalaska/Dutch Harbor, Alaska, at a location acceptable to the Engineer. (09/01/89)R16

Standard Modification

109-1.08 FINAL PAYMENT. Add the following sentence to the first paragraph: The Department will not process the final estimate until the Contractor completes Items 1 through 4 in the first paragraph of subsection 105-1.16. (06/30/04)E11

Add the following Section:

SECTION 120

DISADVANTAGED BUSINESS ENTERPRISE (DBE) PROGRAM

Special Provisions

120-1.01 DESCRIPTION. The work consists of providing Disadvantaged Business Enterprises (DBEs), as defined in Title 49, CFR (Code of Federal Regulations), Part 26, with the opportunity to participate on an equitable basis with other contractors in the performance of contracts financed in whole, or in part, with federal funds. The Contractor or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The Contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of USDOT assisted contracts.

120-1.02 INTERPRETATION. It is the intent of this section to implement the requirements of 49 CFR, Part 26, and the Department's federally approved DBE Program.

120-1.03 ESSENTIAL CONTRACT PROVISION. Failure to comply with the provisions of this section will be considered a material breach of contract, which may result in the termination of this contract or such other remedy as ADOT&PF deems appropriate. The Department also considers failure to comply with this section to be so serious as to justify debarment action as provided in AS 36.30.640(4).

120-1.04 DEFINITIONS AND TERMS. The following definitions will apply.

1. Broker. A DBE certified by the Department that arranges for the delivery or provision of creditable materials, supplies, equipment, transportation/hauling, insurance, bonding, etc., within its certified category, that is necessary for the completion of the project. A broker of materials certified in a supply category must be responsible for scheduling the delivery of materials and fully responsible for ensuring that the materials meet specifications before credit will be given.

2. Commercially Useful Function (CUF). The execution of the work of the Contract by a DBE carrying out its responsibilities by actually performing, managing, and supervising the work involved using its own employees and equipment. The DBE shall be responsible, with respect to materials and supplies used on the Contract, for negotiating price, determining quality and quantity, ordering the material, and installing (where applicable) and paying for the material itself. To determine whether a DBE is performing a commercially useful function, an evaluation of the amount of work subcontracted, industry practices, whether the amount the firm is to be paid under the Contract is commensurate with the work it is actually performing and the DBE credit claimed for its performance of the work. Other relevant factors will be considered. The Engineer makes the

determination of CUF after evaluating the way in which the work was performed during the execution of the Contract.

3. Disadvantaged Business Enterprise (DBE). An enterprise which is a for-profit small business concern

   a. that is at least 51 percent owned by one or more individuals who are both socially and economically disadvantaged or, in the case of a corporation, in which 51 percent of the stock is owned by one or more such individuals;

   b. whose management and daily business operations are controlled by one or more of the socially and economically disadvantaged individuals who own it; and

   c. has been certified by the Department in accordance with 49 CFR, Part 26.

4. DBE Key Employee. Permanent employees identified by the DBE owner in its certification file in the Department Civil Rights Office.

5. DBE Utilization Goal. The percent of work to be performed by certified DBEs that is established by the Department and specified in the Contract.

6. Good Faith Efforts. Efforts by the bidder or Contractor to achieve a DBE goal or other requirement of 49 CFR Part 26, by their scope, intensity, and appropriateness to the objective, that can reasonably be expected to fulfill the program requirement.

7. Manufucturer. A DBE certified by the Department in a supply category that changes the shape, form, or composition of original material in some way and then provides that altered material to the project and to the general public or the construction industry at large on a regular basis.

8. Notification. For purposes of soliciting DBE participation on a project and to count toward a contractor's Good Faith Efforts, notification shall be by letter or fax transmission, with a return receipt requested or successful transmission report. Telephonic contact with a DBE may be allowed, however it shall be based on the ability of Civil Rights staff to independently verify this contact.

9. Regular Dealer. A DBE certified by the Department in a supply category that

   a. maintains an in-house inventory on a regular basis of the particular product provided to this project; and

   b. keeps an inventory in an amount appropriate for the type of work using that product; and

c. offers that inventory for sale to the general public or construction industry at large (private and public sectors), not just supplied as needed on a project by project basis during the construction season, except where the product requires special or heavy equipment for delivery and the DBE possesses and operates this equipment on a regular basis throughout the construction season in order to deliver the product to the general public or construction industry at large. If the distribution equipment is rented or leased, it must be on a repetitive, seasonal basis; and may additionally

d. fabricate (assembles large components) for use on a construction project, consistent with standard industry practice, for delivery to the project.

120-2.01 UTILIZATION GOAL. The DBE Utilization Goal for this contract is shown on Form 25A324 (DBE Subcontractable Items) as a percentage of the total basic bid amount. A DBE may be considered creditable towards meeting the DBE Utilization Goal at time of Contract award, if the DBE is certified by the Department in a category covering the CUF to be performed at the time of listing on Form 25A325C (DBE Utilization Report).

A bidder shall demonstrate the ability to meet the DBE Utilization Goal or perform and document all of the required Good Faith Efforts under Subsection 120-3.02 in order to be eligible for award of this Contract.

If the quantity of work of a bid item involving a DBE firm is reduced by the Department, the DBE Utilization Goal on Form 25A325C will be reduced proportionately.

120-3.01 DETERMINATION OF COMPLIANCE

1. Phase I - Bid. Each bidder must register with the Civil Rights Office annually in accordance with §§26.11 & 26.53(b)(2)(iv) of 49 CFR, Part 26. No contract may be awarded to a bidder that is not registered.

2. Phase II - Award. The apparent low bidder will provide the following within 15 days of receipt of notice of intent to award:

   a. **Written DBE Commitment.** Written commitments from DBEs to be used on the project. The written commitment shall contain the following information:

      1) A description of the work that each DBE will perform;

      2) The dollar amount of participation by the DBE firm;

      3) Written documentation of the bidder/offeror's commitment to use a DBE subcontractor whose participation it submits to meet a contract goal; and

4) Written confirmation from the DBE that it is participating in the contract as provided in the prime Contractor's commitment.

b. **DBE Utilization Report**. Form 25A325C listing the certified DBEs to be used to meet the DBE Utilization Goal.

c. **Good Faith Effort Documentation**. Summary of Good Faith Effort Documentation (Form 25A332A and attachments) and DBE Contact Reports (Form 25A321A) if the Contractor submits less DBE utilization on Form 25A325C than is required to meet the DBE Utilization Goal. If accepted by the Department, this lower DBE utilization becomes the new DBE Utilization Goal. If the bidder cannot demonstrate the ability to meet the DBE Utilization Goal, and can not document the minimum required Good Faith Efforts (as outlined in subsection 120-3.02 below), the Contracting Officer will determine the bidder to be not responsible.

3. Phase III - Construction.

a. **Designation of DBE/EEO Officer**. At the preconstruction conference, the Contractor shall submit, in writing, the designation of a DBE/EEO officer.

b. **DBE Creditable Work**. The CUF work items and creditable dollar amounts shown for a DBE on the DBE Utilization Report (Form 25A325C) shall be included in any subcontract, purchase order or service agreement with that DBE.

c. **DBE Replacement**. If the Engineer approves a DBE replacement, the Contractor shall replace the DBE with another DBE for the same work in order to fulfill its commitment under the DBE Utilization Goal. In the event that the Contractor cannot obtain replacement DBE participation, the Engineer may adjust the DBE Utilization Goal if, in the opinion of the Engineer and the Civil Rights Office, both of the following criteria have been met:

1) The Contractor has not committed any discriminatory practice in its exercise of good business judgement to replace a DBE.

2) If the Contractor is unable to find replacement DBE participation and has adequately performed and documented the Good Faith Effort expended in accordance with Subsection 120-3.02.

d. **DBE Utilization Goal**. The DBE Utilization Goal will be adjusted to reflect only that amount of the DBE's work that can not be replaced.

120-3.02 GOOD FAITH EFFORT

1. **Good Faith Effort Criteria.** The Contracting Officer will use the following criteria to judge if the bidder, who has not met the DBE Utilization Goal, has demonstrated sufficient Good Faith Effort to be eligible for award of the contract.

   Failure by the bidder to perform and document all of the following actions constitutes insufficient Good Faith Effort.

   a. Consideration of all subcontractable items. The bidder shall, at a minimum, seek DBE participation for each of the subcontractable items upon which the DBE goal was established as identified by the Department (on Form 25A324) prior to bid opening. It is the bidder's responsibility to make the work listed on the subcontractable items list available to DBE firms, to facilitate DBE participation.

   b. If the bidder can not achieve the DBE Utilization Goal using the list of available DBE firms based on the subcontractable items list, then the bidder may consider other items that could be subcontracted to DBEs.

   c. Notification to all active DBEs listed for a given region in the Department's most current DBE Directory at least 7 calendar days prior to bid opening. The bidder must give the DBEs no less than five days to respond. The bidder may reject DBE quotes received after the deadline. Such a deadline for bid submission by DBEs will be consistently applied. DBEs certified to perform work items identified on Form 25A324 must be contacted to solicit their interest in participating in the execution of work with the Contractor. Each contact with a DBE firm will be logged on a Contact Report (Form 25A321A).

d. The bidder may reject non-competitive DBE quotes. Allegations of non-competitive DBE quotes must be documented and verifiable. A DBE quote that is more than 10.0% higher than the accepted non-DBE quote will be deemed non-competitive, provided the DBE and non-DBE subcontractor quotes are for the exact same work or service. Bidders must have a non-DBE subcontractor quote for comparison purposes. Such evidence shall be provided in support of the bidder's allegation. Where the bidder rejects a DBE quote as being non-competitive under this condition, the work must be performed by the non-DBE subcontractor and payments received by the non-DBE subcontractor during the execution of the Contract shall be consistent with the non-DBE's accepted quote. This does not preclude increases as a result of Change documents issued by the Department.

e. Provision of assistance to DBEs who need help in obtaining information about bonding or insurance required by the bidder.

f. Provision of assistance to DBEs who need help in obtaining information about securing equipment, supplies, materials, or related assistance or services.

g. Providing prospective DBEs with adequate information about the requirements of the Contract regarding the specific item of work or service sought from the DBE.

h. Follow-up of initial notifications by contacting DBEs to determine whether or not they will be bidding. Failure to submit a bid by the project bid opening or deadline by the bidder is de facto evidence of the DBE's lack of interest in bidding. Documentation of follow-up contacts shall be logged on the Contact Report (Form 25A321A).

i. Items c through h will be utilized to evaluate any request from the Contractor for a reduction in the DBE Utilization Goal due to the default or decertification of a DBE and the Contractor's subsequent inability to obtain additional DBE participation.

2. **Administrative Reconsideration.** Under the provisions of 49 CFR. Part 26.53(d), if it is determined that the apparent successful bidder has failed to meet the requirements of this subsection, the bidder must indicate whether they would like an opportunity for administrative reconsideration. The bidder must exercise such an opportunity within 3 calendar days of notification it has failed to meet the requirements of this subsection. As part of this reconsideration, the bidder must provide written documentation or argument concerning the issue of whether it met the goal or made adequate good faith efforts to do so.

   a. The DBE Liaison Officer will make the decision on reconsideration.

   b. The bidder will have the opportunity to meet in person with the DBE Liaison Officer to discuss the issue of whether it met the goal or made adequate good faith efforts to do so. If a meeting is desired, the bidder must be ready, willing and able to meet with the DBE Liaison Officer within 4 days of notification that it has failed to meet the requirements of this subsection.

   c. The DBE Liaison Officer will render a written decision on reconsideration and provide notification to the bidder. The written decision will explain the basis for finding that the bidder did or did not meet the goal or make adequate good faith efforts to do so.

   d. The result of the reconsideration process is not administratively appealable to US DOT.

120-3.03 COMMERCIALLY USEFUL FUNCTION (CUF).

1. **Creditable Work.** Measurement of attainment of the DBE Utilization Goal will be based upon the actual amount of money received by the DBEs for creditable CUF work on this project as determined by the Engineer in accordance with this Section. CUF is limited to that of a:
   a. regular dealer;
   b. manufacturer;
   c. broker;
   d. subcontractor;
   e. joint-venture; or
   f. prime contractor.

2. **Determination of Commercially Useful Function**. In order for the CUF work of the DBE to be credited toward the goal, the Contractor will ensure that all of the following requirements are met:

   a. The CUF performed by a DBE certified in a supply category will be evaluated by the Engineer to determine whether the DBE performed as either a broker, regular dealer, or manufacturer of the product provided to this project.

   b. A DBE trucking firm certified and performing work in a transportation/hauling category is restricted to credit for work performed with its own trucks and personnel certified with the CRO prior to submitting a bid to a contractor for DBE trucking. The DBE trucking firm must demonstrate that it owns all trucks (proof of title and/or registration) to be credited for work and that all operators are employed by the DBE trucking firm. A DBE trucking firm that does not certify its trucks and personnel that it employs on a job will be considered a broker of trucking services and limited to credit for a broker. (This does not effect the CUF of that same firm, when performance includes the hauling of materials for that work.)

   c. The DBE is certified in the appropriate category at the time of

      1) the Engineer's approval of the DBE subcontract, consistent with the written DBE commitment; and

      2) the issuance of a purchase order or service agreement by the Contractor to a DBE performing as either a manufacturer, regular dealer, or broker (with a copy to the Engineer).

   d. The Contractor will receive credit for the CUF performed by DBEs as provided in this Section. Contractors are encouraged to contact the Engineer in advance of the execution of the DBE's work or provision of goods or services regarding CUF and potential DBE credit.

   e. The DBE may perform work in categories for which it is not certified, but only work performed in the DBE's certified category meeting the CUF criteria may be credited toward the DBE Utilization Goal.

   f. The work of the DBE firm must meet the following criteria when determining when CUF is being performed by the DBE:

      1) The work performed will be necessary and useful work required for the execution of the Contract.

2) The scope of work will be distinct and identifiable with specific contract items of work, bonding, or insurance requirements.

3) The work will be performed, controlled, managed, and supervised by employees normally employed by and under the control of the certified DBE. The work will be performed with the DBE's own equipment. Either the DBE owner or DBE key employee will be at the work site and responsible for the work.

4) The manner in which the work is sublet or performed will conform to standard, statewide industry practice within Alaska, as determined by the Department. The work or provision of goods or services will have a market outside of the DBE program (must also be performed by non-DBE firms within the Alaskan construction industry). Otherwise, the work or service will be deemed an unnecessary step in the contracting or purchasing process and no DBE credit will be allowed.

   There will be no DBE credit for lower-tier non-DBE subcontract work.

5) The cost of the goods and services will be reasonable and competitive with the cost of the goods and services outside the DBE program within Alaska. Materials or supplies needed as a regular course of the Contractor's operations such as fuel, maintenance, office facilities, portable bathrooms, etc. are not creditable.

   The cost of materials actually incorporated into the project by a DBE subcontractor is creditable toward the DBE goal only if the DBE is responsible for ordering and scheduling the delivery of creditable materials and fully responsible for ensuring that the materials meet specifications.

6) Unless the Engineer's approval is given before subletting, use the same unit of measure as contained in the Bid Schedule for subcontract work, with the exception of truck hauling.

7) The DBE will control all business administration, accounting, billing, and payment transactions. The prime contractor will not perform the business, accounting, billing, and similar functions of the DBE. The Engineer may, in accordance with AS 36.30.420(b), inspect the offices of the DBE and audit the records of the DBE to assure compliance.

g. On a monthly basis, the Contractor shall report on Form 25A336 (Monthly Summary of DBE Participation) to the Department Civil Rights Office the payments made (canceled checks or bank statements that identify payor, payee, and amount of transfer) for the qualifying work, goods and services provided by DBEs.

3. **Decertification of a DBE.** Should a DBE performing a CUF become decertified during the term of the subcontract, purchase order, or service agreement for reasons beyond the control of and without the fault or negligence of the Contractor, the work remaining under the subcontract, purchase order, or service agreement may be credited toward the DBE Utilization Goal.

Should the DBE be decertified between the time of Contract award and the time of the Engineer's subcontract approval or issuance of a purchase order or service agreement, the work of the decertified firm will not be credited toward the DBE Utilization Goal. The Contractor must still meet the DBE Utilization Goal by either

a. withdrawing the subcontract, purchase order or service agreement from the decertified DBE and expending Good Faith Effort (Subsection 120-3.02, Items c through h) to replace it with one from a currently certified DBE for that same work or service through subcontractor substitution (Subsection 103-1.01); or

b. continuing with the subcontract, purchase order or service agreement with the decertified firm and expending Good Faith Effort to find other work not already subcontracted out to DBEs in an amount to meet the DBE Utilization Goal through either

1) increasing the participation of other DBEs on the project;
2) documenting Good Faith Efforts (Subsection 120-3.02, items c through h); or
3) by a combination of the above.

4. **DBE Rebuttal of a Finding of no CUF.** Consistent with the provisions of 49 CFR, Part 26.55(c)(4)&(5), before the Engineer makes a final finding that no CUF has been performed by a DBE firm the Engineer will coordinate notification of the presumptive finding through the Civil Rights Office to the Contractor, who will notify the DBE firm.

   The Engineer, in cooperation with the Civil Rights Office, may determine that the firm is performing a CUF if the rebuttal information convincingly demonstrates the type of work involved and normal industry practices establishes a CUF was performed by the DBE. Under no circumstances shall the Contractor take any action against the DBE firm until the Engineer has made a final determination. The Engineer's decisions on CUF matters are not administratively appealable to US DOT.

120-3.04 DEFAULT OF DBE. In the event that a DBE firm under contract or to whom a purchase order or similar agreement has been issued defaults on their work for whatever reason, the Contractor shall immediately notify the Engineer of the default and the circumstances surrounding the default.

The Contractor shall take immediate steps, without any order or direction from the Engineer, to retain the services of other DBEs to perform the defaulted work. In the event that the Contractor cannot obtain replacement DBE participation, the Engineer may adjust the DBE Utilization Goal if, in the opinion of the Engineer, the following criteria have been met:

1. The Contractor was not at fault or negligent in the default and that the circumstances surrounding the default were beyond the control of the Contractor; and

2. The Contractor is unable to find replacement DBE participation at the same level of DBE commitment and has adequately performed and documented the Good Faith Effort expended in accordance with items c through h of Subsection 120-3.02 for the defaulted work; or

3. It is too late in the project to provide any real subcontracting opportunities remaining for DBEs.

The DBE Utilization Goal will be adjusted to reflect only that amount of the defaulted DBE's work that can not be replaced.

120-4.01 METHOD OF MEASUREMENT. The Contractor will be entitled to count toward the DBE Utilization Goal those monies actually paid to certified DBEs for CUF work performed by the DBE as determined by the Engineer. The Contractor will receive credit for the utilization of the DBEs, as follows:

1. Credit for the CUF of a DBE prime contractor is 100% of the monies actually paid to the DBE under the contract for creditable work and materials in accordance with 49 CFR 26.55.

2. Credit for the CUF of a subcontractor is 100% of the monies actually paid to the DBE under the subcontract for creditable work and materials. This shall include DBE trucking firms certified as a subcontractor and not a broker. Trucks leased from another DBE firm shall also qualify for credit and conforms to the provisions of 49 CFR 26.55(d).

3. Credit for the CUF of a manufacturer is 100% of the monies paid to the DBE for the creditable materials manufactured.

4. Credit for the CUF of a regular dealer of a creditable material, product, or supply is 60% of its value. The value will be the actual cost paid to the DBE but will not exceed the bid price for the item.

5. Credit for the CUF of a broker performed by a DBE certified in a supply category for providing a creditable material, product or supply is limited to a reasonable brokerage fee. The brokerage fee will not exceed 5% of the cost of the procurement contract for the creditable item.

6. Credit for the CUF of a broker performed by a DBE certified in the transportation/hauling category for arranging for the delivery of a creditable material, product or supply is limited to a reasonable brokerage fee. The brokerage fee will not exceed 5% of the cost of the hauling subcontract.

7. Credit for the CUF of a broker performed by a DBE certified in a bonding or insurance category for arranging for the provision of insurance or bonding is limited to a reasonable brokerage fee. The brokerage fee will not exceed 5% of the premium cost.

8. Credit for the CUF of a joint venture (JV) (either as the prime contractor or as a subcontractor) may not exceed the percent of the DBE's participation in the joint venture agreement, as certified for this project by the Department. The DBE joint venture partner will be responsible for performing all of the work as delineated in the certified JV agreement.

120-5.01 BASIS OF PAYMENT. Work under this item is subsidiary to other contract items and no payment will be made for meeting or exceeding the DBE Utilization Goal.

If the Contractor fails to utilize the DBEs listed on Form 25A325C as scheduled or fails to submit required documentation to verify proof of payment or documentation requested by the Department to help in the determination of CUF, the Department will consider this to be unsatisfactory work. If the Contractor fails to utilize Good Faith Efforts to replace a DBE, regardless of fault (except for Subsection 120-3.04 item 3), the Department will also consider this unsatisfactory work.

Unsatisfactory work may result in disqualification of the Contractor from future bidding under Subsection 102-1.13 and withholding of progress payments consistent with Subsection 109-1.06.

(11/17/00)S 33

ADDENDUM 2
ATTACHMENT 4

SECTION 202

REMOVAL OF STRUCTURES AND OBSTRUCTIONS

Special Provisions

202-1.01 DESCRIPTION. Add the following: This work includes removing the existing South Channel Bridge Number 1386 in its entirety.

The existing South Channel Bridge is approximately 521 feet long and 29 feet wide. "As-Built" and Shop Drawings for the existing bridge can be obtained from the office of the Chief Bridge Engineer at 3132 Channel Drive, Juneau AK 99801.

These drawings are available for informational use only and the Department neither warrants nor represents that they accurately depict the configuration of the existing bridge. Where details of the work under this contract are dependent on the dimensions of the existing bridge, verify the controlling field dimensions and adjust dimensions of the work to fit existing conditions.

202-3.03 REMOVAL OF BRIDGES, CULVERTS AND OTHER DRAINAGE STRUCTURES. Insert the following after the third paragraph: Maintain traffic on the existing bridge until traffic is permanently shifted to the new bridge. This includes measures necessary to complete earthwork and utility construction in the vicinity of the new bridge abutment and Henry Swanson Drive, while maintaining traffic on the existing bridge. (3/13/03, ANH)

Add the following: No less than thirty (30) days prior to commencing bridge removal, submit for approval a Bridge Demolition Plan. The Bridge Demolition Plan will include, but is not limited to:

1. The method and sequence of removal.
2. A list of the type, number and size of all proposed equipment
3. Crane locations and lifting locations.
4. Weights of parts.
5. Waste site location.
6. Details of lead paint containment and disposal.

Receipt of the Bridge Demolition Plan by the Engineer does not constitute approval of the plan or the adequacy of the plan. Do not commence bridge removal operations without the written authorization of the Engineer.

Deliver all structural steel (e.g. girders, diaphragms, piers, etc.) to a steel mill or ferrous foundry where the steel will be melted down to a raw material and recycled. Structural steel on the existing South Channel Bridge is coated with lead-based paint. The existing paint system for the structural steel has been analyzed in accordance with EPA Methods SW846-7420 and SW6010B and found to contain up to 370,000 PPM of lead and up to 111 mg/Kg of Chromium, respectively. Follow all applicable OSHA, EPA, DEC, Federal , State, Local and Section 513 requirements for containing and disposing of lead based paint

waste and debris when dismantling, removing, handling, transporting, delivering and recycling structural steel from the existing bridge. Submit to the Engineer certification from the mill or foundry attesting that all of the existing structural steel has been recycled and that the lead byproduct has been recycled or disposed of in accordance with applicable regulatory requirements. In the certification, provide the weight of steel recycled and the mill or foundry's EPA regulated waste activity identification number. Dispose of all non-salvageable and non-recyclable materials in a Contractor-furnished waste disposal site or in a manner approved by the Engineer.

Regrade old bridge approaches as shown on the drawings and as directed by the Engineer. (ANH, 10/1/05, ACMP)

202-3.05 REMOVAL OF PAVEMENT, SIDEWALKS, AND CURBS. Add the following: Pavement sawcutting is required when the resulting joint will not be overlayed and when directed by the Engineer. The pavement shall be removed to a distance one(1) foot beyond the limits of excavation.

Obtain a solid waste disposal permit from DEC or use a site previously approved by DEC for disposal of removed asphalt if not using it in the embankment. A DEC permitting officer in Anchorage may be contacted at (907) 269-7590. (03/29/01)R84USC

Add the following subsection:

202-3.06 REMOVE AND/OR ABANDON EXISTING PRV FACILITIES. Perform work and operations necessary to:

1. Remove and/or demolish and dispose of in place the existing Pressure Reducing Valve (PRV) facility located under the north bridge abutment.
2. Fill, dispose of in place, and abandon the existing Pressure Reducing Valve (PRV) facility located at the intersection of Captains Bay Road.
3. Salvage existing valves, piping, controls, above ground fuel oil tank, heater, and appurtenances and deliver acceptable materials to the City of Unalaska Water Department. The City will make a determination of what materials are considered acceptable. The remaining materials will become the property of the Contractor.
4. Dispose of materials and/or structure not otherwise abandoned or accepted by the City.
5. Remove and/or abandon existing waterlines located under the new bridge abutment.

Sequence work to meet requirements outlined in Section 627.

Water valves are to be operated by City personnel only. See Section 627 for requirements related to water main shutdowns.

202-4.01 METHOD OF MEASUREMENT. Add the following:

4. Lump Sum. All work required without measurement of quantities.

202-5.01 BASIS OF PAYMENT.

Add the following at the end of the first paragraph: Item 202(1) includes the removal and relocation of all items that do not have separate pay items under this section.

Add the following after the third paragraph:

Item 202(14), Removal of Existing PRV Facility. At the contract price per unit specified. Payment is full compensation for excavation, demolition, filling of cavities, disposal on-site, removal, loading, hauling, unloading, and off-site disposal of the existing PRV Facilities and appurtenances. New pipe, connections, valves and appurtenances are paid for under Section 627. Temporary water service is paid for under Section 627. Excavation, Bedding, and backfill are subsidiary.

Item 202(17), Removal of Bridge Number 1386. **Payment is full compensation for removing, handling, transporting, and disposing of the existing South Channel Bridge, Bridge Number 1386, in its entirety in accordance with this Contract.** This work includes the removal of any utilities or other facilities mounted to the bridge.

Add the following: Sawcutting, if required, will not be paid for directly, but will be subsidiary to Item 202(2), Removal of Pavement.

Activities associated with pipes to be abandoned in place are not paid for directly, but are included under Item 202(4) Removal of Culvert Pipe.

Removal of sidewalk and pathway will be included in Item 202(2), Removal of Pavement.

Preparation of a plan and the work necessary for maintaining traffic on the existing bridge until the new bridge is placed in service will not be measured for payment and will be subsidiary to Item 202(17), Removal of Bridge Number 1386. (03/13/03, ANH)

Delete standard pay items 202(2) and 202(9), and add the following pay items:

Pay Item	Pay Unit
202(2) Removal of Pavement	Lump Sum
202(9) Removal of Curb and Gutter	Lump Sum
202(14) Removal of Existing PRV Facility	Lump Sum
202(17) Removal of Bridge Number 1386	Lump Sum

SECTION 203

EXCAVATION AND EMBANKMENT

Special Provision

Add the following subsections:

203-1.02 DEFINITIONS.

1. Air Concussion is the propagation of pressure waves through the atmosphere imparted by firing explosive charges.

2. Blasting Operations are all activities related to blasting including, but not restricted to, collaring and drilling of holes, preparing, fixing and firing of explosive charges, handling of misfires and the removal and disposal of blasted material.

3. Fly rock is the throw of fragmented material in response to the firing of explosive charges.

4. Ground Vibration is the motion of the ground surface induced by blasting and is measured as the peak particle velocity (PPV).

5. Half Casts are the remains of blast holes left on the finished surface of the cut face after blasting and scaling have been completed.

6. Overbreak is the fragmentation of material beyond the design lines of the Blasting.

7. Production Blasting is the main fragmentation blasting resulting from relatively widely spaced production holes drilled throughout the main excavation area adjacent to the controlled blast line. The purpose of production blasting is to fragment the rock to allow for excavation and removal.

8. Water Borne Overpressure is the propagation of pressure waves underwater imparted by firing explosive charges.

203-1.03 SUBMITTALS. The following information and procedures shall be submitted for acceptance at least 10 calendar days prior to commencement of work described in the submittal.

1. Blasting Records. Each shot shall have a blasting record prepared and submitted by the Contractor on the day of the blast containing the following information:

   a. Actual dimensions of the shot including hole diameters, hole depths, burden, spacing, subdrilling, stemming, powder loads, powder factors, and timing.

b. A drawing or sketch showing direction of the face and physical shot layout.

c. Location of the blast in relation to project stationing and elevation.

d. Date and time of loading and detonation.

e. Name of person in responsible charge of loading and firing.

f. Comments by Blaster in Charge regarding damage to existing facilities, adjacent property, or completed work; misfires; fly rock occurrences; unusual results; or unusual effects.

203-2.01 MATERIALS. Delete subitem 2a., Common Excavation and b., Rock Excavation, and replace with the following:

a. Common Excavation. Materials other than rock, including but not limited to silt, sand, gravel, other granular material, muck, ash, glacial drift, vegetative mat, and other organics.

b. Rock Excavation. For purposes of classifications of excavation, rock is defined as a sound and solid mass, layer, or ledge of mineral matter of such hardness and texture that it cannot be effectively loosened or broken down by mechanical ripping equipment with a minimum drawbar pull of 81 kips. All boulders or detached pieces of solid rock more than two cubic yards in volume will be classified as rock excavation. Frozen soils are not classified as rock.

203-3.01 GENERAL. Add the following: Wait a minimum of 48 hours after staking is complete before commencing excavation activities. The Engineer, after staking by the Contractor, may adjust stationing of sections for best fit without additional compensation to the Contractor.

After the subgrade has been substantially completed, the full width shall be conditioned by removing any soft or other unstable material. Except where sensitive soils are present, the resulting areas and all other low areas, holes or depressions shall be brought to grade with material compacted to the requirements of subsection 203-3.03 or 3.04 as appropriate. Except where sensitive soils are present, scarifying, blading, rolling and other methods shall be performed to provide a thoroughly compacted subgrade shaped to the lines and grades shown on the plans. (CM/ANH, 02/08/02)

No subbase, or surface course shall be placed on the subgrade until the subgrade has been approved by the Engineer.

Add the following to the end of the sixth paragraph: The City of Unalaska Landfill is an approved disposal site for excess useable material. Excess useable material delivered to the landfill becomes property of the City of Unalaska. Excess useable material removed from the PRV building site is property of the City of Unalaska and shall be delivered to the City Landfill.

203-3.02 ROCK EXCAVATION. Add the following to the first paragraph: Controlled blasting techniques, as covered herein, shall be used for forming highway rock cut slopes at the locations shown on the plans or called for in the special provisions

Delete subitem 1.a, Blasting Plan, and substitute the following:

a. Blasting Plan. At the PreConstruction Conference, or at any time the Contractor proposes to change the drilling and blasting methods, the Contractor shall submit 6 copies of the Blasting Plan to the Engineer for review. In addition, blasting plan and the name and certification number of the Blaster-in Charge shall be submitted to Department of Natural Resources (DNR) not less than two weeks prior to commencing drilling and blasting operations.

Attn: Becky Peltz
Department of Natural Resources
550 W. 7th Avenue, Suite 900C
Anchorage, AK 99501

The blasting plan shall contain the full details of the drilling and blasting patterns and controls the Contractor proposes to use for both the controlled and production blasting. The blasting plan shall contain the following minimum information:

(1) Station limits of proposed shots for each design.

(2) Plan and section views of proposed drill pattern including free face, burden, blast hole spacing, blast hole diameters, blast hole angles, lift height, and subdrill depth.

(3) Loading diagram showing type and amount of explosives, primers, initiators, and location and depth of stemming.

(4) Initiation sequence of blast holes including delay times and delay system.

(5) Manufacturer's data sheets for all explosives, primers, and initiators to be employed.

(6) Methods, materials, and routes for accessing the top of slopes, storing material, and protecting and, if necessary restoring vegetation to maintain and restore vegetation disturbed by construction activities, if any.

(7) Methods and equipment that will be used by the Blast Monitor for monitoring ground vibration and water overpressure.

The Blasting Plan submittal is for quality control and record keeping purposes. Review of the blast plan by the Engineer shall not relieve the Contractor of his responsibility for the accuracy and adequacy of the plan when implemented in the field.

The Blasting Plan for work within one quarter mile of a water body containing fish will require approval by the ADF&G prior to any drilling and blasting in these areas.

Delete subitem 1.b, Blaster, and substitute the following:

b. Blaster in Charge At the PreConstruction Conference, the Contractor shall submit the name and qualifications of the person authorized to act on behalf of the Contractor and licensed by the applicable State and/or local regulatory agencies to possess, transport, and use explosives. This person shall have a minimum of 10 years experience with blast design and significant involvement as a Blaster in Charge for a minimum of five major rock excavation projects involving controlled blasting. Experience is also required in the design of blasting rounds with restrictions on vibrations and air blast noise. The resume shall contain a description of the projects, details of the blast plans and modifications made during the project. The resume shall also contain the names and telephone numbers of project owners with sufficient knowledge of the projects to verify the submitted information. The qualifications of the Blaster in Charge shall be approved by the Engineer prior to the beginning of any drilling or blasting work.

The Blaster in Charge shall be an employee of the Contractor, and shall be on site during all loading and blasting operations.

Add the following to subitem 1. d., Safety: At the PreConstruction Conference, provide a Safety Plan that details the means and methods by which explosives will be transported, stored, inventoried, segregated and loaded. Include procedures for restricting access to blast zones prior to and subsequent to blasts.

Under subitem 1. e., Controlled Blasting, delete in its entirety and substitute the following: Controlled blasting holes are closely spaced, lightly loaded holes drilled along the plane of the final design slope. Controlled blasting is either pre-shear (pre-split) or cushion (trim) blasting. Cushion blasting or pre-split blasting shall be used along the final line for all cut faces, including test section blasting, and shall conform to the following requirements.

(1) The final line holes shall be drilled in the plane of the final slope in order to achieve a face angle of 1/4H:1V. The Contractor shall employ proper equipment and techniques to ensure that no hole deviates from the plane of the planned slope by more than 9 inches either parallel or normal to the slope. Drill holes exceeding these limits will not be paid for unless satisfactory slopes are being obtained.

(2) Unless otherwise permitted by the Engineer, the Contractor shall completely remove all overburden soil and loose or decomposed rock along the top of the excavation in accordance with the Slope Rounding Detail shown in the Plans.

(3) Potentially dangerous boulders or other material located beyond the excavation limits shall also be removed as ordered by the Engineer. Payment for removal of the material located beyond the excavation limits shall be by the man hour under Item 203(13) Rock Scaling.

(4) The final line drill holes shall be not less than 2.5 inches and not more than 3 inches in diameter.

(5) Difference in delay time between the final line and the nearest production row shall not be greater than 75 milliseconds nor less than 25 milliseconds.

(6) All drilling equipment used to drill the final line holes shall have mechanical devices affixed to that equipment to accurately determine the angle at which the drill steel enters the rock. Final line hole drilling will not be permitted if these devices are either missing or inoperative.

(7) The height of any individual lift shall not exceed 30 feet, and shall be less than 30 feet if the Engineer considers that the tolerance in directional control is inadequate.

(8) When the cut height will require more than one lift, a maximum 24 inch horizontal offset between lifts shall be permitted to allow for drill equipment clearances. The Contractor shall begin the control blast hole drilling at a point which will allow for necessary offsets and shall adjust, at the start of lower lifts, to compensate for any drift which may have occurred in the upper lifts.

(9) Drilling 24 inches below the bottom of each excavation lift and below ditch bottom at roadway level will be required to facilitate removal of horizontal benches on the cut face and of the toe berm at roadway level.

(10) Before placing charges, the Contractor shall determine that the hole is free of obstructions for its entire depth. All necessary precautions shall be exercised so that the placing of the charges will not cause caving of material from the walls of the holes.

(11) Drill hole conditions may vary from dry to filled with water. The Contractor will be required to use whatever type(s) of explosives and/or blasting accessories necessary to accomplish the specified results.

(12) Bulk ammonium nitrate and fuel oil (ANFO) shall not be used in the final line holes.

(13) If fractional portions of standard explosive cartridges are used, they shall be firmly affixed to the detonating cord in such a manner that the cartridges will not slip down the detonating cord nor bridge across the hole.

(14) The upper portion of all final line holes, from the top charge to the hole collar, shall be stemmed. Stemming materials shall be sand or other dry angular granular material, all of which passes a 3/8 inch sieve.

(15) Unloaded and unstemmed guide holes, when used between final line holes, shall be of the same diameter and drilled in the same plane and to the same tolerance as the final line holes.

Under subitem 1. f., Production Blasting, delete the fourth sentence beginning with the words "Detonate production hole charges....", and add the following to the end of the subsection: All production blasting, including that carried out in conjunction with blasting test section requirements, shall be performed in accordance with the following requirements.

(1) The row of production blast holes immediately adjacent to the controlled blast line shall be drilled on a plane approximately parallel to the controlled blast line.

(2) Production blast holes shall not be drilled closer than 6 feet to the controlled blast line, unless approved by the Engineer. All blast holes shall be logged by the driller for the locations of voids, open fractures or soft seams. The Blaster in Charge shall incorporate this information into the loading design of each production blast hole, including the use of explosive decking as appropriate.

(3) The bottom of the production holes shall not be lower than the bottom of the controlled blast holes.

(4) Production holes shall not exceed 6 inches in diameter, unless approved by the Engineer.

(5) Stemming material used in production holes shall be sand or other dry angular granular material, all of which passes a 3/8 inch sieve.

(6) All necessary precautions shall be taken in the production blasting to minimize blast damage to the rock backslope.

(7) Overbreak below the design roadbed excavation level as shown on the drawings shall be minimized and any overbreak shall be backfilled with Selected Material, Type C and compacted to the satisfaction of the Engineer at the Contractor's expense. . If blasting below subgrade leaves a rock pocket that will not drain, the Contractor shall use light blasting, mechanical excavation or other means to create a trench from the pocket to the lower road side ditch, then backfill the pocket and trench with rock fragments, gravel, or other free-draining material approved by the Engineer, at no expense to the Department.

(8) All excavated material is to be removed and stockpiled in Contractor supplied areas, or as approved in writing by the Engineer.

Delete item 1. g., Scaling, in its entirety and substitute the following:

g. Scaling and Stabilization.

(1) All rock on the cut face that is loose, hanging, or potentially dangerous shall be removed or stabilized, to the Engineer's satisfaction, during or upon completion of the excavation in each lift. Drilling of the next lift will not be allowed until this work has been completed.

(2) The slopes shall be scaled throughout the span of the contract and at such frequency as required to remove all hazardous loose rock or overhangs. The slopes shall be hand scaled using a suitable standard steel mine scaling rod. Subject to the Engineer's approval, other methods such as air pillows, hydraulic jacks or splitters, or light blasting may be used in lieu of or to supplement hand scaling. Payment for scaling of blasted surfaces shall be incidental to the contract unit price for Item 203(2), Rock Excavation.

(3) If in-place stabilization is required, as determined by the Engineer, rock bolting, dowels, shotcrete application or other Engineer approved stabilization techniques will be used. Stabilization necessitated, in the opinion of the Engineer, by the geologic conditions, will be paid for at the appropriate unit price or by time and materials. Stabilization necessitated, in the opinion of the Engineer, by the Contractor's blasting operations, shall be performed at the Contractor's expense.

Delete item 1. h., Ditch Line/Subgrade Blasting, in its entirety and substitute the following:

h. Ditch Line/Subgrade Blasting. Drill, blast, or rip the rock as shown on the Typical Sections or as directed by the Engineer to construct a free-draining fractured rock zone below the ditch line and/or the bottom of the structural section. Hole depth, spacing, and staggering of rows needed to achieve the desired fracturing should be provided in the Blasting Plan. Load these holes lighter than production holes and stem so as to prevent rifling. Excavate test areas as directed by the Engineer to demonstrate the effectiveness of the ditch line/subgrade blasting in producing the desired outcome to the approval of the Engineer. Discuss the methodology for this item in the Blasting Program and Blasting Plans.

Add the following subitems to Item 1, Blasting:

i. Blasting Materials. All products and materials used for any Blasting Operation shall be from a recognized supplier, and shall be products of a company regularly engaged in the manufacture of explosives and related products.

Explosives with an expired shelf life shall not be used.

Use of Explosives shall be in accordance with subsection 107-1.10.

j. Notification. The Contractor shall coordinate blasting operations with and notify all affected parties and agencies in accordance with the following requirements:

(1) Engineer. The Contractor shall provide notice to Engineer of the scheduled time of each blast a minimum of 1.5 hours prior to the blast. The time of the blast shall be estimated within a one hour duration. For example, the Contractor shall notify Engineer by 19:00 hours of a blast between 20:30 and 21:30 hours.

(2) City of Unalaska, Police and Fire, Public Works and Public Utilities. The Contractor shall notify the City of Unalaska, Police and Fire, Public Works and Public Utilities in accordance with the same requirements for notifying the Engineer, above. The contact for the City of Unalaska Public Works and Public Utilities is:

City of Unalaska, Public Works and Public Utilities
Ph: 907-581-1260

(3) Federal Aviation Administration. A 1,000 ft above ground level Controlled Firing Area restriction will be in effect for the blast areas. The following shall be accomplished:

i. The Contractor shall contact the Cold Bay Flight Service Station at 907-532-2454 or toll free at 1-800-478-7250 twelve hours prior to blasting.

ii. The Contractor shall provide an aircraft watch attendant who is in continuous contact with the person in responsible charge for firing.

iii. Blast faces shall be limited to a maximum height of 250 ft above sea level, and no fly rock shall be allowed higher than 500 ft above ground level.

(4) Harbor Master. The Contractor shall notify the Harbor Master in accordance with the same requirements for notifying the Engineer, above. The contact for the Harbor Master is:

Unalaska Harbor Master
Ph: 907-581-1254

(5) ADF&G. The Contractor shall notify the Alaska Department of Fish and Game in accordance with requirements outlined in the Permit of their approval of the Blasting Plan. The contact for the ADF&G is Forrest Bowers:

ADF&G

Ph: 907-581-1239

i Detonation of a blast shall not occur during periods of fish or other wildlife migration, as identified in the ADF&G approval of the Blasting Plan.

k. Blasting Test Section(s).

(1) Prior to commencing full-scale blasting operations, the Contractor shall demonstrate the adequacy of the proposed blast plan by drilling, blasting, excavating, and providing final surface finish for short test sections, up to 60 feet in length along the alignment, to determine which combination of method, hole spacing, and charge works best. When field conditions warrant, as determined by the Engineer, the Contractor may be ordered to use test section lengths less than 60 feet.

(2) Unless otherwise allowed by the Engineer, the Contractor shall begin the tests with the controlled blast holes spaced 3.0 feet apart, then adjust if needed, until the Engineer accepts the spacing to be used for full-scale blasting operations.

(3) Requirements for controlled and production blasting operations, and final surface finishing covered elsewhere in this specification shall also apply to the blasting carried out in conjunction with the test shots.

(4) The Contractor shall not drill ahead of the test shot area until the test section has been excavated and the results evaluated by the Engineer. If the results of the test shot(s), in the opinion of the Engineer, are unsatisfactory, then, notwithstanding the Engineer's prior review of such methods, the Contractor shall adopt such revised methods as are necessary to achieve the required results. Unsatisfactory test shot results include an excessive amount of fragmentation beyond the indicated lines and grade, excessive fly rock, or violation of other requirements within these specifications. All costs incurred by the Contractor in adopting revised blasting methods necessary to produce an acceptable test shot shall be considered incidental to the contract unit price for Rock Excavation.

(5) If at any time during the progress of the work, the methods of drilling and blasting do not produce the desired results, within the tolerances specified, the Contractor will be required to drill, blast and excavate in short sections, not exceeding 100 feet in length, until a technique is arrived at that will produce the desired results. Extra cost resulting from this requirement shall be borne by the Contractor.

l. Safety. In addition to all provisions of the Contractor submitted Safety Plan, the following shall also be implemented:

(1) The Contractor shall observe the entire blast area for a minimum of

5 minutes following a blast to guard against rock fall before commencing work in the cut.

(2) The Engineer will, at all times, have the authority to prohibit or halt the Contractor's blasting operations if it is apparent that through the methods being employed, the required slopes are not being obtained in a stable condition.

m. Access. All access to the excavation areas shall be contained entirely within the designated right-of-way (ROW) and temporary construction easement (TCE) shown in the Plans. No access roads, material storage or waste rock and soil disposal shall be in any area other that those designated in these specifications as storage and disposal areas. Every effort shall be made to minimize disturbance to the rock, soil and vegetation outside the excavation limits, except as required for the safety of the work and as approved by the Engineer.

n. Final Surface Finishing. The objective of the blasting and rock excavation is to create a stable back slope that is uniform and smooth. The slope profile shall conform to the Typical Sections shown in the Plans. Offsets between lifts that exceed the allowable 24 inch maximum shall be removed at the Contractor's expense if so directed by the Engineer. Half casts and other indications of controlled blasting are acceptable on the final face. Scaling of blast faces shall be adequate to remove loose hazardous rock and overhangs to the satisfaction of the Engineer. The Engineer shall have final decision authority on all issues of permanent rock slope stability as it pertains to removal methods versus stabilization by rock bolts, rock dowels or shotcrete. Notwithstanding, the Contractor shall maintain responsibility for site safety for the Contractor's employees and subcontractors.

o. Protection of Existing Facilities.

(1) Nearby Buildings. The precautions outlined below shall be taken during the blasting operations to minimize risk of damage to nearby buildings.

i. The Contractor shall take the utmost care to prevent damage to the nearby buildings, due to either fly rock or ground vibrations. This may necessitate control of fly rock, ground vibrations or other phenomena which could cause damage to these buildings.

ii. Costs for measures to protect the buildings, including but not limited to granular padding material and blasting mats, or relocation, or replacement are considered incidental to the cost for Rock Excavation and no additional payment shall be considered for these items.

iii. Any damage to the buildings caused by the Contractor shall be the sole responsibility of the Contractor. Under no circumstances shall

the Engineer, the Owner or their agents accept responsibility for any damages caused by the Contractor.

iv. The Contractor shall be responsible for making pre-blast surveys of susceptible buildings to identify any pre-existing damage and for carrying out vibration monitoring during blasting. If the ground vibrations exceed the allowable maximum levels the Contractor shall make modifications to the blasting method to reduce vibrations to allowable values. The cost of the pre-blast surveys, vibration monitoring and required modifications to the blasting method is considered incidental to the contract unit price for Rock Excavation and no additional payment shall be considered for this item.

(2) South Channel Bridge. The precautions outlined below shall be taken during the blasting operations to minimize risk of disturbance to the existing and/or proposed South Channel Bridge:

i. The Contractor shall take the utmost care to prevent damage to these structures by construction sequencing, controlling fly rock and limiting ground vibrations.

ii. Fly rock shall be controlled by the use of blasting mats, and appropriate explosive loads and detonation sequences as appropriate for varying conditions along the alignment.

iii. Ground vibrations shall be controlled such that the peak particle velocity does not exceed 3 inches/sec. at any point on the bridge except if curing concrete is present. In such case, vibrations should be limited in accordance with recommendations presented on Page 354 in *Foundations on Rock* by Duncan C. Wyllie, Second Edition, 1999. Ground vibrations shall be controlled by appropriately limiting the explosive load detonated per delay.

(3) Overburden Soil Slopes. The precautions outlined below shall be taken during the blasting operations to minimize risk of disturbance to the natural soil slopes above the rock cuts:

i. The Contractor shall take the utmost care to prevent damage to these slopes by controlling fly rock and limiting ground vibrations.

ii. Fly rock shall be controlled by the use of blasting mats, and appropriate explosive loads and detonation sequences as appropriate for varying conditions along the alignment.

iii. The Contractor shall be responsible for developing the top-of-cut in accordance with the Slope Rounding Detail in the Plans. The

natural vegetative mat is to be preserved and draped over newly created soil cut slopes.

iv. Access by the Contractor to the top-of-cut is to be strictly limited to areas designated ROW or TCE in the Plans. Damage to the vegetative cover between the top-of-cut and the ROW and TCE boundaries should be the minimum necessary for efficient access to the work site. Restoration of damaged vegetative cover shall be to the Engineer's satisfaction and at the cost of the Contractor.

(4) Fisheries Resources. The precautions outlined below shall be taken during all blasting operations to minimize the risk of adverse impacts to fisheries resources.

i. All blasting must conform to the requirements of ADF&G outlined in the permit, regarding allowable peak particle velocities and water overpressures. The Contractor is responsible for carrying out ground vibration and water overpressure monitoring during blasting. Monitoring of ground vibrations and water overpressure should be performed by an independent third party Blast Monitor.

ii. Fly rock shall be controlled by the use of blasting mats, and appropriate explosive loads and detonation sequences as appropriate for varying conditions along the alignment.

iii. The cost for protective measures is considered incidental to the contract unit price for Rock Excavation and no additional payment shall be considered for this item.

p. Blast Monitor. At the preconstruction conference, the Contractor shall submit the name and qualifications of the independent third party who will perform monitoring of ground vibrations and water overpressures that are listed in the Permit and/or these specifications. The Blast Monitor should have at least 10 years of experience monitoring ground vibrations and water overpressures on at least 5 projects involving controlled blasting in close proximity to historic and cultural resources or sensitive habitat. The qualifications statement should include the name of the projects, details of the monitoring requirements, and any corrective actions taken. Names and telephone numbers of project owners with sufficient knowledge to verify the submitted information should be included. No drilling or blasting work shall begin until the Engineer approves the qualifications of the Blast Monitor.

Delete Item 2., Stabilization in its entirety.

Delete Item 4, Drain Holes, in its entirety and substitute the following:

4. Horizontal Drains. The work consists of furnishing, drilling and installing horizontal drains as shown in the Plans and Horizontal Drain Detail and as

designated by the Engineer. The length and location of Horizontal Drains will be determined in the field by the Engineer.

a. Materials. Horizontal drainpipes will consist of both un-slotted and machine-slotted, 2-inch diameter Schedule 40 PVC as per ASTM D 1785. Drainpipes will be supplied by a manufacturer routinely engaged in the production of PVC pipe for use in horizontal drain applications.

b. Construction Requirements. Drill holes for horizontal drains at the locations shown on the plans or as designated by the Engineer. Advance the holes at an inclination of +5 percent to facilitate drainage. The drilled hole diameter is not to exceed 3 inches.

Install horizontal drainpipes to full depth of the drain holes and extend 3 to 6 inches beyond the rock surface or the final finished surface of shotcrete, or as designated by the Engineer. Centralizers are not required for the pipe. Provide un-slotted PVC pipe 10 feet in length at the outlet end of the drain hole. Place quick set mortar plug at rock surface or shotcrete surface to permanently secure pipe in the drilled hole. Use machine slotted PVC pipe for the remainder of the drainpipe string.

Add the following item:

5. Shotcrete. This work consists of constructing a pneumatically applied shotcrete blanket onto rock/soil surfaces at locations designated by the Engineer to stabilize rock slopes. The Contractor will supply all materials, equipment, and labor necessary to place the shotcrete at the location shown in the Plans.

These specifications refer to premixed cement and aggregate pneumatically applied by suitable equipment and competent operators.

The shotcrete will be composed of Portland cement, fine and coarse aggregate, and water. Either wet-mix or dry-mix shotcrete may be used. The shotcrete will be reinforced with steel or synthetic fibers.

The shotcrete will be applied according to these specifications and applicable sections of the American Concrete Institute's "Guide to Shotcrete" (ACI 506R-85).

The Contractor is responsible for the design of shotcrete mixes and for the quality of shotcrete placed in the work.

a. Qualifications of Contractor's Personnel. Prior to beginning shotcrete work, provide written evidence that the foreman, nozzleman, and delivery equipment operator have performed satisfactory work in similar capacities elsewhere for a sufficient length of time to be fully qualified to perform their duties as required below.

The foreman will have at least two years' experience as a shotcrete nozzleman. The nozzleman and delivery equipment operator will have served at least one year of apprenticeship on similar applications with the same type of equipment. Prior to the start of shotcreting for this job, the nozzlemen will demonstrate their ability to apply shotcrete of the required quality on a test panel in the presence of the Engineer. One satisfactory test panel shot in a vertical position for each mix design used during the course of the work will be the minimum qualification test for nozzlemen before they will be permitted to place shotcrete in a permanent construction.

b. Materials. Materials to conform to the requirements of Section 700 of the Standard Specifications and the following:

(1) Prepackaged Product: Premixed and prepackaged concrete products, with or without steel fibers, specifically manufactured as a shotcrete product may be provided for on-site mixed shotcrete, if approved by the Engineer. The packages will contain cement, aggregate, and if included, steel fibers conforming to the materials portion of this specification.

(2) Admixtures: Admixtures will not be used without permission of the Engineer. If admixtures are used to entrain air, reduce water-cement ratio, retard or accelerate setting time or accelerate the development of strength, they will be used at the rate specified by the manufacturer and must be compatible with the cement used. Use of calcium chloride accelerating agent will not be permitted. When used, admixtures will be dissolved in water before introduction into the mixture.

(3) Water: The water used in the shotcrete mix is to be free of elements that would cause staining.

(4) Aggregates: The combined gradation of the fine and coarse aggregate used in the shotcrete will meet the following grading requirements:

Sieve Size	% Passing by Weight
1/2 inch	100
3/8 inch	90 - 100
No. 4	70 - 85
No. 8	50 - 70
No. 16	35 - 55
No. 30	20 - 35
No. 50	8 - 20

No 100	2 - 10

(5) Anchor Bars: Unless shown otherwise on the plans, anchor bars will consist of No. 5 reinforcement bar bent into an L shape. The short leg of the L shaped bar will be approximately 6 inches long and the long leg 24inches long.

(6) Fiber reinforcement: Steel fibers will have a length between ½ inch and 1 ¼ inch, have blunt or hooked ends, have a length to diameter ratio of less than 80, and be cold drawn carbon steel with a minimum tensile strength of 160 ksi. The steel fiber content will not be less than 100 lb for each cubic yard of shotcrete. If synthetic fibers are used they must be certified by the manufacturer to provide shotcrete properties comparable to those of steel fiber reinforced shotcrete. Only fibers manufactured specifically for use in shotcrete applications will be allowed.

c. Acceptance Sampling and Testing

(1) General: Prepare shotcrete test panels on vertically supported molds. Test panels to be approximately 24 inch x 24 inch by a minimum of 4 inches deep. The material used to form the back and sides of the molds will be rigid, nonabsorbent and non-reactive with cement. Place the shotcrete in vertical molds utilizing the same shotcrete mix, air and water pressure, and nozzle tip as used for the actual placement of shotcrete on production surfaces. Leave the panels undisturbed and protected at the point of placement for at least 24 hour or until the final set has taken place.

(2) Pre-Production Testing: Prepare at least one test panel for each mix design omitting the fibers for testing. Submit a copy of the mix design and the compressive strength test results at least 5 days prior to starting any production work. Production shotcrete work will not begin until satisfactory test results are obtained.

(3) Compressive strength tests:

i. Comprehensive strength cylinders: Prepare compression test cylinders by coring 2 inch outside diameter cores from the cured shotcrete test panels. Five cores will be taken from each panel. Transport the cylinders to the testing laboratory within seven days of being shot in a manner to prevent being damaged.

ii. Shotcrete compressive strength: The shotcrete without fibers will be capable of attaining 1,800 psi at 3 days, 2,500 psi compressive strength at 7 days, and 4,000 psi at 28 days as determined by AASHTO T22 (ASTM C39-84) testing of

compression test cylinders.

(4) Failure of shotcrete: Should any shotcrete section be deficient in any of the specified criteria, that section will be remedied to the Engineer's satisfaction at the Contractor's expense. Such remedies may include, but are not limited to, removal and replacement of the substandard section.

d. Equipment. Provide equipment to meet the following requirements:

(1) Pump system: The pump system utilized to convey premixed shotcrete ingredients will deliver a uniform and uninterrupted flow of material, without segregation or loss of the ingredients. The mixing equipment will be capable of thoroughly mixing the specified materials in sufficient quantity to maintain continuous placing.

(2) Air compressor: The air compressor will be capable of maintaining a supply of clean air adequate for maintaining sufficient nozzle velocity for all parts of the work and for the simultaneous operation of a blow pipe for clearing away rebound. The compressor will be capable of providing a minimum of 330 cubic feet per minute per operating nozzle.

(3) Dry Mix process:

i. Batching and mixing equipment - The mixing equipment will be capable of thoroughly mixing the specified materials in sufficient quantity to maintain continuous application.

ii. Delivery equipment - The equipment will be capable of discharging the aggregate and cement mixture into the delivery hose and delivering a continuous stream of uniformly mixed material to the discharge nozzle. The discharge nozzle will be equipped with a manually operated water injection system (water ring) for directing an even distribution of water through the aggregate and cement mixture. The water valve will be capable of ready adjustment to vary the quantity of water and will be convenient to the nozzleman. The water pressure at the discharge nozzle will be sufficiently greater than the operating air pressure to assure that the water is thoroughly mixed with the other material. The water pressure to be steady (nonpulsating). Equipment parts, especially the nozzle liner and water ring, will be regularly inspected and replaced as required.

(4) Wet Mix process:

i. Batching and mixing equipment - The mixing equipment will be capable of thoroughly mixing the specified materials in sufficient quantity to maintain continuous application.

ii. Delivery equipment - The equipment will be capable of discharging the premixed materials into the delivery hose and delivering a continuous stream of uniformly mixed material to the discharge nozzle. Recommendations of the equipment manufacturer will be followed on the type and size of nozzle to be used, and on cleaning, inspection and maintenance of the equipment.

e. Construction Requirements.

(1) Surface preparation: Immediately prior to shotcrete application, scale rock surfaces of the areas to be shotcreted of all loose material and thoroughly clean by using air or water jets or other means approved by the Engineer. Clean soil surfaces of loose material by using an air jet. Do not place shotcrete on any surface which is frozen, spongy, or where there is free water. Dampen the surface before applying shotcrete.

(2) Shotcrete blanket thickness control: Control the thickness of the shotcrete blanket by installing non-corrosive pins, nails, or other gauging devices normal to the face, such that they protrude the required shotcrete thickness outside the face. Place the pins on a maximum 5 - foot square pattern.

(3) Anchor bars: Unless otherwise shown on the plans, place anchor bars at approximately 5-foot centers maximum, both horizontal and vertical, in 1 ¼ inch holes drilled into the rock/soil approximately 24 inches deep. Blow the drilled hole to clear prior to installation of the anchor bar. Fill the drilled hole completely with epoxy or polyester resin or neat cement grout using a grout tube extending to the bottom of the hole. Push the anchor bar into the resin/grout filled hole and center such that the short leg of the L shaped bar points upward and is located about 1 ½ inch from the rock/soil surface.

(4) Weep holes: Unless otherwise shown on the plans, provide weep holes throughout the shotcrete mat at 3-foot centers maximum, horizontal and vertical. The weep holes will consist of 24 inch long, 2-inch diameter Schedule 40 PVC machine slotted drain pipe placed within pre-drilled holes and sloped to drain. Pre-drilled holes will not be larger than 3-inch in diameter. Install the slotted

drain pipe prior to placement of shotcrete. Extend the drain pipe 1 to 3 inches outside the final finished surface of shotcrete. During placement of shotcrete, protect the weep holes and drain pipes against contamination to insure proper function upon completion.

(5) Batching and mixing shotcrete:

i. Dry mix process -- Batch the cement and aggregate by weight. Incorporate pre-dampening prior to flow into the main hopper and immediately after flow out of the packaging in order to ensure that the premix will flow at the uniform rate (without slugs) through the main hopper, delivery hose, and nozzle to form uniform shotcrete free of dry pockets. No pre-dampened cement and aggregate mix will be used if allowed to stand for more than 90 minutes.

ii. Wet mix process - Batching and mixing will be done according to the applicable provisions of ASTM C 94.

(6) Batching and mixing fibers: If pre-batching/mixing is not done, the procedure used for adding fibers to the shotcrete in the field will be demonstrated by the Contractor and is subject to approval by the Engineer. If fiber addition takes place at the nozzle, fibers will be uniformly distributed throughout the mortar matrix without isolated concentrations. If fibers are added to the dry or wet mix during the batching and mixing process, use a screen having a mesh of 1 ½ inch to 2 ½ inch to prevent any fiber balls from entering the shotcrete line. Batching through a screen will not be required if it is demonstrated that fiber balls are not being formed. Do not add fibers to the dry or wet mix at a rate faster than they can be blended with the other ingredients without forming balls or clumps. Pass bulk fibers that have a tendency to tangle together through a vibrating screen or be carefully sifted into the mix so that they enter it as individual elements and not as clumps.

(7) Shotcrete application:

i. Unless shown otherwise on the Plans, the minimum finished thickness of shotcrete will be 3 inches. Shotcrete reinforced with steel fibers and located within 10 feet of the ditch line shall be convered with a flash coat of non reinforced shotcrete sufficiently thick to cover the steel fibers. A flash coat is not required for shotcrete reinforced with synthetic fibers

ii. Apply the shotcrete from the lower portion of the area upwards so that rebound does not accumulate on the portion of surface that still has to be covered. Do not

incorporate rebound material into the finished product. Rebound is defined as the shotcrete constituents which fail to adhere to the surface to which shotcrete is being applied. It is not to be salvaged and included in later batches. Shotcrete is to emerge from the nozzle in a steady uninterrupted flow. When, for any reason, the flow becomes intermittent, divert the nozzle away from the work until steady flow resumes. A nozzelman's helper, equipped with an air blowout jet, will attend the nozzleman at all times during the placement of shotcrete to keep the working area free from rebound.

iii. Suspend application if:

- High winds prevent the nozzleman from proper application of the material.
- The temperature is below 40 degrees Fahrenheit.
- External factors such as rain or seepage, wash cement out of the freshly placed material or cause sloughs in the work.

iv. Taper construction joints over a minimum distance of 12 inches to the thin edge and thoroughly wet the surface of such joints before any adjacent section of mortar is placed. Square construction joints will not be permitted.

v. Sound the shotcrete surface with a hammer for unsound areas resulting from rebound pockets or lack of bond. Carefully cut out unsound areas, sags, or other defects and replace with a succeeding layer at the Contractor's expense.

vi. Where a layer of shotcrete is to be covered by a succeeding layer, first allow it to take its initial set. Clean the initial layer of all loose material prior to placing succeeding layers.

(8) Finishing: Leave the shotcrete surface in the natural gun finish.

203-3.03 EMBANKMENT CONSTRUCTION. Delete the first sentence of the tenth paragraph, and substitute the following: Place roadway embankment of earth materials in horizontal layers not exceeding 8 inches in thickness measured before compaction. Each layer of classified material shall have its joint offset from the joint below, longitudinally by 1 foot and transversely by 10 feet.

Add the following: Where the Plans call for placement of selected material and excavation is required, the existing material may be left in place at the Engineer's discretion if tests determine that it will meet the appropriate selected material requirements. Any reduction in excavation or Borrow quantities as a result because of

this condition shall not constitute a basis for adjustment in contract unit prices except as provided for in Section 104, Scope of Work.

(11/18/04)R23USC02

Delete the first sentence of the tenth paragraph and replace with the following: Lift thickness shall be at least 1.25 times the largest particle size.

203-3.04 COMPACTION WITH MOISTURE AND DENSITY CONTROL. Delete this section in it's entirety and substitute the following: Construct embankments with moisture and density control from specified materials placed and compacted at approximately optimum moisture content. Dry or moisten material as required.

Compact all embankment within 20 feet of a bridge abutment, or adjacent existing paved surfaces to be matched, full width to not less than 100 percent of the maximum density. Grade all material used within this zone to pass the 3 inch sieve. (11/05/02)R113USC02

Compact embankment material to not less than 95 percent of the maximum dry density as determined by WAQTC FOP for AASHTO T 99 / T 180 or ASTM 212. The Engineer will determine in-place field densities using WAQTC FOP for AASHTO T 310 and WAQTC FOP for AASHTO T 224. (matls 2/05)

203-3.05 COMPACTION WITHOUT MOISTURE AND DENSITY CONTROL. Delete the second and third paragraphs and substitute the following: In areas of subgrade excavation without sensitive soils the subgrade shall be compacted with a vibratory roller having a minimum static weight of 24,000 lb until the roller drum rebounds back off the subgrade. Do not cover any lift by another lift until compaction has been completed. (CM/ANH, 02)

Add the following subsections:

203-3.06 ROCK SCALING. This work consists of the manual removal of vegetation and loose rock and soil on the slope at locations proposed by the Contractor and/or Engineer andapproved by the Engineer. The Contractor will provide all materials, equipment, and labor necessary to perform this work.

1. Submittals. Not less than 2 weeks prior to commencing rock scaling, provide to the Engineer:

    a. Written evidence that the rock slope scaling foreman and scalers have performed satisfactory work in similar capabilities for sufficient length of time to be fully qualified to perform their duties. The foreman is to demonstrate not less than 1500 hours of comparable scaling experience and the scalers not less than 1000 hours of comparable experience on similar projects.

    b. A detailed work plan for the project to include:

(1) The type of equipment and tools to be used.
(2) The number of scalers qualified to work on the project.
(3) Debris removal and disposal plan generated from the scaling work.
(4) Provisions to protect adjacent facilities.

Scaling will not commence until the appropriate submittals have been approved in writing by the Engineer.

2. Materials. Hand scaling will be done with the use of scaling bars, portable hydraulic wedges, air pillows or other mechanical means. Other hand tools in addition to scaling bars may be used provided they have demonstrated effectiveness to perform the required work and are approved by the Engineer.

3. Construction Requirements. Proceed in accordance to the approved work plan and schedule submitted prior to commencement of work and as directed by the Engineer.

Start rock scaling at the top of the slope and proceed down slope, removing loose rock and soil as the work progresses. The extent of the scaling will be determined by the Engineer and/or be specified in the Plans.

Remove all rock and debris produced by the scaling operation and incorporate it into the work, or dispose of it.

203-3.07 ROCK BOLTS. Install tensioned rock bolts to stabilize rock slopes at locations as directed by the Engineer. The Engineer will determine the minimum lengths and orientations of the rock bolts. The Contractor will select and construct the rock bolts to carry the specified loads and supply all materials, equipment, and labor to test and install the bolts.

1. Submittals. Submit the following not less than three weeks prior to commencement of rock bolting activities:

a. A rock bolting plan for approval by the Engineer and containing the following:
(1) Choice of rock bolt material, polyester resin and cement grout, depending on the expected rock type, strength characteristics and discontinuities. Note: resin anchoring will not be allowed for bolts longer than 20 feet unless the Contractor can demonstrate satisfactory anchor zone construction for longer bolts.
(2) The proposed anchor steel/tendon, couplers, bearing plate, anchor unit, flat washer, and beveled washer specifications including manufacturer's data sheets, catalog cuts and mill certificates. Note: couplers will not be allowed for resin anchoring.
(3) Mix design for cement grout including strength test results, additives, manufacturer's data sheets, and procedure for placing grout.

(4) Product specifications and Material Safety Data Sheets for polyester resins.
(5) Planned construction sequence.
(6) Method for placing equipment at the bolt locations.
(7) Drilling method and drill equipment.
(8) Planned hole diameter and depth for each type of rock bolt proposed for use.
(9) Corrosion protection for the rock bolt system including surface components exposed to weather.
(10) Calibration records of an independent testing facility for load cell, test jack, pressure gauge and master pressure gauge to be used in the proof and performance testing. Complete calibration not later than 30 days prior to use of the wrenches or jacks.
(11) Performance testing procedures and equipment to assure the full design load is reached and is transferred to the rock without creep and without exceeding extension limits of the bolt in accordance with the specifications herein.

b. Documentation showing the rock bolting foreman and the drill operators have comparable previous experience in installing rock bolts. Demonstrate that the foreman has a minimum of 1000 hours of experience in installation of rock bolts. Demonstrate that the drill operators have a minimum of 500 hours of experience in installing rock bolts.

2. Materials. Provide rock bolts, bearing plates, couplers, nuts, washers, expansion shells and other accessories from a manufacturer regularly engaged in the manufacturing of materials for use with rock bolts. Deliver rock bolt bar steel to the project site in manufactured mill lengths (i.e. not precut at the factory). Provide rock bolts adequate to provide minimum design loads of not less than 35 kips and meeting the requirements of ASTM A615 or A722. Anchor bar steel will be in the form of deformed steel bar or deformed continuous thread bar with a minimum yield strength of 59 kips and minimum diameter of one inch (Grade 75 No. 8 bar). Bar steel to be epoxy coated in accordance with subsection 709-2.01. Provide non-shrink water/cement grout with a minimum unconfined compressive strength of 4000 psi at 3 days. For resin grout to be used for anchor zone, follow manufacturer's shelf-life and installation recommendations. Provide a sample of the grout, epoxy or polyester resins for testing, if requested by the Engineer,

Provide mild steel face plates for each rock bolt with minimum dimensions of ¾ inch thickness by 8 inches square. The plate will have a central hole large enough to fit easily over the bolt while maximizing the average bearing surface for the washer and the nut and have provision for insertion of a grout tube through the plate. Use beveled washers to accommodate non-perpendicular installations.

Provide surface corrosion protection paint to conform to Section 708-2.01 - Galvanizing Repair Paint, High Zinc Dust Content.

3. Construction Requirements. Field cut anchor bar to the appropriate minimum

lengths as shown in the Plans or as directed by the Engineer. Maximum bolt length will not exceed 30 feet. Resin anchoring will not be allowed for bolts longer than 20 feet unless the Contractor can demonstrate satisfactory anchor zone construction for longer bolts. Contractor must provide equipment to spin maximum bolt length to achieve resin mixing in accordance with manufacturer's specifications.

Install bolts according to the approved bolting plan and at locations and orientations (within five degrees of specified angle) indicated in Plans and Specifications or as directed by the Engineer.

If the rock bolt is not installed perpendicular to the rock face, use bearing pads, beveled washers and other accessories to assure the tensioning load is applied parallel to the axis of the bolt so the bolt will not bend. At least three quarters of the bearing plate is to be in contact with the rock face or bearing pad.

Handle and store the rock bolt bars and accessories in such a manner as to avoid damage or corrosion. Damage to the bolt steel as a result of abrasion, cuts, nicks, welds, and weld splatter will be cause for rejection. If heavy corrosion or pitting is noted, the Engineer will reject the rock bolt.

Drill holes with 12-inches of overdrill length that will be suitable for the particular length and diameter of rock bolt. Flush the drill hole of all drill cuttings and debris with compressed air prior to the installation of the rock bolt. Holes drilled for rock bolting in which bolt installation is considered by the Engineer to be impractical will be re-drilled at the Contractor's expense. Place sufficient fast setting resin in the lower drill hole to ensure full capsulation of the bolt in the anchorage zone and provide adequate pull out resistance for the bolt under the design load.

Follow the approved procedure for testing rock bolts as described in the approved bolting plan. For the resin anchored bolts, use a fast setting resin at the bottom of the hole in the anchorage zone. Slow set resin will not be allowed for the free-stressing length. Once the fast setting resin has set, tension and test the bolt before injecting cement grout by grout tube at the lowest point of each hole to fill the remainder of hole in one continuous operation. Place grout volume up to 200 percent of the drilled hole volume. Engineer will direct grout quantity in excess of 200 percent and may request thicker grout mix or multi-stage grouting to overcome grout loss.

If a bolt fails the testing criteria, replace the bolt with an additional bolt installed in a separate hole.

Trim the completed rock bolt to within three inches of the nut. Paint all exposed parts of the bolt, bearing plate and nut on the surface with an approved corrosion protection paint.

4. Testing. At the Engineer's discretion, conduct up to three performance tests on

sacrificial bolts to demonstrate the effectiveness of the rock bolt construction method. Performance tests to be done prior to installation of production rock bolts or when a significant change is proposed in the construction method. Tension the rock bolts to 120 percent of the design load of the rock bolt with a calibrated hollow-ram hydraulic jack. Unless otherwise specified in the Plans, the design load for each rock bolt is 35 kips.

Make load and extension measurements during tensioning with an independently mounted measuring device such as a dial gauge or vernier scale capable of measuring to 0.001 inches. Contractor to provide all required calibrated testing equipment.

The Engineer will analyze the rock bolt test results and determine whether the rock bolt is acceptable. A rock bolt will be acceptable if:

a. The total elastic movement obtained at the maximum test load does exceed 80 percent of the theoretical elastic elongation of the stressing length; and,

b. The rock bolt will carry the maximum test load with a creep rate that does not exceed 0.04inches between one (1) and ten (10) minutes, or 0.08 inches per log cycle of time between the ten (10) and sixty (60) minute readings.

Proof test each production rock bolt. Proof test will consist of tensioning the rock bolt to 120 percent of the design load and holding that load for 10 minutes. If no loss of load occurs in this time period, the rock bolt is accepted. If a rock bolt fails this proof test, replace the rock bolt with an additional bolt installed in a separate hole. No payment will be made for rock bolts that fail.

After tensioning, lock off the bolt at 100 percent of the design load and grout the remaining portion of the rock bolt, if appropriate.

203-3.08 ROCK DOWELS. All provisions for Rock Bolts, 203-3.07 will apply to Rock Dowels, 203-3.08 amended as follows:

Prior to insertion and grouting, place centralizers on the bar on 10-foot centers with a minimum of two centralizers per dowel.

Provide cement grout for complete installation. No resin grout to be used.

After the cement grout has reached adequate set, install the face plate, washer, and nut. Torque the nut to a nominal 100 foot-pounds to insure proper seating against the rock face. Cut the end of the completed rock dowel to within 3 inches of the nut.

As directed by the Engineer, proof test up to 5 percent, but not less than three rock dowels, of the installed rock dowels. Tension the rock dowel to 10 kips with a calibrated hollow-ram hydraulic jack using a bar extension and coupler attached to the rock dowel and hold for 10 minutes. If no loss of load occurs over this time period, the rock dowel is acceptable. The Engineer may require additional proof of testing beyond the 5 percent

maximum, if rock dowels fail the proof testing. Replace all failed rock dowels with an additional rock dowel installed in a separate hole. No payment will be made for rock dowels that fail or for additional proof testing.

Add the following subsections:

203-3.09 CONTAMINATED MATERIAL TESTING. This work shall consist of testing soils for contaminants. Each truckload of soil imported from a suspected site, or other locations at the direction of the Engineer, shall be examined for contamination.

The Contractor shall retain an independent test laboratory to conduct tests including, but not limited to the following:

1. Field Tests

    a. Organic Vapor Analyzer (OVA) Analysis
    b. Visual Analysis (Petroleum Odor)

2. Laboratory Tests

    a. Volatile Aromatic Hydrocarbons
    b. Total Petroleum Hydrocarbons

The Contractor shall obtain the services of a hazardous waste professional to conduct field testing using an organic vapor analyzer (OVA) or equivalent equipped with a photoionizing detector (PID), or other approved DEC instrument. The Contractor shall submit the name of the hazardous waste professional to the Engineer at the preconstruction conference. The hazardous waste professional shall be available at all times hauling is in progress to conduct the required field tests.

The hazardous waste professional shall sample and test in accordance with standard DEC approved testing procedures. If an OVA response indicates the presence of any contamination, the soils will have failed the test and will be designated as contaminated. If no response is observed, the soil will be examined for odor. If a petroleum odor is detected, the soils will fail the test and will be designated as contaminated. If no petroleum odor is detected, the soil will be considered to have passed field criteria.

The hazardous waste professional shall be responsible for ensuring that soils exhibiting an OVA response that indicate the presence of any contamination, or soils that exhibit characteristics of fuel contamination (i.e. odor, sheen, or stain), are identified to the Engineer.

Contaminated material will not be accepted for borrow and shall be immediately removed from the site.

The OVA will be calibrated at the beginning and end of each day, and after every four hours of use.

ADDENDUM 2
ATTACHMENT 5

203-3.10 EXCAVATION OF CONTAMINATED MATERIAL. This work shall consist of removing and disposing of fuel contaminated soils and water encountered during the excavation. Disposal of fuel contaminated material shall be at a location approved by the Engineer.

1. Determining Limits of Contaminated Material. The exact limits of potential contaminated soil or water within the excavation can not be determined until the material is exposed. Once exposed, the material shall be tested in accordance with Subsection 203-3.09, Contaminated Material Testing. Testing will verify the contamination levels and determine if the material can be disposed of as unclassified excavation or if it will require special handling. Soils that have a response from photoionizing detector or equivalent instrument of 1 part per million or more above background are considered to be "contaminated" and will require special handling and shall be disposed of in accordance with this Subsection.

2. Worker Health and Safety. Prior to the excavation of any soils identified as contaminated, the Contractor shall assure that all personnel working in the area of potential contamination have received the State of Alaska, Department of Labor, Health and Safety Training. The Contractor shall provide the Engineer a list of all personnel and subcontractors that will be working within the area identified as being potentially contaminated.

   The Contractor shall notify all personnel and subcontractors prior to their beginning Work at the site that they will be working in an area identified as being potentially contaminated with petroleum fuel.

3. Contaminated Soil Removal and Segregation. In the event the Contractor must stockpile contaminated soil, a liner, cover and temporary fencing will be required. The size and location of the liner shall be as approved by the Engineer. The Contractor shall cover and secure the stockpile at the end of each work day. The Contractor shall be responsible for removal of the stockpile liner, safety fence and cover once the fuel contaminated soil is removed.

   The method of treatment and/or disposal shall be in accordance with Department of Environmental Conservation guidelines for reducing BTEX or TPH in soils. Any additional testing required at the disposal site shall be done in accordance with Subsection 203-3.09, Contaminated Material Testing, unless otherwise directed by the Engineer.

   Prior to the Contractor backfilling the excavation, random samples from the excavation (bottom and sides) shall be taken for confirmation testing. Backfill within the limits of planned excavation shall meet the requirements for the item of work involved. Backfill outside plan excavation limits shall meet the requirements of Select Material, Type C or better.

4. Responsibility. With respect to preexisting hazardous substances or contaminated materials in the project area, nothing in this contract is intended to impose upon the Contractor, or to require the Contractor to assume, the status under state or federal environmental law of a facility owner or operator, or an owner or generator of those preexisting hazardous substances or contaminated materials. The Contractor is advised, however, that he shall assume the responsibility to obtain all administrative approvals and to coordinate all activities with the Alaska Department of Environmental Conservation and/or any federal agency having jurisdiction, to carefully abide by all applicable laws, regulations and the terms of any administrative approvals, and to otherwise use environmentally sound management practices such that the Contractor does not, as a result of its own actions, become a facility owner or operator, or an owner or generator of hazardous substances by reason of an unpermitted release of hazardous substances. (East Point/C St., ANH, 09/06)

203-4.01 METHOD OF MEASUREMENT. Add the following:

Item 203(13A) Furnish Rock Bolts. By the linear foot of rock bolts furnished.

Item 203(13B) Install Rock Bolts. By the linear foot of rock bolts installed.

Item 203(14A) Furnish Dowels. By the linear foot of dowels furnished.

Item 203(14B) Install Dowels. By the linear foot of dowels installed.

203(15) Shotcrete. **According to Subsection 109-1.05.**

203(28), Fuel Contaminated Soil Special Handling, will not be measured for payment.

Backfilling to replace contaminated soils that were excavated will be subsidiary to the respective items of work. (East Point, ANH, 09/06)

203(32) Rock Scaling Existing Slopes. By the man hour, including all labor, scaling tools, and equipment as proposed by the Contractor and approved by the Engineer. Rock scaling of newly blasted surfaces will not be measured.

203(33) Grout Overrun. By the cubic yard.

203-5.01 BASIS OF PAYMENT. Add the following: Work required to ensure the material used within 20 feet of bridge abutments meets the requirements of subsection 203-3.04 will not be paid for directly, but will be subsidiary to Section 203 items.

Stripping of surface organics is subsidiary to 203(1) Common Excavation, no separate payment will be made.

Selected Material, Type A is to be produced from the excavation. Associated crushing, stockpiling, and placement is subsidiary to the excavation pay items. (11/05/02)R113 USC02modified

Item 203(12) Horizontal Drain Holes. Will be full payment to perform the work as specified, including furnishing the equipment, materials, and labor for drain installation.

Item 203(13A) Furnish Rock Bolts. Will be full payment for furnishing, properly storing, and removing unused rock bolts. Bolts not used will remain the property of the Contractor.

Item 203(13B) Install Rock Bolts. Will be full payment for installing, grout installation, and performance proof testing rock bolts. The price includes grout take-up to 200 percent of the drilled volume calculated from the hole diameter and length. For grout takes greater than 200 percent in any specific hole, the Contractor will be reimbursed under Item 203(33), Grout Overrun. Wasted grout and grout not pumped into the bolt holes will not be measured for payment. For the measurement of the volume of grout injected, the Contractor will supply a measurement system satisfactory to the Engineer.

Item 203(14A) Furnish Rock Dowels. Will be full payment for furnishing, properly storing, and removing unused dowels. Dowels not used will remain the property of the Contractor.

Item 203(14B) Install Rock Dowels. Will be full payment for installing, grout installation, and proof testing dowels. The price includes grout take-up to 200 percent of the drilled volume calculated from the hole diameter and length. For grout takes greater than 200 percent in any specific hole, the Contractor will be reimbursed under Item 203(33), Grout Overrun. Wasted grout and grout not pumped into the bolt holes will not be measured for payment. For the measurement of the volume of grout injected, the Contractor will supply a measurement system satisfactory to the Engineer.

203(15) Shotcrete. **Payment for shotcrete work will be made under Item 203(15) on a time and materials basis according to Subsection 109-1.05 for authorized work.**

203(28), Fuel Contaminated Soil Special Handling. Payment will be as specified on the authorizing work order, and will include payment for providing the hazardous waste professional, testing, special handling and disposal of contaminated soils. (East Point, ANH, 09/06)

203(32) Rock Scaling Existing Slopes. Will be paid on a contingent sum basis at the rate of $125 per man hour. The Contractor and/or Engineer will propose the location of the work, but the work shall not proceed until approved by the Engineer. The price per hour will be full compensation for performing the work as specified in the directive, including furnishing all materials and equipment as required. Removal of debris generated will not be paid for under this item, it will be considered a subsidiary obligation of the contract and no separate payment will be made. The scaling of newly blasted surfaces shall be incidental to the contract unit price for Item 203(2), Rock Excavation.

203(33) Grout Overrun. The unit price will be paid for grout overruns required during installation of rock bolts and rock dowels.

Delete Items 203(12), 203(13), 203(14), and 203(15), and add the following pay items:

Pay Item	**Pay Unit**
203(12) Horizontal Drain Holes	Linear Foot
203(13A) Furnish Rock Bolts	Linear Foot
203(13B) Install Rock Bolts	Linear Foot
203(14A) Furnish Rock Dowels	Linear Foot
203(14B) Install Rock Dowels	Linear Foot
203(15) Shotcrete	**Contingent Sum**
203(28) Fuel Contaminated Soil Special Handling	Contingent Sum
203(32) Rock Scaling Existing Slopes	Contingent Sum
203(33) Grout Overrun	Cubic Yard

SECTION 204

STRUCTURAL EXCAVATION FOR CONDUITS AND MINOR STRUCTURES

Special Provisions

204-2.01 MATERIALS. Add the following to the end of the first paragraph: Bedding material for electrical and telecom conduits shall conform to requirements of Sand Blanket as specified under 703-2.12. (ANH, 06/22/06)

204-3.01 CONSTRUCTION REQUIREMENTS. Add the following to the second paragraph: No blasting for conduits and minor structures will begin until the Engineer approves the blasting plan. The plan must employ controlled blasting methods to minimize overbreak and damage to nearby structures, utilities, and slope faces.

Delete the fourth paragraph and replace it with the following: Native material may be utilized for electrical conduit backfill outside the pavement structure if it meets the minimum requirements of Selected Material, Type C, as specified in Subsection 703-2.07. Bedding for electrical conduit shall be as specified in Subsection 703-2.12 Sand Blanket. Compaction as approved by the Engineer. (EPS, 06/19/06)

SECTION 205

EXCAVATION, BACKFILL AND FOUNDATION FILL FOR STRUCTURES

Special Provisions

205-3.01 EXCAVATION. Add the following to numbered item 2. Foundations on Bedrock: No less than fifteen (15) days prior to excavating rock for the spread footing at Abutment 1 as shown in the Plans, notify the Engineer and the Statewide Materials Engineer in writing of your intent to begin excavation. Contact the Statewide Materials Engineer at 5800 E. Tudor Rd., Anchorage, AK 99507-1286.

With this notification, identify the Project, copy this Specification item and specify a time period of no less than two (2) days when you anticipate that the Department will have access to inspect the excavated rock surface that will support the abutment. Do not commence any construction on the abutment until a representative from the Department's Statewide Materials Section has examined the excavated rock surface to determine whether the exposed rock is competent.

Add the following subsection:

205-3.01(2) FOUNDATIONS ON BEDROCK. All provisions in subsection 203-3.02, Rock Excavation, shall apply to Excavation for Structures 205-3.01(2) amended as follows:

1. Excavations. After removal of soil and loose rock, install dowels for pre reinforcement of excavation slopes at the locations shown in the Plans prior to rock excavation. Rock Dowels to be cement grouted using tremi tube placement from the distal end to a position that corresponds nominally to the neat line of the excavation limit. Excavate poorer quality bedrock for all footings for the bridge structure using jackhammers or machine mounted impact hammers. The Engineer must authorize use of explosives for the excavation of better quality rock if the preceding methods are ineffective. In such case, provide blasting plans in accordance with subsection 203-3.02. Scale final exposed faces to remove loose rock. Complete rock dowels by installing face plate, washer, and nut in accordance with subsection 203-3.08 and load testing up to 5 percent, but not less than one, rock dowel in the foundation excavation. Install additional rock dowels or rock bolts if directed by the Engineer. Stable slopes are the responsibility of the Contractor and depend on actual site conditions.

2. Foundation Subgrade Preparation. Use mechanical excavation techniques or drilling and blasting to create level subgrade as shown in the Plans. All blasting for footings will be approved by the Engineer and must employ controlled blasting methods to minimize damage and overbreak to the slope faces and the foundation subgrade. Clean the subgrade of loose, broken and sheared rock to the satisfaction of the Engineer. Subexcavate weak seams with widths greater than one foot to a minimum depth of half their width and backfill with lean concrete.

205-4.01 METHOD OF MEASUREMENT. Add the following:

4. Lump Sum. All work required without measurement of quantities.

205-5.01 BASIS OF PAYMENT. Add the following: Porous backfill material is subsidiary to other items, including but not limited to Class A Concrete, Perforated Pipe Underdrain, and Stormdrain Manholes. Overexcavation of weak seams and backfilling with Class W Concrete is subsidary. No separate payment will be made.

Furnishing and Installing Rock Dowels shall be paid for under the respective pay items per Section 203.

Delete the standard pay item 205(1) and add the following pay item:

Pay Item	**Pay Unit**
205(1) Excavation for Structures	Lump Sum

SECTION 301

AGGREGATE BASE AND SURFACE COURSE

Special Provisions

301-5.01 BASIS OF PAYMENT. Delete the second paragraph and subsequent table and insert the following: Aggregate Base Course, Grading D-1 is subsidiary to other items and will not be paid for.

SECTION 307

EMULSIFIED ASPHALT TREATED BASE

Special Provisions

307-3.04 EQUIPMENT. Delete the words "or motor grader" from item number 3, Spreading Equipment and substitute the following: or reclaimer.

Add the following subsection:

307-3.09 TRAFFIC CONTROL. Limit the speed of traffic and the time between placing the EATB and surfacing such that the EATB meets Standard Specifications 307-3.05, 307-3.06, 307-3.07 and 307-3.08 at the time the surfacing is applied.

307-5.01 BASIS OF PAYMENT. Add the following: Emulsified Asphalt Treated Base is subsidiary to 643(20) Detour, no separate payment will be made.

Do not underline

Delete Section 401 in its entirety and substitute the following:

SECTION 401

ASPHALT CONCRETE PAVEMENT

Special Provisions

401-1.01 DESCRIPTION. Construct one or more layers of plant-mixed hot asphalt concrete pavement on an approved surface, to the lines, grades, and depths shown on the Plans.

MATERIALS

401-2.01 COMPOSITION OF MIXTURE - JOB MIX DESIGN. Meet the requirements of Table 401-1 for the Job Mix Design performed according to ATM 417.

TABLE 401-1
ASPHALT CONCRETE MIX DESIGN REQUIREMENTS

DESIGN PARAMETERS	CLASS "A"	CLASS "B"
Stability, pounds	1800 min.	1200 min.
Flow, 0.01 inch	8-14	8-16
Voids in Total Mix, %	3-5	3-5
Compaction, number of blows each side of test specimen	75	50
Percent Voids Filled with Asphalt (VFA)	65-75	65-78
Asphalt Content, min. %	5.0	5.0
Dust-asphalt ratio*	0.6-1.4	0.6-1.4
Voids in the Mineral Aggregate (VMA), %, min.		
Type I	12.0	11.0
Type II	13.0	12.0
Type III, IV	14.0	13.0

*Dust-asphalt ratio is the percent of material passing the No. 200 sieve divided by the percent of effective asphalt (calculated by weight of mix).

The approved Job Mix Design will specify the target values for gradation, the target value for asphalt cement content, the Maximum Specific Gravity (MSG) of the hot mix asphalt, the additives, and the allowable mixing temperature range.

Target values for gradation in the Job Mix Design must be within the broad band limits shown in Table 703-3, for the type of asphalt concrete pavement specified. For acceptance testing, hot mix asphalt concrete mixture will have the full tolerances in Table 401-2 applied. Except the tolerances for the No. 200 sieve, the tolerance limits will apply even if they fall outside the broad band limits shown in Table 703-3. The tolerance limits

for the No. 200 sieve will be confined by the broad band shown in Table 703-3. Tolerance limits will not be applied to the largest sieve specified.

Do not produce hot mix asphalt for payment until the Engineer approves the Job Mix Design. Do not mix asphalt concrete mixtures produced from different plants.

Use Asphalt Concrete Type II, Class B, minimum, for temporary pavement.

Submit the following to the Engineer at least 15 days before the production of hot mix asphalt:

1. A letter stating the location, size, and type of mixing plant, the proposed gradation for the Job Mix Design, gradations for individual stockpiles with supporting process quality control information, and the blend ratio of each aggregate stockpile. The proposed gradation must meet the requirements of Table 703-3 for each type of hot mix asphalt specified in the Contract.

2. Representative samples of each aggregate (coarse and/or intermediate, fine, and al blend material and/or mineral filler, if any) in the proportions required for the proposed mix design. Furnish a total of 500 pounds of material.

3. Five separate 1-gallon samples of the asphalt cement proposed for use in the hot mix asphalt. Include name of product, manufacturer, test results of the applicable quality requirements of subsection 702-2.01, manufacturer's certificate of compliance according to subsection 106-1.05, a temperature viscosity curve for the asphalt cement or manufacturer's recommended mixing and compaction temperatures, and current Material Safety Data Sheet.

4. One sample, of at least 1/2 pint, of the anti-strip additive proposed, including name of product, manufacturer, and manufacturer's data sheet, and current Material Safety Data Sheet.

The Engineer will then evaluate the material and the proposed gradation using ATM 417 and the requirements of Table 401-1 for the appropriate type and class of hot mix asphalt specified and establish the approved Job Mix Design that will become a part of the Contract.

No payment for asphalt concrete pavement for which a new Job Mix Design is required, will be made until the new Job Mix Design is approved. Approved changes apply only to hot mix asphalt produced after the submittal of the changes.

Changes. Failure to achieve results conforming to Table 401-1 or changes in the source of asphalt cement, source of aggregates, aggregate quality, aggregate gradation, or blend ratio, will require a new Job Mix Design. Submit changes and new samples in the same manner as the original submittal.

401-2.02 AGGREGATES. Conform to subsection 703-2.04.

Use a minimum of three stockpiles for crushed asphalt concrete aggregate (coarse, intermediate, and fine). Place blend material or mineral filler, if any, in a separate pile.

401-2.03 ASPHALT CEMENT. Provide the grade of asphalt cement specified in the Contract meeting the applicable requirements of Section 702. If not specified, use PG 52-28.

Provide test reports for each batch of asphalt cement showing conformance to the specifications in Section 702 before delivery to the project. Require that the storage tanks used for each batch be noted on the test report, the anti-strip additives required by the mix design be added during load out for delivery to the project, and a printed weight ticket for anti-strip is included with the asphalt cement weight ticket. The location where anti-strip is added may be changed with the written approval of the Engineer.

Furnish the following documents at delivery:

1. Manufacturer's certificate of compliance (106-1.05).
2. Conformance test reports for the batch (Section 702).
3. Batch number and storage tanks used.
4. Date and time of load out for delivery.
5. Type, grade, temperature, and quantity of asphalt cement loaded.
6. Type and percent of anti-strip added.

401-2.04 ANTI-STRIP ADDITIVES. Use anti-strip agents in the proportions determined by ATM 414 and included in the approved Job Mix Design. At least 70% of the aggregate must remain coated when tested according to ATM 414.

401-2.05 PROCESS QUALITY CONTROL. Sample and test materials for quality control of the hot mix asphalt according to subsection 106-1.03. Provide copies of these test results to the Engineer within 24 hours.

Failure to perform quality control forfeits the Contractor's right to a retest under subsection 401-4.02.

Submit a paving and plant control plan at the pre-paving meeting to be held a minimum of 5 working days before initiating paving operations. Address the sequence of operations and joint construction. Outline steps to assure product consistency, to minimize segregation, and to prevent premature cooling of the hot mix asphalt. Include a proposed quality control testing frequency for gradation, asphalt cement content, and compaction.

CONSTRUCTION REQUIREMENTS

401-3.01 WEATHER LIMITATIONS. Do not place the hot mix asphalt on a wet surface, on an unstable/yielding roadbed, when the base material is frozen, or when weather conditions prevent proper handling or finishing of the mix. Do not place hot mix asphalt unless the roadway surface temperature is 40 °F or warmer.

Place the top layer of paving or surface course between May 1 and August 15. Place bottom and middle layers of asphalt, leveling courses, and treated bases according to the limitations of this subsection and subsection 108-1.04. (07/03/03)S90

401-3.02 EQUIPMENT, GENERAL. Use equipment in good working order and free of hot mix asphalt buildup. Make equipment available for inspection and demonstration of operation a minimum of 24 hours before placement of hot mix asphalt.

401-3.03 ASPHALT MIXING PLANT. Meet AASHTO M 156. Use an asphalt plant designed to dry aggregates, maintain accurate temperature control, and accurately proportion asphalt cement and aggregates. Calibrate the asphalt plant and furnish copies of the calibration data to the Engineer at least 4 hours before hot mix asphalt production.

Provide a scalping screen at the asphalt plant to prevent oversize material or debris from being incorporated into the hot mix asphalt.

Provide a tap on the asphalt cement supply line just before it enters the plant (after the 3-way valve) for sampling asphalt cement.

Provide aggregate and asphalt cement sampling conditions meeting OSHA safety requirements.

401-3.04 HAULING EQUIPMENT. Haul hot mix asphalt in trucks with tight, clean, smooth metal beds, thinly coated with a minimum amount of paraffin oil, lime water solution, or an approved manufactured asphalt release agent. Do not use petroleum fuel as an asphalt release agent.

Cover the hot mix asphalt in the hauling vehicle, when directed.

401-3.05 ASPHALT PAVERS. Use self-propelled pavers equipped with a heated vibratory screed. Control grade and cross slope with automatic grade and slope control devices. Use an erected string line, a 30-foot minimum mobile stringline (ski), or other approved grade follower, to automatically actuate the paver screed control system. Use grade control on either (a) both the high and low sides or (b) grade control on the high side and slope control on the low side.

Equip the paver with a receiving hopper having sufficient capacity for a uniform spreading operation. Equip the hopper with a distribution system to place the hot mix asphalt uniformly in front of the screed.

Use a screed assembly that produces a finished surface of the required smoothness, thickness and texture without tearing, shoving or displacing the hot mix asphalt. Heat and vibrate screed extensions. Place auger extensions within 20 inches of the screed extensions or per written manufacturer's recommendations.

Equip the paver with a means of preventing the segregation of the coarse aggregate particles from the remainder of the bituminous plant mix when that mix is carried from the paver hopper back to the paver augers. The means and methods used shall be

approved by the paver manufacturer and may consist of chain curtains, deflector plates, or other such devices and any combination of these.

The following specific requirements apply to the identified bituminous pavers:

(1) Blaw-Knox bituminous pavers shall be equipped with the Blaw-Knox Materials Management Kit (MMK).
(2) Cedarapids bituminous pavers must have been manufactured in 1989 or later.
(3) Caterpillar bituminous pavers shall be equipped with deflector plates.

The use of a "Layton Box" or equivalent towed paver is allowed on bike paths, sidewalks, and driveways.

401-3.06 ROLLERS. Use both steel-wheel (static or vibratory) and pneumatic-tire rollers. Operate rollers according to manufacturer's instructions. Avoid crushing or fracturing of aggregate. Use rollers designed to compact hot mix asphalt and reverse without backlash.

Use fully skirted pneumatic-tire rollers with a minimum operating weight of 3000 pounds per tire.

401-3.07 PREPARATION OF EXISTING SURFACE. Prepare existing surfaces conforming to the Plans and Specifications. Before applying tack coat to the existing surface, clean out loose material from cracks in existing pavement wider than 1 inch in width full depth then fill using asphalt concrete tamped in place. Clean, wash, and sweep existing paved surfaces of loose material.

Preparation of a milled surface,

- Prelevel remaining ruts, pavement delaminations, or depressions having a depth greater than ½-inch with Asphalt Concrete, Type IV. No density testing is required for the leveling course material. The Engineer will inspect and accept this material.

- If planing breaks through existing pavement remove 2 inches of existing base and fill with Asphalt Concrete, Type II. Notify the Engineer of pavement areas that might be considered thin or unstable during pavement removal.

Existing surface must be approved by the Engineer before applying tack coat. Clean existing pave surfaces of loose material.

Before placing the hot asphalt mix, uniformly coat contact surfaces of curbing, gutters, sawcut pavement, cold joints, manholes, and other structures with tack coat material meeting Section 402.

Allow prime coat to cure and emulsion tack coat to break before placement of hot mix asphalt on these surfaces.

401-3.08 PREPARATION OF ASPHALT. Provide a continuous supply of asphalt cement to the asphalt mixing plant at a uniform temperature, within the allowable mixing temperature range.

401-3.09 PREPARATION OF AGGREGATES. Dry the aggregate so the moisture content of the hot mix asphalt, sampled at the point of acceptance for asphalt cement content, does not exceed 0.5% (by total weight of mix), as determined by WAQTC FOPT for AASHTO T 329.

Heat the aggregate for the hot mix asphalt to a temperature compatible with the mix requirements specified.

Adjust the burner on the dryer to avoid damage to the aggregate and to prevent the presence of unburned fuel on the aggregate. Hot mix asphalt concrete containing soot or fuel is considered unacceptable according to subsection 105-1.11.

401-3.10 MIXING. Combine the aggregate, asphalt cement and additives in the mixer in the amounts required by the Job Mix Design. Mix to obtain 98% coated particles when tested according to AASHTO T 195.

For batch plants, put the dry aggregate in motion before addition of asphalt cement.

Mix the hot mix asphalt within the temperature range determined by the Job Mix Design.

401-3.11 TEMPORARY STORAGE. Silo type storage bins may be used, provided that the characteristics of the hot mix asphalt are not altered. Signs of visible segregation, heat loss, changes from the Job Mix Design, change in the characteristics of asphalt cement, lumpiness, or stiffness of the mixture are causes for rejection.

401-3.12 PLACING AND SPREADING. Place the hot mix asphalt upon the approved surface, spread, strike off, and adjust surface irregularities. Use asphalt pavers to distribute hot mix asphalt, including leveling courses. Use asphalt pavers to distribute hot mix asphalt, including leveling courses. The maximum compacted lift thickness allowed is 3 inches.

During placement, the Engineer may evaluate the hot mix asphalt immediately behind the paver for temperature uniformity. Areas with temperature differences more than 25°F lower than the surrounding hot mix asphalt are likely to produce areas of low density. Any thermal images and/or thermal profile data will become part of the project record and shared with the Contractor. The Contractor shall immediately adjust his laydown procedures to correct the problem.

Use hand tools to spread, rake, and lute the hot mix asphalt in areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impracticable.

When the section of roadway being paved is open to traffic, pave adjacent traffic lanes to the same elevation within 24 hours. Place approved material against the outside pavement edge when the drop off exceeds 2 inches.

When multiple lifts are specified in the Contract, do not place the final lift until all lower lifts throughout that section, as defined by the Paving Plan, are placed and accepted.

Do not pave against new Portland concrete curbing until it has cured for at least 72 hours.

Place hot mix asphalt over bridge deck membranes according to Section 508 and the manufacturer's specifications.

401-3.13 COMPACTION. Thoroughly and uniformly compact the hot mix asphalt by rolling. In areas not accessible to large rollers, compact with mechanical tampers or trench rollers. Compact hot mix asphalt immediately after it is placed and spread, and as soon as it can be compacted without undue displacement, cracking or shoving. Perform initial breakdown compaction while the hot mix asphalt mixture temperature is greater than 235°F and finish compaction before the surface temperature reaches 150°F. (07/03/03)E02

The target value for density is 94% of the maximum specific gravity (MSG), as determined by WAQTC FOP for AASHTO T 209. For the first lot of each type of hot mix asphalt, the Job Mix Design will determine the MSG. For additional lots, the MSG will be determined by the sample from the first sublot of each lot.

Acceptance testing for density will be performed in accordance with WAQTC FOP for AASHTO T 166/T 275 using a 6-inch diameter core. (Acceptance testing for density of leveling course or temporary pavement is not required.)

Do not leave rollers or other equipment standing on hot mix asphalt that has not cooled sufficiently to prevent indentation.

401-3.14 JOINTS. Minimize the number of joints. Place and compact the hot mix asphalt to ensure a continuous bond, texture, and smoothness between adjacent sections of the hot mix asphalt.

Remove to full depth improperly formed joints resulting in surface irregularities, replace with new hot mix asphalt, and thoroughly compact.

Precut pavement removal to a neat line with a power saw or by other approved method.

Form transverse joints by saw cutting back on the previous run to expose the full depth of layer with a power saw or other method approved by the Engineer or use a removable bulkhead. Skew transverse joints between 15-25 degrees.

Offset the longitudinal joints in one layer from the joint in the layer immediately below by at least 6 inches. Align the joints of the top layer at the centerline or lane lines. Where preformed marking tape striping is required, offset the longitudinal joint in the top

layer not more than 13.5 inches from the edge of the stripe. Locate longitudinal joint so that the GSB-78 material can be applied without overspray onto pavement markings.

Uniformly coat joint surfaces below the final lift with tack coat conforming to Section 703 before placing any fresh HMA against the joint.

Before placing an adjacent panel of hot mix asphalt to form a joint in the top layer, apply Crafco Pavement Joint Adhesive No. 34524 Deery Cold Joint Adhesive or approved equal, to the edge of the existing panel. Edge surface preparation, application temperature, thickness, and method shall be according to manufacturer's recommendations.

For the top layer of hot mix asphalt, the minimum specification limit for longitudinal joint density is 91% of the MSG of the panel completing the joint. Cut one 6 inch diameter core centered on the longitudinal joint at each location the panel completing the joint is cored for acceptance density testing. Density will be determined in accordance with WAQTC FOP for AASHTO T 166/T 275.

In the top layer seal longitudinal joints with Asphalt Systems GSB-78 or approved equal, while the hot mix asphalt is clean, free of moisture, and before traffic marking. Longitudinal joint sealing shall be according to the manufacturer's recommendations and an application rate of 0.15 gallons per square yard. Apply the sealant at least 12 inches wide centered on the longitudinal joint.

Hot lapped joints formed by paving in echelon must be completed while the mat temperature is over 150°F. These joints do not need to be tacked and will be measured and evaluated for joint density.

Longitudinal joints will be evaluated for acceptance according to subsection 401-4.05.

401-3.15 SURFACE TOLERANCE. The Engineer will test the finished surface after final rolling at selected locations using a 10 foot straightedge. Correct variations from the testing edge, between any two contacts of more than 1/4 inch.

After completion of corrective work, the Engineer will measure the pavement surface in the driving lanes a second time for a smoothness price adjustment. No measurements will be taken in turn lanes, lane transitions, or within 25 feet of the existing pavement at the project beginning and end.

The finished surface of hot mix asphalt shall match dimensions shown on the Plans for horizontal alignment and width, profile grade and elevation, crown slope, and paving thickness. Water shall drain without puddles, across the pavement surface. The surface shall be of uniform texture and without ridges, humps, depressions, and roller marks. The surface shall be free of raveling, cracking, tearing, rutting, asphalt cement bleeding, and aggregate segregation. The hot mix asphalt shall be free of foreign material, uncoated aggregate, and oversize aggregate.

Any finished surface area that does not meet the requirements of this Subsection is

deemed unacceptable as per Subsection 105-1.11. The Engineer will determine whether the unacceptable hot mix asphalt shall either be corrected, or removed and replaced. Submit correction methods to the Engineer for approval prior to correction work commencing. (07/03/03)E02

401-3.16 PATCHING DEFECTIVE AREAS. Remove hot mix asphalt that becomes contaminated with foreign material, is segregated, or is in any way determined to be defective. Do not skin patch. Remove defective materials for the full thickness of the course. Cut the pavement so that edges are vertical, the sides are parallel to the direction of traffic and the ends are skewed between 15-25 degrees. Coat edges with a tack coat meeting Section 402 and allow to cure. Place and compact fresh hot mix asphalt according to subsection 401-3.13 to grade and smoothness requirements.

Costs associated with patching defective areas are subsidiary to the Hot Mix Asphalt pay item.

401-3.17 TEMPERATURE REQUIREMENTS. The Engineer may reject hot mix asphalt that is mixed, hauled, spread and placed, or compacted at a temperature outside the temperature range determined by either the Job Mix Design, by a control test strip, or by the Specifications. Rejected hot mix asphalt is deemed unacceptable as per Subsection 105-1.11. The Engineer will determine whether the unacceptable hot mix asphalt shall either be corrected, or removed and replaced.

At the Engineer's discretion, the Contractor may be allowed to compact hot mix asphalt that is already placed and spread but is outside the temperature range. If the compacted hot mix asphalt fails the Engineer's tests for acceptance, it must be removed and replaced as per Subsection 105-1.11. (07/03/03)E02

401-4.01 METHOD OF MEASUREMENT. Section 109 and the following:

Hot Mix Asphalt.

a) By weighing. No deduction will be made for the weight of asphalt cement or anti stripping additive.

b) By the area of final pavement surface.

Asphalt Price Adjustment. Calculated by quality level analysis under subsection 401-4.03.

Asphalt Cement. By the ton, as follows.

1. Percent of asphalt cement for each sublot multiplied by the total weight represented by that sublot. Percent of asphalt cement will be determined by ATM 405 or WAQTC FOP for AASHTO T 308. The same tests used for the acceptance testing of the sublot will be used for computation of the asphalt cement quantity. If no acceptance testing is required, the percent of asphalt cement is the target value for asphalt cement in the Job Mix Design.

2. Supplier's invoices minus waste, diversion and remnant. This procedure may be used on projects where deliveries are made in tankers and the asphalt plant is producing asphalt concrete mixture for one project only.

   The Engineer may direct, at any time, that tankers be weighed in the Engineers presence before and after unloading. If the weight determined at the project varies more than 1% from the invoice amount, payment will be based on the weight determined at the project.

   Any remnant or diversion will be calculated based on tank stickings or weighing the remaining asphalt cement. The Engineer will determine the method. The weight of asphalt cement in waste asphalt concrete mixture will be calculated using the target value for asphalt cement as specified in the Job Mix Design.

Method 1 will be used for determining asphalt quantity unless otherwise directed in writing. The procedure initially used will be the one used for the duration of the project. No payment will be made for any asphalt cement more than 0.4% above the optimum asphalt content specified in the Job Mix Design.

Job Mix Design. When specified, Contractor furnished Job Mix Designs will be measured at one per hot mix asphalt class and type.

Temporary Pavement. By weighing. No deduction will be made for the weight of asphalt cement or anti-stripping additive.

Longitudinal Joint Adhesive and Sealing. By the lineal foot of longitudinal joint.

Preleveling. By weighing. No deduction will be made for the weight of asphalt cement or anti stripping additive.

401-4.02 ACCEPTANCE SAMPLING AND TESTING. The quantity of each class and type of hot mix asphalt produced and placed will be divided into lots and the lots evaluated individually for acceptance.

A lot will normally be 5,000 tons. The lot will be divided into sublots of 500 tons, each randomly sampled and tested for asphalt cement content, density, and gradation according to this subsection. If the project has more than 1 lot, and less than 8 additional sublots have been sampled at the time a lot is terminated, either due to completion of paving operations or the end of the construction season (winter shutdown), the material in the shortened lot will be included as part of the prior lot. The price adjustment computed, according to subsection 401-4.03, for the prior lot will include the samples from the shortened lot.

If 8 or 9 samples have been obtained at the time a lot is terminated, they will be considered as a lot and the price adjustment will be based on the actual number of test results (excluding outliers) in the shortened lot.

If the contract quantity is between 1,500 tons and 4,999 tons, the contract quantity will be considered one lot. The lot will be divided into sublots of 500 tons and randomly sampled for asphalt cement content, density, and gradation according to this subsection except that a determination for outliers will not be performed. Hot mix asphalt quantities of less than 300 tons remaining after dividing the Contract quantity into sublots will be included in the last sublot. Hot mix asphalt quantities of 300 tons or greater will be treated as an individual sublot. The lot will be evaluated for price adjustment according to subsection 401-4.03 except as noted.

For Contract quantity of less than 1,500 tons (and for temporary pavement), hot mix asphalt will be accepted for payment based on the Engineer's approval of a Job Mix Design and the placement and compaction of the hot mix asphalt to the specified depth and finished surface requirements and tolerances. The Engineer reserves the right to perform any testing required in order to determine acceptance. Remove and replace any hot mix asphalt that does not conform to the approved JMD.

If hot mix asphalt fails to meet the requirements of this Subsection, the Engineer may determine a price reduction for asphalt as per Subsection 105-1.03; or the Engineer may direct you either to correct, or to remove and replace the unacceptable area as per Subsection 105-1.11. (07/03/03)E02

Samples collected at the plant from dry batched aggregates, the conveyor system, or the asphalt cement supply line shall be taken by the Contractor in the presence of the Engineer. The Engineer will take immediate possession of the samples.

1. Asphalt Cement. Hot mix samples taken for the determination of asphalt cement content will be taken randomly from behind the screed before initial compaction, at the end of the auger, or from the windrow according to WATC FOP for AASHTO T 168 and ATM 403, as directed by the Engineer. Hot mix asphalt samples taken for the determination of both asphalt cement content and gradation will be taken randomly from behind the screed before initial compaction or from the windrow according to WAQTC FOP for AASHTO T 168 and ATM 403.

   Two separate samples will be taken, one for acceptance testing and one held in reserve for retesting if applicable. At the discretion of the Engineer, asphalt cement content will be determined according to ATM 405 or WAQTC FOP for AASHTO T 308.

2. Aggregate Gradation.

   a. Drum Mix Plants. Samples taken for the determination of aggregate gradation from drum mix plants will be from the combined aggregate cold feed conveyor via a diverter device, or from the stopped conveyor belt according to WAQTC FOP for AAHSTO T2, or from the same location as samples for the determination of asphalt cement content. Locate diverter devices for obtaining aggregate samples from drum mix plants on the conveyor system delivering combined aggregates into the drum. Divert aggregate from the full width of the conveyor system and maintain the

diverter device to provide a representative sample of aggregate incorporated into the hot mix asphalt. Two separate samples will be taken, one for acceptance testing and one held in reserve for retesting if applicable. The aggregate gradation for samples from the conveyor system will be determined in accordance with WAQTC FOP for AASHTO T 27/T 11. For hot mix asphalt samples, the gradation will be determined according to WAQTC FOP for AASHTO T 30 from the aggregate remaining after the ignition oven (WAQTC FOP for AASHTO T 308) has burned off the asphalt cement.

b. Batch Plants. Samples taken for the determination of aggregate gradation from batch plants will be from the same location as samples for the determination of asphalt cement content, or from dry batched aggregates according to WAQTC FOP for AASHTO T 2. Two separate samples will be taken, one for acceptance testing and one held in reserve for retesting if applicable. Dry batched aggregate gradations will be determined according to WAQTC FOP for AASHTO T 27/T 11. For hot mix asphalt samples, the aggregate gradation will be determined according to WAQTC FOP for AASHTO T 30 from the aggregate remaining after the ignition oven (WAQTC FOP for AASHTO T 308) has burned off the asphalt cement.

3. Density. Cut full depth core samples from the finished hot mix asphalt within 24 hours after final rolling. Neatly cut one 6 inch diameter core sample with a core drill at each location marked by the Engineer. Use a core extractor to prevent damage to the core. The Engineer will determine the density of the core samples in accordance with WAQTC FOP for AASHTO T 166/T 275. Do not core asphalt concrete pavement on bridge decks. Backfill and compact voids left by coring with new hot mix asphalt within 24 hours.

Cores for longitudinal joint density shall be centered on the longitudinal joint at each location the panel completing the joint is cored for mat density acceptance testing.

4. Retesting. A retest of any sample outside the limits specified in Table 401-2 may be requested provided the quality control requirements of 401-2.05 are met. Deliver this request in writing to the Engineer within 7 days of receipt of the initial test result. The Engineer will mark the sample location for the density retest within a 2 foot radius of the original core. The original test results will be discarded and the retest result will be used in the price adjustment calculation regardless of whether the retest result gives a higher or lower pay factor. Only one retest per sample is allowed. Except for the first lot, gradation and asphalt cement content are determined from the same sample, retesting for gradation or asphalt cement from the first sublot of a lot will include retesting for the MSG; when separate samples are used, retesting for asphalt cement content will include retesting for MSG.

5. Asphalt Cement.

The lot size for asphalt cement will normally be 200 tons. If a project has more than one lot and the remaining asphalt cement quantity is less than 150 tons, it will be added to the previous lot and that total quantity will be evaluated for price adjustment as one lot. If the remaining asphalt cement quantity is 150 tons or greater, it will be sampled, tested and evaluated as a separate lot.

If the contract quantity of asphalt cement is between 85 – 199 tons, the contact quantity will be considered as one lot and sampled, tested, and evaluated in accordance with this subsection. Quantities of asphalt cement less than 85 tons will be accepted based on manufacturer's certified test reports and certification of compliance.

Asphalt cement will be sampled according to WAQTC FOP for AASHTO T 40, tested for conformance to the specifications in Section 702, and evaluated for price adjustment in accordance with 401-4.03. Asphalt cement pay reduction factors for each sample will be determined from Table 401-4. Three separate samples from each lot will be taken, one for acceptance testing, one for Contractor retesting, and one held in reserve for referee testing if applicable.

The total asphalt cement price adjustment is the sum of the individual lot price adjustments and will be subtracted under Item 401(6) Asphalt Price Adjustment.

401-4.03 EVALUATION OF MATERIALS FOR ACCEPTANCE. The following method of price adjustment will be applied to each type of Hot Mix Asphalt for which the contract quantity equals or exceeds 1,500 tons, except as specified in subsection 401-4.02.

Acceptance test results for a lot will be analyzed collectively and statistically by the Quality Level Analysis method as specified in subsection 106-1.03 to determine the total estimated percent of the lot that is within specification limits.

The price adjustment is based on the lower of two pay factors. The first factor is a composite pay factor for asphalt concrete mixture, which includes gradation and asphalt cement content. The second factor is for density.

A lot containing asphalt concrete pavement with less than a 1.00 pay factor will be accepted at an adjusted price, provided the pay factor is at least 0.75 and there are no isolated defects identified by the Engineer. A lot containing asphalt concrete pavement that fails to obtain at least a 0.75 pay factor will be considered unacceptable and rejected under subsection 105-1.11.

The Engineer will reject asphalt concrete mixture that appears to be defective based on visual inspection. A minimum of two samples will be collected from the rejected mixture and tested if requested. If test results are within specification limits, payment will be made for the mixture. If any of the test results fail to meet specifications, no payment will be made and the cost of the testing will be subtracted under Item 401(6) Asphalt Price Adjustment. Costs associated with removal and disposal of the rejected asphalt

concrete mixture are subsidiary to the Hot Mix Asphalt pay item.

Outlier Test. Before computing the price adjustment, the validity of the test results will be determined by SP-7, the Standard Practice for Determination of Outlier Test Results. Outlier test results will not be included in the price adjustment calculations.

When gradation and asphalt cement content are determined from the same sample, if any size on the gradations test or the asphalt cement content is an outlier, then the gradation test results and the asphalt cement content results for that sublot will not be included in the price adjustment. The density test result for that sublot will be included in the price adjustment provided it is not an outlier also.

If the density test result is an outlier, the density test result will not be included in the price adjustment, however, the gradation and asphalt cement content results for that sublot will be included provided neither is an outlier.

When gradation and asphalt cement content are determined from separate samples, if any sieve size on the gradation test is an outlier, then the gradation test results for that sample will not be included in the price adjustment. The asphalt cement content and density test results for that sublot will be included in the price adjustment provided neither is an outlier. If the asphalt cement content test result is an outlier, it will not be included in the price adjustment but the gradation and density test results for the sublot will be included provided neither is an outlier. If the density test result is an outlier, it will not be included in the price adjustment but the gradation and asphalt cement content test results will be included provided neither is an outlier.

Quality Level Analysis. Pay factors are computed as follows:

1. Outliers (determined by SP-7), and any test results on material not incorporated into the work, are eliminated from the quality level analysis.

   The arithmetic mean ($\bar{x}$) of the remaining test results is determined: $\bar{x} = \frac{\Sigma x}{n}$

   Where: Σ = summation of
   x = individual test value to x_n
   n = total number of test values

   $\bar{x}$ is rounded to the nearest tenth for density and sieve sizes except the No. 200 sieve. $\bar{x}$ is rounded to the nearest hundredth for asphalt cement content and the No. 200 sieve.

2. The sample standard deviation(s), after the outliers have been excluded, is computed:

$$s = \sqrt{\frac{n\Sigma(x^2) - (\Sigma x)^2}{n(n-1)}}$$

   Where: $\Sigma (x^2)$ = sum of the squares of individual test values.
   $(\Sigma x)^2$ = square of the sum of the individual test values.

The sample standard deviation (s) is rounded to the nearest hundredth for density and all sieve sizes except the No. 200 sieve. The sample standard deviation (s) is rounded to the nearest 0.001 for asphalt cement content and the No. 200 sieve.

If the computed sample standard deviation (s) is <0.001, then use s = 0.20 for density and all sieves except the No. 200. Use s = 0.020 for asphalt cement content and the No. 200 sieve.

3. The USL and LSL are computed. For aggregate gradation and asphalt cement content, the Specification Limits (USL and LSL) are equal to the Target Value (TV) plus and minus the allowable tolerances in Table 401-2. The TV is the specification value specified in the approved Job Mix Design. Specification tolerance limits for the largest sieve specified will be plus 0 and minus 1 when performing PWL calculations. The TV for density is 94% of the maximum specific gravity (MSG), the LSL is 92% of MSG and the USL is 98%.

TABLE 401-2
LOWER SPECIFICATION LIMIT (LSL) & UPPER SPECIFICATION LIMIT (USL)

Measured Characteristics	LSL	USL
3/4 inch sieve	TV-6.0	TV+6.0
1/2 inch sieve	TV-6.0	TV+6.0
3/8 inch sieve	TV-6.0	TV+6.0
No. 4 sieve	TV-6.0	TV+6.0
No. 8 sieve	TV-6.0	TV+6.0
No. 16 sieve	TV-5.0	TV+5.0
No. 30 sieve	TV-4.0	TV+4.0
No. 50 sieve	TV-4.0	TV+4.0
No. 100 sieve	TV-3.0	TV+3.0
No. 200 sieve[1]	TV-2.0	TV+2.0
Asphalt %	TV-0.4	TV+0.4
Mat Density %	92	98

Note 1.Tolerances for the No. 200 sieve may not exceed the broad band limits in Table 703-3.

4. The Upper Quality Index (Q_U) is computed: $Q_U = \frac{USL - \bar{x}}{s}$

Where: USL = Upper Specification Limit
Q_U is rounded to the nearest hundredth.

5. The Lower Quality Index (Q_L) is computed: $Q_L = \frac{\bar{x} - LSL}{s}$

Where: LSL = Lower Specification Limit
Q_L is rounded to the nearest hundredth.

6. P_U (percent within the upper specification limit which corresponds to a given Q_U) is determined. See Subsection 106-1.03.

7. P_L (percent within the lower specification limit which corresponds to a given Q_L) is determined. See Subsection 106-1.03.

8. The Quality Level (the total percent within specification limits) is determined for aggregate gradation, asphalt cement content, and density.

$$\text{Quality Level} = (P_L + P_U) - 100$$

9. Using the Quality Levels from Step 8, the lot Pay Factor is determined for Density (DPF) and gradation and asphalt cement content pay factors (PF) from Table 106-2. The maximum pay factor for the largest sieve size specification for gradation is 1.00.

10. The Composite Pay Factor (CPF) for the lot is determined using the following formula:

$$CPF = \frac{[f_{3/4\ inch}\ (PF_{3/4\ inch}) + f_{1/2\ inch}\ (PF_{1/2\ inch}) + \ldots f_{ac}\ (PF_{ac})]}{\Sigma f}$$

The CPF is rounded to the nearest hundredth.

Table 401-3 gives the weight factor (f) for each sieve size and asphalt cement content.

TABLE 401-3
WEIGHT FACTORS

Sieve Size	Type I	Type II	Type III
	Factor "f"	Factor "f"	Factor "f"
1 inch sieve	4		
3/4 inch sieve	4	4	
1/2 inch sieve	4	5	4
3/8 inch sieve	4	5	5
No. 4 sieve	4	4	5
No. 8 sieve	4	4	5
No. 16 sieve	4	4	5
No. 30 sieve	4	5	6
No. 50 sieve	4	5	6
No. 100 sieve	4	4	4
No. 200 sieve	20	20	20
Asphalt Cement Content, %	40	40	40

The price adjustment will be based on either the CPF or DPF, whichever is the lowest value. The price adjustment for each individual lot will be calculated as follows:

Price Adjustment = [(CPF or DPF)* -1.00] x (tons in lot) x (PAB)

* CPF or DPF, whichever is lower.

PAB = Price Adjustment Base = $70 per ton

The total asphalt concrete price adjustment is the sum of all price adjustments for each lot and will be adjusted under Item 401(6) Asphalt Price Adjustment.

EVALUATION OF ASPHALT CEMENT Asphalt cement will be randomly sampled and tested every 200 tons and evaluated for price adjustment. If the last sample increment is 100 tons or less, that quantity of asphalt cement will be added to the quantity represented by the previous sample and the total quantity will be evaluated for price adjustment. If the last sample increment is greater than 100 tons, it will be sampled, tested and evaluated separately. Asphalt cement pay reduction factors for each sample will be determined from Table 401-4.

The total asphalt cement price adjustment is the sum of the individual sample price adjustments and will be subtracted under Item 401(6) Asphalt Price Adjustment.

Table 401-4
ASPHALT CEMENT PAY REDUCTION FACTORS
(Use the single, highest pay reduction factor)

	Spec	Pay Reduction Factor (PRF)								
		0	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.1**	**0.25**	**Reject or Engr Eval**
Tests On Original Binder										
Viscosity	<3 Pa-s	≤3		>3						
Dynamic Shear	>1.00 kPa	>1.00		0.88-0.99				0.71-0.89	0.50-0.70	<0.50
Toughness	>110 in-lbs	>93.5	90.0-93.4	85.0-89.9	80.0-84.9	75.0-79.9	70.0-74.9			<70.0
Tenacity	>75 in-lbs	>63.8	61.0-63.7	58.0-60.9	55.0-57.9	52.0-54.9	48.0-51.9			<48.0
Tests On RTFO										
Mass Loss	<1.00 %	<1.00		1.001-1.092				1.093-1.184	1.185-1.276	>1.276
Dynamic Shear	>2.20 kPa	>2.20		1.816-2.199				1.432-1.815	1.048-1.431	<1.048
Test On PAV										
Dynamic hear	<5000 kPa	<5000		5001-5289				5290-5578	5579-5867	>5867
Creep Stiffness, S	<300 MPa	<300		301-338				339-388	389-450	>450
Creep Stiffness, m-value	>0.300	>0.300		0.287-0.299				0.274-0.286	0.261-0.273	<0.261
Direct Tension	>1.0 %	>1.0		0.287-0.299				0.274-0.286	0.261-0.273	<0.56

Asphalt Cement Price Adjustment for each sample = 5 x PAB x Qty X PRF
PAB = Price Adjustment Base
Qty = Quantity of asphalt cement represented by asphalt cement sample
PRF = Pay Reduction Factor from Table 401-4

Asphalt Cement Appeal Procedure. Once notified of a failing test result of an asphalt cement sample, the Contractor has 21 days to issue a written appeal. The appeal must be accompanied by all of the Contactor's quality control test results and a test result of Contactor's sample of this lot tested by an AASHTO accredited asphalt laboratory (accredited in the test procedure in question). The Engineer will review these test results and using ASTM D3244 determine a test value upon which to base a price reduction.

If the Contractor challenges this value, then the referee sample held by the Engineer will be sent to a mutually agreed upon independent AASHTO accredited laboratory for testing. This test result will be incorporated into the ASTM D3244 procedure to determine a test value upon which to base a price reduction. If this final value incurs a price adjustment, the Contractor under Item 408(3) Asphalt Price Adjustment, shall pay the cost of testing the referee sample.

The total Asphalt Price Adjustment is the sum of all the price adjustments for each lot and will be included in 401(6) Asphalt Price Adjustment.

EVALUATION OF LONGITUDINAL JOINT DENSITY. Longitudinal joint density price adjustments apply when asphalt concrete mixture quantities are equal to or greater than 1,500 tons. A longitudinal joint density price adjustment for the top layer will be based on the average of all the joint densities on a project and determined as follows:

1. If project average joint density is less than 91% MSG, apply the following disincentive:

   Longitudinal joint density price adjustment equal to $3.00 per lineal foot is deducted under Item 401(6) Asphalt Price Adjustment.

2. If project average joint density is greater than 92% MSG apply the following incentive:

   Longitudinal joint density price adjustment equal to $1.50 per linear foot is added under Item 401(6) Asphalt Price Adjustment.

The longitudinal joint price adjustment will be included in Item 401(6) Asphalt Price Adjustment.

401-5.01 BASIS OF PAYMENT. Separate payment will not be made for asphalt cement or anti-strip additives for Item 401(3) Temporary Pavement, or asphalt concrete for leveling course.

Asphalt cement, anti stripping additives, tack coat, and crack sealing (401-3.07) are subsidiary to the asphalt concrete pavement unless specified as pay items.

Price adjustments will not apply to:

1. Hot Mix Asphalt for leveling course
2. Temporary Pavement

Failure to cut core samples within the specified period will result in a deduction of $100.00 per sample per day. Failure to backfill voids left by sampling within the specified period will result in a deduction of $100.00 per hole per day. The accrued amount will be subtracted under Item 401(6) Asphalt Price Adjustment.

The Engineer will assess a fee of $2,500.00 under Item 401(6), Asphalt Price Adjustment, for each mix design subsequent to the approved Job Mix Design for each Type and Class of Asphalt Concrete Pavement specified.

Payment will be made under:

Pay Item	**Pay Unit**
401(1) Hot Mix Asphalt, Type ; Class	Ton
401(1A) Hot Mix Asphalt, Type ; Class	Ton
401(2) Asphalt Cement,	Ton
401(6) Asphalt Price Adjustment	Contingent Sum
401(9) Longitudinal Joint Adhesive and Sealing	Lump Sum

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SECTION 405

SURFACE TREATMENT

Delete this section in its entirety and substitute the following:

SECTION 405

HIGH FLOAT SURFACE TREATMENT

Special Provisions

405-1.01 DESCRIPTION. This work consists of the construction of a single-course High Float Asphalt Emulsion Surface Treatment (HFST) in accordance with these specifications and in reasonable conformance with the lines shown on the Plans.

405-2.01 ASPHALT MATERIALS. The HFMS-2s high float asphalt emulsion material shall conform to the applicable requirements of Section 702-2.03. The asphalt material will be conditionally accepted at the source.

405-2.02 AGGREGATES. Aggregates for cover coat material (cover aggregate) shall meet the requirements of Subsection 703-2.05 and Table 703-5HF, Requirements for Cover Aggregate for High Float Surface Treatment, Grading B, except that the following quality requirements shall apply:

Percent of Wear	AASHTO T 96	50 max.
Degradation Value	ATM T-13	25 min.
Percent Fracture	WAQTC TM-1	50 min.
Sodium Sulfate Soundness	AASHTO T 104	9% max (5 cycles)
Thin - Elongated Pieces	ATM T-9	8% max.
Plasticity Index *	AASHTO T 90	3 max.

* Prepare material for AASHTO T 90 according to the wet preparation method, AASHTO T 146.

The test sampling location(s) will be determined by the Engineer, before crushing operations begin.

Cover coat material stockpiles shall be covered to exclude precipitation.
Gradation testing:

Acceptance Testing: Determine the gradation by AASHTO T-27. Testing will be done upon notification by the Contractor that the crusher is ready for production.

Assurance Testing: Determine the gradation by AASHTO T-27 and AASHTO T-88 except dry the material for the T-88 test within a temperature range of 90° to 100°F .

405-2.03 SURFACE TREATMENT BLOTTER MATERIAL. Blotter material shall be suitable clean sand. Unless otherwise required by the Engineer, all sand used as blotter material shall pass the 8 mesh sieve, and have no more than 0.5% material passing the 200 mesh sieve. The material may be accepted in stockpile at the source.

Gradation shall be determined by AASHTO T-27.

405-2.04 DETERMINE HFST DESIGN COMPOSITION. Within two days after the start of cover aggregate crushing, the Contractor shall submit a representative 70 lb sample of the cover aggregate and a 1 gallon sample of the high float asphalt emulsion proposed for use on the project. Fill the asphalt container to the brim so that it contains no air.

Changes in application rates warranted by changes in aggregate gradation, source of cover aggregate, or high float emulsion supplier shall be submitted by the Contractor in the same manner as the original submittal.

405-2.05 COMPOSITION OF SURFACE TREATMENT. The initial application rates of asphalt and cover aggregate materials shall be as determined by the Engineer per Subsection 405-2.04. The Engineer may adjust application rates as required by field conditions.

The following table provides the pre HFST Design estimating factors, and specifies the tolerance allowed the Contractor for applying surface treatment material above or below the application rates determined by the Engineer.

Material	Pre-HFST Design Estimating Factor	Specified Tolerance
HFMS-2s Asphalt	0.75 gallon per sq. yard	±0.04 gallon per sq. yard
Cover Aggregate	75 lb per sq. yard	±3 lb per sq. yard

CONSTRUCTION REQUIREMENTS

405-3.01 GENERAL.

1. The longitudinal joints shall be allowed only at the centerline.

2. The work shall be done in a manner such that asphalt and cover aggregate applications are completed full width by the end of each shift.

405-3.02 WEATHER LIMITATIONS.

1. The ambient air temperature shall be 50°F or above. Temperatures shall be measured in the shade away from any heat source.

2. The HFST shall not be applied during periods of rain, fog, mist or imminent rain. Do not apply the HFST when weather conditions prevent the proper penetration of the asphalt material and/or adhesion of the cover aggregate.

3. Weather conditions shall be such that proper construction of the HFST and adequate curing time is available prior to inclement weather or freeze-up. No HFST shall be applied before May 15 or after August 15.

405-3.03 EQUIPMENT.

1. Distributor

The distributor shall be so designed, equipped, maintained and operated that asphalt material at even heat may be applied uniformly on variable widths of surface up to half the roadway width plus 6 inches, at the specified rate, from 0.38 to 0.75 gallons per square yard, with uniform pressure and within specified tolerances.

The distributor equipment shall include the following:

- Computerized control of liquid asphalt spread rates to automatically deliver specified delivery rates and capable of changing rates when so directed.
- Computer monitoring of spread rate, truck speed and distance traveled.
- A thermometer for measuring temperatures of the tank's contents, readily visible from outside the truck cab.
- Each nozzle in the spray bar shall be turned to make the constant angle with the longitudinal axis of the spray bar that is recommended by the manufacturer of the distributor. All nozzles in the spray bar shall be of the same manufacture, type and size. The spray bar height shall provide triple overlap of the asphalt emulsion being applied by the spray nozzles.

Before the application of asphalt, the Contractor shall ensure that the distributor meets the following requirements:

- The spray bar can be maintained at a constant height throughout the entire operation.
- Spray bar nozzles are clean and in good working condition.
- The spray bar has been provided with a positive shutoff to prevent dribbling.
- The distributor is capable of maintaining a uniform speed.

Calibration and adjustment requirements will include:

- The distributor will be inspected by the Engineer prior to the commencement of the operation. Any adjustments, maintenance and other requirements shall be performed prior to being used.
- The distributor shall be calibrated in accordance with the manufacturer's recommendations. The Engineer may require the Contractor to prove the accuracy of the distributor prior to commencing the asphalt application and any time thereafter if

deemed necessary by the Engineer. Any change in settings on the distributor after calibrating will require that the distributor be recalibrated.

- Should any of the nozzles on the spray bar fail to provide a constant, uniform flow during the application of asphalt material, the distributor shall immediately cease application of the asphalt material. The distributor shall not be allowed to resume applying asphalt material until all of the nozzles are in good working order. Nozzle adjustments and/or repairs must be approved by the Engineer.

2. Aggregate Spreader

The aggregate spreader shall be capable of evenly applying cover aggregate material to the specified roadway width in a maximum of two passes. The aggregate spreader shall be computer controlled to automatically maintain the specified delivery rate of cover aggregate regardless of variations in machine speed. The spreader shall have a sufficient size feed system to maintain cover aggregate in the spread hopper at all times. The spread hopper shall be equipped with augers or other approved equipment to prevent segregation of the cover aggregate materials.

Stopping the aggregate spreader to refill the receiving hopper will be permitted provided that the spreader is backed up at least 20 feet from the last cover aggregate application. The aggregate spreader will be permitted to slow down to allow trucks to backup and discharge loads into the receiving hopper. The aggregate spreader shall be constructed to eliminate material segregation in the various hoppers.

Immediately before using the aggregate spreader on the project, the aggregate spreader shall be calibrated for the cover aggregate to be applied. The forward speed of the aggregate spreader during calibration shall approximate the speed required to apply the cover aggregate over the asphalt material and maintain a continuous operation with the distributor. The aggregate spreader shall be calibrated in accordance with the manufacturer's recommendations. The Engineer may require the Contractor to prove the accuracy of the aggregate spreader.

The aggregate spreader shall be recalibrated whenever directed by the Engineer. The calibration procedure will be observed by the Engineer each time it is done.

3. Rollers

A minimum of three self-propelled pneumatic rollers weighing not less than 20,000 lbs, equipped with not less than nine tires staggered back and front, inflated to 60 psi shall be utilized. All tires shall have equal pressure, and each roller shall be equipped with a suitable tire pressure gauge for checking tire inflation pressure.

405-3.04 PREPARATION OF SURFACE.

1. HFST shall be applied on sections of fully shaped and compacted grade. Grade shall be approved by the Engineer prior to application of HFST. HFST shall be applied within 72 hours of approval of the grade. Areas of grade not surfaced within the 72 hour period are subject to reapproval by the Engineer. The surface shall be rolled with a steel wheeled soil compactor immediately prior to application of asphalt materials. The Contractor shall not leave windrows of materials that may impede drainage on or adjacent to the surface treatment area.

2. HFST shall be applied when the prepared surface is damp. Prior to the asphalt application, the Engineer may require dampening the surface by applying a fine spray of water to the prepared surface. HFST shall not be applied to a wet surface or when rain or fog is present or imminent.

405-3.05 APPLYING HIGH FLOAT ASPHALT EMULSION MATERIAL.

1. The length of spread of high float asphalt emulsion (hereafter referred to as asphalt) material shall not be in excess of that which trucks loaded with cover aggregate can immediately cover.

2. The first pass over the segment of roadway being surfaced, will follow a string line, set either on the shoulder or on the centerline, whichever is on the driver's side of the distributor. The second pass will be done with the centerline joint on the driver's side of the distributor.

3. At no time shall any equipment or vehicles be allowed on sprayed asphalt prior to cover aggregate application.

4. The spread of asphalt material shall not be more than 6 inches wider than the width covered by the cover aggregate from the spreader. Under no circumstances shall operations proceed in such a manner that asphalt material will be allowed to chill, set up, dry, or otherwise impair retention of the cover aggregate.

5. The distributor, when not spreading, shall be parked so that the spray bar or mechanism will not drip asphalt material on the surface of the roadway.

6. Application temperature of asphalt material shall be 150°-180°F.

Any skipped areas or deficiencies shall be corrected. Junctions of spreads shall be carefully made to prevent an excess of asphalt material.

405-3.06 APPLICATION OF COVER AGGREGATE MATERIAL.

1. The cover aggregate shall have a temperature of no less than 40°F and shall have a 3%-5% moisture content (by dry weight) at the time of application. If necessary, the cover aggregate shall be moistened or dried to achieve the specified moisture content.

2. Cover aggregate shall be applied within 1.5 minutes after application of the asphalt material or as directed by the Engineer. This increment shall be kept as constant as possible, but shall be adjusted as needed to meet changing conditions. Whenever it is apparent that the time limit above will be exceeded, a transverse joint shall be made by placing construction paper (roofing felt or similar product) on the prepared surface and ending the HFST operations on the paper. The paper shall be removed and disposed of properly. The edges of the applied HFST shall be touched up prior to restarting HFST operations.

3. Immediately after cover aggregate is spread, deficient areas shall be covered by additional material. Pneumatic tire rolling for the full width of the aggregate shall begin immediately after placement of cover aggregate and shall be continued until at least six complete coverages are obtained or until cover aggregate is bound tightly, to the satisfaction of the Engineer. The rolling operation shall be accomplished within 500 feet of the cover aggregate application. The high float application operation shall be slowed if the rolling cannot be completed within this distance. Pneumatic tire roller speed shall not exceed 5 miles per hour. The Contractor shall maintain a spare pneumatic tired roller on the project during high float application, in addition to those rollers necessary to accomplish this specification.

4. Spreading shall be accomplished in such a manner that the tires of the trucks or aggregate spreader at no time contact the uncovered and newly applied asphalt material.

5. Sweeping to remove excess cover aggregate is required. Sweeping is to occur between two and three weeks following the application of cover coat material as directed by the Engineer. Ridges of loose aggregate created by traffic prior to sweeping, shall be removed or uniformly spread over the surface as they develop as directed by the Engineer.

405-3.07 APPLICATION OF BLOTTER MATERIAL. Due to weather, construction and/or materials problems, it is possible that the finished surface treatment may become unstable. To minimize development of damage to the surface, blotter material may be required. Blotter material shall be applied as directed by the Engineer and immediately rolled with a pneumatic-tired roller (as described above) with tire pressures adjusted to 90-100 psi.

405-3.08 TRAFFIC CONTROL. Construction equipment shall not operate at speeds exceeding 15 miles per hour on a freshly applied surface treatment, for a period of up to 24 hours, as directed by the Engineer.

Unless otherwise specified, the highway shall be kept open to traffic at all times. No traffic shall be allowed on freshly sprayed asphalt or cover aggregate material that is not fully compacted. As soon as final rolling of the HFST layer is accomplished, controlled traffic may be permitted to operate on the HFST surface. Traffic on the HFST shall be controlled by pilot cars to a speed not exceeding 15 miles per hour for a period of 12 hours or as directed by the Engineer.

405-4.01 METHOD OF MEASUREMENT.

Work under this Section will not be measured.

405-5.01 BASIS OF PAYMENT. Add the following: Work under this section is subsidiary to 643(20) Detour, no separate payment will be made.

SECTION 501

STRUCTURAL CONCRETE

Special Provisions

501-1.01 DESCRIPTION. Add the following:

Class DS:	Drilled Shaft Concrete

501-2.01 MATERIALS. Add the following:

DS Aggregate	Subsection 703-2.13
DS Grout	Subsection 701-2.04
Elastomeric Pads	Section 720
Utiliduct	ASTM A53
RMC	Galvanized rigid conduit made of mild steel meeting UL standard UL-6
Bridge Seal	Subsection 705-2.03
Pourable Joint Sealant	Self-leveling, urethane sealant designed to seal expansion joints. Submit product information to the Engineer for approval.
Concrete Anchor Insert	Internally threaded insert for cast-in-place concrete capable of accommodating the safe working loads as indicated in this Contract. Submit product information to the Engineer for approval.

Use only Type I or Type II Portland Cement for bridge structure and foundations.

501-3.01 PROPORTIONING. Add the following numbered item:

6. DS Concrete. Use an AASHTO accredited laboratory to conduct trial mix and slump loss tests for Class DS Concrete and provide mix design supporting documentation. Provide 7 day and 28 day compressive strength data. Provide slump test data for 30 minutes, one hour and 5 hours after batching. Concrete mix must stay plastic for 5 hours. Perform slump and compressive tests at 40°F and at 70°F.

Add the following to Table 501-1, Class of Concrete:

	DS
Cement Content, sacks/yd^3, minimum	7.0
Water Cement Ratio, lbs/lbs, maximum	N/A
Slump Range, in Dry Hole Wet Hole	 7 +/- 1 8 +/- 1
Entrained Air Range, Percentage	None
Coarse Aggregate Gradation, AASHTO M43	No. 7
Compressive Strength, psi, min.	4000

501-3.02 ACCEPTANCE OF CONCRETE. Under Item 4. Test Methods. WAQTC FOP for AASHTO T121: Change "Air Content" to "Cement Content".

Under Item 5, Point of Acceptance, delete the last paragraph and substitute the following: Concrete failing to meet the maximum of the design strength indicated on the plans and the minimum compressive strength of Table 501-1 will be evaluated for structural adequacy and durability by the Engineer. If the Engineer finds the material to be adequate, payment will be adjusted according to Subsection 501-5.01.

Add the following to Item 7, Rejecting Concrete: Remove and replace all rejected concrete to the satisfaction of the Engineer and at no extra cost to the Department.

501-3.03 BATCHING. Under Item 2.Water. After the first sentence, add: Ensure that the accuracy is within 1%.

501-3.04 MIXING. Add the following to item number 3 immediately before the last paragraph: When carrying wash water on the truck mixer, carry it in a compartment separate from the one used for carrying or measuring the mixing water. The Engineer will specify the amount of wash or flush water, when permissible, and may specify a "dry" drum if wash water is used without measurement or without supervision.

501-3.08 PLACING CONCRETE. Add the following to Item 9(d) Strip Seals: Do not damage the strip seal or surrounding concrete when welding the sliding plate to the expansion joint assembly. Meet the welding requirements of Subsection 504-3.01.8.

Add the following numbered items:

15. Drilled Shaft Concrete Placement in Wet Hole. Place concrete immediately after placing shaft reinforcing steel and the Engineer has accepted shaft. Place shaft concrete in one continuous operation.

    Use the tremie or concrete pump method.

    a. Tremie Method. Use a tremie with an inside diameter of at least 10 inches that is watertight. Construct the tremie line so that it will

readily discharge concrete. Construct the discharge end of the tremie to prevent water intrusion and permit the free flow of concrete during concrete placement. Use valves, bottom plates or plugs so that concrete discharge can begin within one tremie diameter of the base.

Ensure that the tremie has sufficient length and weight to rest on the shaft bottom before starting concrete placement.

Place the discharge orifice of the tremie at least 8 feet below the concrete surface. Monitor the concrete level during the pour to ensure that the tremie discharge orifice remains below the concrete level throughout concrete placement. Maintain a continuous flow of concrete and a positive pressure differential of the concrete in the tremie at all times to prevent water or slurry intrusion into the shaft concrete.

Support the tremie so that it can be raised to increase the discharge of concrete and lowered to reduce the discharge of concrete. Do not rapidly raise or lower the tremie to increase the discharge of the concrete.

Ensure that the free fall of concrete into the tremie intake is less than 5 feet.

b. Concrete Pump Method. Use concrete pump lines that are greater than 5 inches in diameter and that are watertight. Do not use aluminum pump lines. Arrange pump lines to minimize the number of bends in the line. Construct the discharge end of the pump line to prevent water intrusion and permit the free flow of concrete during placement operations. Ensure that the pump line has sufficient length and weight to rest on the shaft bottom before starting concrete placement.

Do not begin concrete placement until pump line discharge orifice is at the base of the shaft. Prevent the pump line from moving during the initial concrete placement. Maintain a continuous flow of concrete and a positive pressure differential of the concrete in the pump line at all times to prevent water or slurry intrusion into the shaft concrete. Pump concrete continuously without producing air pockets.

Place the discharge orifice of the concrete pump line at least 8 feet below the concrete surface. Monitor the concrete level during the pour to ensure that the pump line discharge orifice remains below the concrete level throughout concrete placement. Temporarily reduce the pump line pressure when repositioning the pump line from one level to the next higher level.

Ensure that the free fall of concrete into the hopper is less than 5 feet.

Provide operational standby equipment adequate to complete concrete placement in the time specified. The standby concrete placement equipment must be located at the job site during shaft concrete placement operations.

If at any time the tremie or pump line discharge orifice is above the fluid concrete surface the shaft will be considered defective. Immediately terminate concrete placement operations and notify the Engineer. With the approval of the Engineer, implement the action plan to rectify the defect as defined in the Drilled Shaft Installation Plan defined in Section 514-1.05. All costs associated with replacement or repair of defective shafts are the responsibility of the Contractor. Implement repair or replacement of defective shafts at no cost to the Department.

Placement of shaft concrete without mechanical vibration is permitted except that the top 5 feet of the shaft must be mechanically vibrated.

Place shaft concrete within the time limits identified in Table 501-3, Shaft Pour Time Limit. The elapsed time for placing drilled shaft concrete includes the concrete mixing time, transit time, and concrete placement time. Maintain the minimum specified slump throughout the elapsed time. **Lower shaft concrete pour rates will be considered by the Engineer if you can show that all of the shaft concrete will maintain the minimum slump specified in Table 501-1 throughout the entire shaft pour operation. Submit requests to lower the shaft concrete pour rate to the Engineer for approval. Provide additional slump test data, specified in Subsection 501-3.01.6, for the total elapsed time after batching (including mixing, transit and placement time) calculated for the shaft pour operation at the lower placement rate.**

Discontinue shaft concrete placement after good quality concrete is evident at the top of the shaft. Good quality concrete shall be concrete of the same consistency, appearance, and quality as that concrete being placed in the tremie and/or pump intake and as accepted by the Engineer. Remove concrete laitance during or immediately after concrete placement operations have ended.

Do not expel water and concrete from the top of the shaft into the channel.

Provide a process control plan to the Engineer for approval. The process control plan must include testing of concrete air content and slump values as specified in the concrete mix design. A Western Alliance of Quality Transportation Construction (WAQTC) certified technician must perform the testing. Test every load of concrete before sending truck to discharge. Record process control data on each delivery ticket.

If an unexpected delay occurs in concrete placement, reduce the rate of shaft concrete placement. In the event that unexpected delays occur, the Engineer may restrict placement of concrete older than 90 minutes from the time of batching into the shaft.

TABLE 501-3
SHAFT POUR TIME LIMIT

Pier Number	Pier 2	Pier 3	Pier 4	Pier 5	Abutment 6
Maximum Time	3h 15m	4h 30m	4h 15m	3h 0m	1h 30m

Times are based on a shaft concrete pour rate of 25 feet per hour.

16. Drilled Shaft Concrete Placement in Dry Hole. Place concrete immediately after placing shaft reinforcing steel and the Engineer has accepted shaft. Place shaft concrete in one continuous operation.

Placement of shaft concrete without mechanical vibration is permitted except that the top 5 feet of the shaft must be mechanically vibrated.

Provide a process control plan to the Engineer for approval. The process control plan must include testing of concrete air content and slump values as specified in the concrete mix design. A Western Alliance of Quality Transportation Construction (WAQTC) certified technician must perform the testing. Test every load of concrete before sending truck to discharge. Record process control data on each delivery ticket.

Remove all water from the excavation prior to placing concrete. Use the Wet Hole concrete placement procedures if the Engineer determines that dewatering the shaft excavation is not practical.

Do not expel concrete from the top of the shaft into the channel.

Use the tremie, concrete pump,or free fall method.

a. Tremie Method. Ensure that the tremie for depositing concrete in a dry drilled shaft excavation consists of a tube of solid construction, a tube constructed of sections that can be added and removed, or a tube of other approved design. Use a tremie with an inside diameter of at least 10 inches.

Pass concrete through a hopper at the top of the tube or through side openings as the tremie is retrieved during concrete placement. Ensure that the free fall of concrete into the tremie intake is less than 5 feet.

b. Concrete Pump Method. Use concrete pump lines that are greater than 5 inches in diameter. Do not use aluminum pump lines.

Do not permit free falling concrete from the discharge end of the pump line to strike the sides of the shaft, reinforcing steel cage, or any other obstruction. Reduce the height of free fall and/or the rate of concrete flow if the concrete strikes the sides of the shaft, reinforcing steel cage, or any other obstruction.

Ensure that the free fall of concrete into the hopper is less than 5 feet.

Provide operational standby equipment adequate to complete concrete placement. The standby concrete placement equipment must be located at the job site during shaft concrete placement operations.

c. Free Fall Method. Provide a centering drop chute at least three feet long.

Do not permit free falling concrete to strike the sides of the shaft, reinforcing steel cage, or any other obstruction. Reduce the height of free fall and/or the rate of concrete flow if the concrete strikes the sides of the shaft, reinforcing steel cage, or any other obstruction.

17. Grouting Permanent Metal Casing. Submit the grout placement procedure to the Engineer for approval.

Use DS Grout as specified in Subsection 701-2.04 or other grout approved by the Engineer.

For casings installed in oversized holes or where gaps exist between the shaft excavation and the casing, grout the zone between the casing and the soil after placing the concrete. Grout the casing the full depth of the shaft. Use at least six grout placement tubes placed uniformly around the perimeter the full length of the casing. Grout the casing in one continuous operation. Withdraw the grout tubes vertically during grout placement operations. Provide at least two water relief/release pipes on opposite sides of the casing. Withdraw the water relief/release pipes vertically during the grout placement operations.

501-3.09 FINISHING CONCRETE SURFACES. Delete the first paragraph and replace with the following: Comply with the requirements of Item 2, Rubbed Finish, for all vertical concrete surfaces exposed in the completed work. Exposed surfaces extend to at least 1 foot below the finished ground line. Give all other concrete surfaces an ordinary finish unless otherwise noted in the Contract document.

501-3.11 PRECAST CONCRETE MEMBERS. Add the following numbered items:

7. Alternate Design. You may submit an alternative design for prestressed girders for approval. Make such substitutions and necessary modifications to other portions of the structure to accommodate the substituted girders without extra compensation and at no adjustment in unit prices or pay quantities. Follow the AASHTO LRFD Bridge Design Specifications, with latest interim specifications and as modified in this specification, for alternate girder designs. Have the alternate design sealed by a professional engineer registered in the State of Alaska.

Proportion alternate girder designs for zero tension stress at the Service III limit state after losses have occurred. Do not use girder designs that use lightweight concrete. Design girders for 50 psf dead load due to wearing surface. When concrete deck slabs are cast integral with the girders, provide at least 2¼ inches of concrete cover above the top mat of deck slab reinforcing steel. Where required, construct cast-in-place curb and sidewalks after erecting the girders. Base alternate designs on the prestressing losses outlined in the AASHTO LRFD Bridge Design Specifications.

8. Girder Inserts. Provide threaded inserts, coil anchors, or approved equal as indicated on the Plans and as required to accommodate utility supports and navigation lighting mounts.

   The Contractor may provide additional inserts in the girder to accommodate diaphragm forms or other construction related requirements.

   Provide holes in the girder web as indicated on the plans to accommodate reinforcing steel. Verify that the hole size provided will accommodate reinforcement placement procedures.

   Show the type and location of all inserts and holes on the shop drawing.

9. Tolerances: Conform to the following dimensional tolerances:

   a. Length: ±3/4 inch (±1 inch for girders longer than 100 feet).

   b. Girder Width (overall): ±1/4 inch, subject to item "k" below.

   c. Depth: ±1/4 inch.

   d. Width of Webs, Stems and Bottom Flanges: -1/8 inch to +3/8 inch.

   e. Flange Thickness: -1/8 inch to +1/4 inch.

   f. Horizontal Alignment (deviation from straight line parallel to centerline of member): 1/2 inch, subject to item "k" below.

   g. Camber: Do not vary from approved camber more than ±1/8 inch per 10 feet of length with a maximum of 1 inch. In addition, the camber of any girder may not differ from that of any other girder by more than 1 inch.

   h. Position of Tendons: ±1/4 inch (±1/2 inch where harped strands exit the member).

   i. Longitudinal Position of Deflection Point for Deflected Strands: ±12 inches.

   j. Position of Weld Plates: ±1 inch measured along joint. ±1/8 inch transverse to joint.

k. Deck Width (measured out-to-out of all girders in the span): +2 inches, except not more than +1/2 inch where more precision is dictated by substructure details such as anchor bolts, parallel wingwalls, etc.

l. Parallelism of Top and Bottom Flanges: Except where shown on the plans, do not vary the depth of any deck type girder at any transverse cross section more than 1/4 inch, when measured perpendicular from a line coincident with the surface of the bottom flange(s) to the deck surface at the edges of the girder.

501-3.12 BACKFILLING AND OPENING TO TRAFFIC. Delete this subsection in its entirety and replace with the following:

501-3.12 PROTECTION OF IN-PLACE CONCRETE. Protect in-place concrete at all times. Do not apply loads to the structural member until the member has attained sufficient strength, with necessary supplemental support, to safely carry the applied loads without damage. Unless otherwise noted, sufficient strength is attained after the concrete has cured at least 7 days and has a compressive strength of at least 80% of the specified 28-day strength.

During the curing period, protect concrete from damaging mechanical disturbances including load stresses, shock, and harmful vibration. Protect concrete surfaces from damage by construction traffic, equipment, materials, rain or running water, and other adverse weather conditions.

The Engineer may reject any structure or portion of a structure containing concrete that is cracked, spalled, or otherwise damaged.

Do not backfill against concrete structures until the concrete has attained a compressive strength of at least 80% of the specified 28-day strength.

Obtain written authorization from the Engineer before driving construction-related equipment or storing materials on the bridge. Keep the bridge closed to traffic until all concrete has been accepted. Obtain written authorization from the Engineer to open the bridge to traffic.

The Engineer will determine the compressive strength from informational test cylinders cured on the site under temperature and moisture conditions similar to the concrete in the structure.

501-4.01 METHOD OF MEASUREMENT. Add the following:

Linear Foot. Height from the bottom of shaft elevation shown on the plans to the top of shaft elevation shown on the plans.

501-5.01 BASIS OF PAYMENT. Delete the second paragraph and replace with the following: The following items are subsidiary to prestressed concrete members: Concrete, reinforcing steel contained in the members (uncoated and/or epoxy coated), prestressing steel, plates, nuts, and all other inserts contained within the member, bolts, studs, anchor bars, blockouts, and other miscellaneous

steel embedded in or attached to the members or diaphragms, steel reinforced elastomeric bearing pads, grout, and expanded polyethylene.

Add the following after the third paragraph: No separate payment will be made for concrete required for the PRV facility. Payment for concrete required for the PRV facility structure will be paid for under Section 627.

Payment for concrete encasement of the sewer pipe required to Lower Existing Water Main for Sewer Crossing will be paid for under item 627(14).

Delete the fourth paragraph beginning "Concrete Price Adjustment" and replace with the following:

Concrete Price Adjustment. Payment for concrete which fails to meet specified acceptance level requirements and has been found to be adequate by the Engineer per Subsection 501-3.02.5 will be adjusted according to the following formula:

$$\text{Pay adjustment} = \frac{-2(f'c - fc)(PAB)(Q)}{f'c}$$

Where: f'c = Specified minimum 28-day compressive strength measured in psi
fc = Compressive strength as determined by the minimum individual strength test in psi
Q = Total quantity of concrete, in cubic yards, placed during the concrete placement operation from which the minimum individual strength test was obtained

* PAB is the Contract unit price for the class of concrete involved. Where the Contract basis of payment for concrete is other than by unit price, PAB is $1000.

Add the following: All material contained within, embedded in or attached to concrete elements including expanded polyethylene, utiliducts, utiliduct caps, expansion joints, PVC conduit, inserts, and attachments are subsidiary to Class A Concrete.

Class DS Concrete will be paid for at the contract unit price per linear foot as determined in Subsection 501-4.01.

DS Grout (Drilled Shaft Grout) will not be measured for payment. The quantity of DS Grout indicated on the plans will not be adjusted for payment regardless of increase or decrease in the amount of grout required.

Concrete at Structure S1-4 is subsidiary to 604 items.

Add the following pay items:

Pay Item	Pay Unit
501(7A) Prestressed Concrete Member (66"x136'-3" Bulb-Tee)	Each

501(7B) Prestressed Concrete Member (66"x136'-3" Bulb-Tee, Tapered Flange)	Each
501(9A) Class DS Concrete (9'-0" Diameter)	Linear Foot
501(9B) Class DS Concrete (4'-0" Diameter)	Linear Foot
501(10) DS Grout	Lump Sum

SECTION 502

PRESTRESSED CONCRETE STRUCTURES

Special Provisions

502-2.01 MATERIALS. In the second paragraph, delete the words "as determined by ASTM C 271"and substitute "as determined by ASTM D 3575, Suffix W, Method B."

502-3.02 FABRICATION.
Tensioning. In paragraph 5, change "80 percent" to "70 percent" and "(0.8f's)" to "(0.7f's)".

Grouting. Add the following: Pressure placed on grout shall not exceed 100psi.

502-3.03 TOLERANCES. Delete this subsection in its entirety.

SECTION 503

REINFORCING STEEL

Special Provisions

503-3.02 PROTECTION OF MATERIALS. Delete the second paragraph and replace it with the following:

Do not damage epoxy-coated bars. When handling coated steel reinforcing bars, avoid bundle-to-bundle or bar-to-bar abrasion. Use padded bundling bands. Handle epoxy-coated bars using equipment with padded contact areas. Lift bundles with a strongback, multiple supports, or a platform bridge to prevent bar-to-bar abrasion from sags in the bar bundle. Do not drop or drag the bars or bundles. Off-load bars as close as possible to their points of placement to minimize re-handling.

Store epoxy-coated bars off the ground. When stacking is necessary, place timbers between bundles. Place supports sufficiently close to prevent sags in the bundles. Store coated and uncoated bars separately.

Protect epoxy-coated bars from sunlight, salt spray, and weather exposure. Cover coated bars and bundles with opaque polyethylene sheeting or other protective material. Secure covering and allow air circulation to minimize condensation under the covering.

The Engineer will reject epoxy-coated reinforcing when the extent of damaged coating exceeds 2 percent of the surface area in any 1 foot length of bar. When the extent of damaged coating does not exceed 2 percent of the surface area in any 1 foot length of bar, repair all damaged coating with patching material conforming to ASTM A 775 and in accordance with the material manufacturer's recommendations. Apply patching material in conformance with the written instructions furnished by the patching material manufacturer. Remove all rust prior to application of the patching material. Allow the patching material to cure before placing concrete.

At all times, protect mechanical splice assemblies, headed bar assemblies, and connecting elements (including reinforcing bar ends) against physical damage and corrosion. Keep assemblies and connecting elements clean and free of deleterious material such as grease, oil, wax, paint, or other foreign materials that adversely affect fabrication or performance. The Engineer will reject mechanical butt splice assemblies, headed bar assemblies, or reinforcing steel that has sustained physical damage or corrosion at any time.

503-3.03 BENDING. Remove this subsection in its entirety and replace with the following:

503-3.03 FABRICATION. Fabricate reinforcing bars to the size and dimension shown in the Contract documents. Reinforcing steel dimensions shown are out-to-out of bar, unless otherwise noted. Do not substitute bars of different size

without prior approval of the Engineer.

Meet fabrication tolerances in ACI 315, *Details and Detailing of Concrete Reinforcement.*

Bend bars when they are cold. Do not field bend bars that are partially embedded in concrete except as shown on the Plans. If the Engineer approves applying heat for field bending reinforcing bars, take precautions to avoid materially altering the physical properties of the steel. Use hooks and bends that conform to the current CRSI *Manual of Standard Practice.*

503-3.04 PLACING AND FASTENING. Add the following: Space all reinforcing steel evenly unless otherwise noted. When reinforcing steel bar spacing is shown on the Plans, place all bars within 1/2 inch of the plan position but do not decrease the minimum clear cover requirements.

Tie the bars with No. 14 or No. 16 gauge steel wire. Tie the bars at all intersections around the perimeter of each mat. Elsewhere, tie the bars at not less than 2-foot centers or at every intersection, whichever is greater. Obtain the Engineer's written authorization before welding reinforcing steel.

Delete the last paragraph in its entirety.

503-3.05 SPLICING. Remove this section and replace with the following: Do not splice reinforcing steel bars in "no splice zones" as designated on the Plans.

Splice straight reinforcing bars using lap splicing, welded butt joints, mechanical butt splicing, welded lap splicing, or mechanical lap splicing. Do not use lap splicing for reinforcing bars greater than 1-1/2 inches in diameter.

Splice spiral and circular hoop reinforcing bars using welded butt joints, welded lap splicing or mechanical lap splicing. Anchor each end unit of spiral reinforcing bar by lapping the free end of the bar to the continuous spiral and using either a welded lap splice or a mechanical lap splice.

Stagger splices in adjacent reinforcing bars, unless otherwise shown on the plans or approved by the Engineer. Stagger lap splices a distance greater than the lapped splice length. Staggered butt splices at least 2 feet.

Reinforcing bars may be continuous at locations where splices are shown on the plans. Locate splices based upon using available commercial lengths where practicable except where shown otherwise in the plans.

Do not field weld epoxy coated reinforcing bars.

1. Lap Splicing.

    a. General: Splices made by lapping consists of placing the reinforcing bars in contact and wiring them together in such a manner as to maintain the alignment of the bars and to provide minimum clearances.

Provide a minimum clear distance of 2 inches between the spliced bars and the nearest adjacent bar. Do not reduce the minimum clearance to the surface of the concrete specified in Subsection 503-3.04, Placing and Fastening.

Use lapped splices that are the following minimum lengths:

Bar Size Designation	Nominal Diameter	Lap Splice Length
#4	1/2"	2'-1"
#5	5/8"	2'-7"
#6	3/4"	3'-2"
#7	7/8"	3'-8"
#8	1"	4'-2"
#9	1-1/8"	5'-4"
#10	1-1/4"	6'-9"
#11	1-3/8"	8'-3"

For epoxy coated reinforcing bars, multiply the minimum lap splice length by 1.5.

b. Qualifications: No qualifications apply when lap splicing.

c. Testing/Inspection: Field verify lap splice length.

2. Welded Butt Joints.

a. General: Butt joints in reinforcing bars shall be complete joint penetration (CJP) groove welds conforming to the requirements in AWS D1.4-98 except as noted below.

Use the joint details and dimensions as shown in Figure 3.2 (A) (B) (D) and (E), "Direct Butt Joints" of AWS D1.4-98. Do not use split pipe backing.

Use electrodes classified as "Nickel-Steel" as referenced in AWS A5.5, A5.28, or A5.29.

Preheat reinforcing bars in accordance with AWS D1.4-98 for a distance of not less than 6 inches on each side of the joint prior to welding. Protect welding areas from air currents, drafts and precipitation to prevent loss of heat or loss of arc shielding. Submit the method of protection of the welding area to the Engineer for approval.

Submit all AWS required test assemblies to the Engineer.

b. Qualifications: The operator and procedure qualification tests may be performed simultaneously.

Submit a welding plan to the Engineer for approval. The welding plan must consist of at least the following items:

Qualifications of Quality Control (QC) Inspector(s).
Welding Procedure Specifications (WPS).
Procedure Qualification Records (PQR), if applicable.
Welder Performance Qualification Records (WPQR).
Type and extent of Nondestructive Examination (NDE) to be performed.

c. Testing/Inspection:

(1) Shop Welds: When complete joint penetration groove welded joints are used, furnish job control tests from a qualified testing laboratory. A job control test consists of the fabrication, under conditions used to produce the splice, and the physical testing of six (6) sample splices for each lot of 150 splices. The Engineer or Engineer's authorized representative will designate when samples for job control tests are to be fabricated and will determine the limits of the lot represented by each job control test.

A lot of shop produced complete joint penetration welded butt joints is defined as 150, or fraction thereof, of the same type of welds used for each combination of bar size and bar deformation pattern that is used in the work.

A sample splice consists of a splice to connect two 30 inches, or longer, bars using the same splice materials, position, location and equipment, and following the same procedures as are being used to make splices in the work. Shorter sample splice bars may be used if approved by the Engineer.

The Engineer or the Engineer's authorized representative shall witness tests performed by a commercial agency.

Identify sample splices with weatherproof markings prior to shipment to the testing laboratory.

Should the average of the results of tests made on the 6 sample splices or should more than one sample splice in any job control test fail to meet the requirements for splices, all splices represented by that test will be rejected and will be replaced at the Contractor's expense.

(2) Field Welds: All field welded complete joint penetration direct butt joints may be subjected to nondestructive examination using radiographic examination (RT) in accordance with AWS D1.1:2002, Section 6, except for Section 6.17, RT Procedures. The standards of acceptance shall be in accordance with AWS D1.4-98, Section 4.4.2 and Section 4.4.8.

Perform radiographic examinations on a random sample of 25 percent of the total number of direct butt joint welds. The Engineer will select the direct butt joints that will compose the sample. Test sample joints in the presence of the Engineer or the Engineer's authorized representative.

If more than three (3) butt joints that have been radiographically examined are defective, examine a second random sample of 25 percent of the total number of direct butt joint welds. If more than three (3) direct butt joints that have been radiographically examined in the second sample are defective, radiographically examine all remaining direct butt joints.

Repair all weld defects in accordance with the requirements of AWS D1.4-98.

Provide sufficient access to the job site to permit the Engineer or the Engineer's authorized representative to perform any additional inspection or testing.

Notify the Engineer in writing 48 hours prior to performing any radiographic examinations.

Make two exposures for each complete joint penetration direct butt joint. For each of the exposures, center the radiation source on each bar to be radiographed. Make the first exposure with the radiation source placed at zero degrees from the top of the weld and perpendicular to the weld root and identify with a station mark of "0". Make the second exposure at 90 degrees to the "0" station mark and identify with a station mark of "90".

Clearly identify each direct butt joint on each radiograph. Establish the radiograph identification and marking system with the Engineer before radiographic inspection begins. Identify film using lead numbers and letters. Do not use etching, flashing or writing to identify film. Legibly mark each piece of film with identification information including, as a minimum, the following information:

Contractor's name
Date
Name of nondestructive testing firm
Initials of radiographer
Weld number

Identify a repaired weld by placing the letter "R" followed by the weld repair number on the radiographic film using lead numbers and letters.

Record the results of all radiographic interpretations on a signed certification. Keep a copy of the certification with the film packet.

3. Mechanical Butt Splices.

a. General: Use one of the following types of mechanical butt splices:

(1) Sleeve-Threaded Mechanical Butt Splices: The sleeve-threaded type of mechanical butt splices consists of a steel splice sleeve with tapered interior threads that joins the reinforcing bars with matching tapered threads. Taper the threads to such a degree that cross threading will not occur during assembly.

Mark each splice sleeve with the heat treatment lot number.

After completion of assembly, tighten the splice to a torque value recommended by the manufacturer for reinforcing bars smaller than one (1) inch in diameter and to a torque value of not less than 2400 in-lbs for reinforcing bars equal to or greater than one (1) inch in diameter.

(2) Sleeve-Swaged Mechanical Butt Splices: The sleeve-swaged type of mechanical butt splices consists of a seamless steel sleeve applied over the ends of the reinforcing bars and swaged to the bars by means of a hydraulic press.

(3) Sleeve-Lockshear Bolt Mechanical Butt Splices: The sleeve-lockshear bolt type of mechanical butt splices consists of a seamless steel sleeve, 2 serrated steel strips welded to the inside of the sleeve, center hole with centering pin, and bolts that are tightened until the bolt heads shear off, and the bolt ends are embedded in the reinforcing bars.

(4) Two-Part Sleeve-Friction Bar Mechanical Butt Splices: The two-part sleeve-friction bar type of mechanical butt splices consists of a shop machined two-part threaded steel sleeve whose ends are friction welded, in the shop, to the reinforcing bars ends.

Engineer's approval of a mechanical butt splice will be based upon manufacturer's technical data, test results, and other necessary proof of satisfactory performance. Engineer's approval will also be based upon the successful results of tests performed by the Department on sample splices and splice material furnished by the manufacturer. Resubmit a design for approval if there is any change in the

details or materials previously submitted and on file.

Do not exceed a total slip of the reinforcing bars within the splice sleeve, after loading in tension to 29000 psi and relaxing to 2900 psi, of 10 mils for reinforcing bars 1.69 inches in diameter and smaller and 30 mils for reinforcing bars 2.257 inches in diameter. Measure the slip between gage points clear of the splice sleeve.

Conform with the manufacturer's recommendations when splicing, except as modified in this section. Make splices using the manufacturer's standard equipment, jigs, clamps and other required accessories.

Cut square the ends of reinforcing bars to be spliced.

Provide a clear cover of not less than 1-1/2 inches measured from the surface of the concrete to the outside of the splice sleeve. Adjust stirrups, ties and other reinforcement if necessary to provide clear cover.

Furnish the following information for each shipment of splice material for review and approval by the Engineer:

The type or series identification of the splice material. The heat treatment lot number for sleeve-threaded type sleeves.

The bar grade and size number to be spliced by the material.

A copy of the manufacturer's catalog giving complete data on the splice material and procedures.

A statement that the splicing systems and materials used in accordance with the manufacturer's procedures will develop not less than a minimum tensile strength of 80000 psi, based on the nominal bar area, and will comply with the total slip requirements and the other requirements in these specifications.

A statement that the splice material conforms in all respects to the details and materials of a specific approved design.

b. Qualifications: Qualify procedures to be used in making splices in reinforcing bars by tests performed by the Contractor on sample splices of the type to be used, before making splices to be used in the work.

Each operator qualification test for mechanical splices consists of

two (2) sample splices. Each mechanical splice procedure test consists of two (2) sample splices.

For sleeve-threaded, sleeve-lockshear bolt and two-part sleeve friction bar mechanical butt splices, make sample splices on the largest reinforcing bar size to be spliced by the procedure or operator being tested, except that 1.69 inch diameter bars may be substituted for 2.257 inch diameter bars.

For sleeve-swaged mechanical butt splices, make sample splices on the largest reinforcing bar size of each deformation pattern to be spliced by the procedure or operator being tested.

Consider each operator qualified for mechanical splicing of reinforcing bars of a given size qualified for all reinforcing bar sizes smaller than those used in making the tests.

Perform a separate operator qualification test or procedure test for each mechanical splicing position and procedure that the operator is expected to use on the work.

Mechanical splice procedures and operators may be approved by the Engineer based upon approval of previous tests performed on appropriate sample splices.

Completed sample splices shall be at least three feet long with the splice at mid-length. Make and test the sample splices in the presence of the Engineer or the Engineer's authorized representative.

The Engineer or the Engineer's authorized representative shall witness tests performed by a commercial agency.

c. Testing/Inspection: When mechanical butt splices are used, furnish job control tests from a qualified testing laboratory. A job control test consists of the fabrication, under conditions used to produce the splice, and the physical testing of six (6) sample splices for each lot of 150 splices. The Engineer will designate when samples for job control tests are to be fabricated and will determine the limits of the lot represented by each job control test.

A lot of mechanical butt splices is defined as 150, or fraction thereof, of the same type of mechanical butt splices used for each combination of bar size and bar deformation pattern that is used in the work.

A sample splice consists of a splice made to connect two 30 inch, or longer bars using the same splice materials, position, location and equipment, and following the same procedures as are being used to make splices in the work. Shorter sample splice bars may be used if approved by the Engineer.

Make and test the sample splices in the presence of the Engineer or the Engineer's authorized representative.

Suitably identify sample splices with weatherproof markings prior to shipment to the testing laboratory.

For sleeve-threaded mechanical butt splices, fabricate the reinforcing bars to be used for job control tests on a random basis during the cutting of threads on the reinforcing bars of each lot and ship to the job site with the material they represent.

Should the average of the test results for the 6 sample splices or should more than one sample splice in any job control test fail to meet the requirements, all splices represented by that test will be rejected and replaced at the Contractor's expense.

4. Welded Lap Splicing.

a. General: Make welded lap splices conforming to the details shown on the plans and the following requirements:

Conform to the requirements of AWS D1.4-98 except as modified in these specifications.

For the SMAW process, purchase electrodes in hermetically sealed containers or dry electrodes for 2 hours at 450°F to 500°F before use. Immediately after removal from hermetically sealed containers or from drying ovens, the store electrodes in ovens held at a temperature of at least 250°F. Redry electrodes not used within 4 hours after removal from hermetically sealed containers or from drying or storage ovens before use.

Do not weld in inclement or wet weather without satisfactory protection.

Flare welds may be made in one pass.

Tack welding for alignment purposes will be permitted when the subsequent weld will consume the tack weld.

Individual hoops, made continuous with welded butt joint splices, may be substituted for bar spiral reinforcement.

Do not exceed a deviation in the alignment of reinforcing bars at a welded lap splice of more than 1/16 inch over a one foot length of bar.

b. Qualifications: Qualify welders and weld procedures in conformance with the requirements in AWS D1.4-98.

Before making splices to be used in the work, qualify procedures to be used in making splices in reinforcing bars and welders and

operators employed to make splices in reinforcing bars by testing sample splices of the type to be used.

Submit a welding plan to the Engineer for approval. The welding plan includes, but is not limited to:

Qualifications of Quality Control (QC) Inspector(s)
Welding Procedure Specifications (WPS)
Procedure Qualification Records (PQR), if applicable
Welder Performance Qualification Records (WPQR)
Type and extent of Nondestructive Examination (NDE) to be performed.

c. Testing/Inspection: Visual inspection of completed welds shall show no evidence of cracks, lack of fusion, undercutting, excessive piping, porosity or inadequate size.

Completed lap splices shall develop a minimum tensile strength, based on the nominal bar area, of 80000 psi for ASTM A706 bars.

5. Mechanical Lap Splicing.

a. General: The mechanical lap splice unit consists of a sleeve, in which the reinforcing bars are positioned, and a wedge driven through holes in the sleeve and between the reinforcing bars. Only use the mechanical lap splice for splicing non-epoxy-coated deformed reinforcing bars less than 3/4 inch in diameter.

Engineer's approval of a mechanical butt splice will be based upon manufacturer's technical data, test results, and other necessary proof of satisfactory performance. Engineer's approval will also be based upon the successful results of tests performed by the Department on sample splices and splice material furnished by the manufacturer. Resubmit a design for approval if there is any change in the details or materials previously submitted and on file. Slip requirements do not apply to mechanical lap splices.

Conform with the manufacturer's recommendations when splicing, except as modified in this section. Make splices using the manufacturer's standard equipment, jigs, clamps and other required accessories.

Slip requirements to not apply to mechanical lap splices.

Provide a clear cover of not less than 1-1/2 inches measured from the surface of the concrete to the outside of the splice sleeve. Adjust stirrups, ties and other reinforcement if necessary to provide clear cover.

Furnish the following information for each shipment of splice material for review and approval by the Engineer:

i. The type or series identification of the splice material.
ii. The heat treatment lot number for sleeve-threaded type sleeves.
iii. The bar grade and size number to be spliced by the material.
iv. A copy of the manufacturer's catalog giving complete data on the splice material and procedures.
v. A statement that the splicing systems and materials used in accordance with the manufacturer's procedures will develop not less than a minimum tensile strength of 80000 psi, based on the nominal bar area, and will comply with the total slip requirements and the other requirements in these specifications.
vi. A statement that the splice material conforms in all respects to the details and materials of a specific approved design.

b. Qualifications: Before making splices to be used in the work, qualify procedures to be used in making splices in reinforcing bars by testing sample splices of the type to be used.

Test two (2) sample splices for each operator qualification test for mechanical splices. Test (2) sample splices for each mechanical splice procedure test.

For sleeve-swaged mechanical lap splices, make sample splices on the largest reinforcing bar size of each deformation pattern to be spliced by the procedure or operator being tested.

Consider each operator qualified for mechanical splicing of reinforcing bars of a given size qualified for all reinforcing bar sizes smaller than those used in making the tests.

Perform a separate operator qualification test or procedure test for each mechanical splicing position and procedure that the operator is expected to use on the work.

Mechanical splice procedures and operators may be approved by the Engineer, based upon approval of previous tests performed on appropriate sample splices.

c. Testing/Inspection: When mechanical lap splices are used, furnish job control tests from a qualified testing laboratory. A job control test consists of the fabrication, under conditions used to produce the splice, and the physical testing of six (6) sample splices for each lot of 200 splices. The Engineer will designate when samples for job control tests are to be fabricated and will determine the limits of the lot represented by each job control test.

A lot of mechanical lap splices is defined as 200, or fraction thereof, of the same type of mechanical lap splices used for each

combination of bar size and bar deformation pattern that is used in the work.

A sample splice consists of a splice made to connect two 30 inch, or longer bars using the same splice materials, position, location and equipment, and following the same procedures as are being used to make splices in the work. Shorter sample splice bars may be used if approved by the Engineer.

Make and test sample splices in the presence of the Engineer or the Engineer's authorized representative.

Suitably identify sample splices with weatherproof markings prior to shipment to the testing laboratory.

Should the average of the results of tests made on the 6 sample splices or should more than one sample splice in any job control test fail to meet the requirements for splices, all splices represented by that test will be rejected and will be replaced at the Contractor's expense.

503-5.01 BASIS OF PAYMENT. Delete the first paragraph and replace with the following: Price and payment will be full compensation for furnishing, placing, splicing, and testing reinforcing steel as indicated in this Contract. Increase in weight of reinforcing due to splices will not be paid for. All materials, equipment and labor required to splice reinforcement will be paid for under the contract lump sum price.

Add the following after the third paragraph: No separate payment will be made for reinforcing required for the PRV facility. Payment for reinforcing required for the PRV facility structure will be paid for under Section 627.

SECTION 504

STEEL STRUCTURES

Special Provisions

CONSTRUCTION REQUIREMENTS

Delete Section 504-3.01 item 8. and substitute the following:

504-3.01 FABRICATION.

8. Welding. Perform all welding and Nondestructive Examination (NDE) as specified or shown on the Plans. Conform to the most recent edition of the ANSI/AASHTO/AWS *Bridge Welding Code* D1.5 when welding new steel bridge girders, beams and stringers. Conform to the latest edition of the *Structural Welding Code* AWS D1.1 when welding all other steel structures.

   At least 30 days prior to welding, submit for approval a welding plan that has been signed and stamped by a Certified Welding Inspector (CWI) responsible for Quality Control (QC) and consisting of the following documents:

   a. Quality Control personnel qualifications listing CWI number.
   b. Welding Procedure Specifications (WPS) using forms in AWS D1.1, Sample Welding Forms.
   c. Procedure Qualification Records (PQR) when applicable, using forms in AWS D1.1, Sample Welding Forms
   d. Welder Performance Qualification Records (WPQR) using forms in AWS D1.1, Sample Welding Forms with the documentation of current welder certification
   e. Sample daily inspection sheet
   f. Type and extent of NDE to be conducted, as required in the specifications

   Perform all Quality Control inspection necessary to ensure the materials and workmanship meet the requirements of the contract documents using a CWI.

   Correct all deficiencies in materials and workmanship revealed by Quality Control and Quality Assurance inspections without additional compensation.

   Furnish all completed Quality Control inspection documents through the Engineer to Bridge Design or when specified the Quality Assurance representative designated by the State.

   Have all completed Quality Control inspection documents available on site

to the Quality Assurance representative.

deleteFollow Charpy V-notch impact test requirements as shown on the Plans, except that the impact energy values for filler metals must not be less than that of the base metals to be joined, when tested at the same temperature as the base metal.

SECTION 507

BRIDGE RAILING

Standard Modification

507-2.01 MATERIALS. Add the following:

Grout	Subsection 703-2.03

E12(6/30/04)

Add the following Section:

SECTION 514

DRILLED SHAFTS

Special Provisions

514-1.01 DESCRIPTION. Construct drilled shaft foundations where indicated in the plans. This work includes all labor, materials, equipment, incidentals and services necessary to perform all operations to complete drilled shaft installation.

514-1.02 QUALITY CONTROL. Provide a Quality Control Inspector to ensure that all materials, techniques and methods are suitable to meet or exceed the minimum requirements of the contract.

The Quality Control Inspector shall submit daily reports to the Engineer during drilled shaft installation and testing operations verifying the Contractor's compliance with requirements of the contract. Include field measurement data, procedural discrepancies, installation problems, names of personnel, equipment usage data, and all other significant information in the daily reports.

514-1.03 PERMITS. Conform to the requirements of the Department obtained permits when constructing drilled shafts and disposing of excavated materials. Obtain all other permits not obtained by the Department required to construct the drilled shafts and dispose of excavation materials.

514-1.04 QUALIFICATIONS. Comply with the experience qualification requirements of Subsection 514-1.05.1.

514-1.05 GENERAL REQUIREMENTS AND SUBMITTALS.

1. Submit the following documents for review and approval no more than one week after the Notice to Proceed:

   Contractor Experience Qualifications. Provide a list of three drilled shaft projects performed by the Drilled Shaft Contractor or Subcontractor in the previous ten years that involved drilling shafts of at least 8 feet in diameter and lengths similar to those indicated on the Plans. Experience must include drilled shaft projects in remote locations, in deep water (greater than 30 feet), and drilled through sand, gravel, large boulders and rock similar in strength and composition to those conditions expected at this project location. Provide the name and telephone number of a contact person at the agency or company for which the work was completed.

   Personnel Experience **Qualifications.** Provide a list of the key personnel involved in the drilled shaft construction. Include the name of the superintendent and of the superintendent's assistants who will be performing and directing the actual drilling operations. Include a resume of each superintendent and assistant

involved in drilled shaft construction indicating:

a. A minimum of five years experience in directing drilled shaft construction of which two years being in responsible charge or operating equipment proposed for this project.

b. The number of years of recent continuous relevant experience in performing similar drilling operations and operating the contractor proposed equipment for this job.

c. Detailed recent relevant experience (3 project minimum) including project description, date of work, actual work performed by individual, and a reference for each project including telephone number.

d. A list of relevant equipment operated including type of equipment and amount and nature of experience.

Only those personnel approved by the Engineer may work on the drilled shaft construction. The Engineer may suspend the drilled shaft work if the Contractor substitutes unauthorized personnel for authorized personnel during construction. If work is suspended due to unauthorized substitution of personnel, the Contractor shall be fully liable for all additional costs resulting from the suspension of work and no adjustment in contract time will be allowed.

2. Submit the following no less than 45 days prior to the anticipated start of drilled shaft construction for review and approval:

Drilled Shaft Installation Plan. Provide the installation plan for the drilled shaft foundations. Include the following:

a. Personnel Experience information identified in item number 2.
b. List the type, number and size of all proposed equipment, including cranes, barges, drills, augers, bailing buckets, final cleaning equipment, desanding equipment, slurry pumps, tremies, concrete pumps, casings, grout pumps, etc. Include manufacturer's recommended capacities for each piece of equipment.
c. Details and methods required for construction including temporary work structures and access roads.
d. Details of sequence of construction operations and sequence of shaft construction including dates and anticipated duration of work.
e. Details of shaft excavation methods, including methods to monitor excavation while drilling .
f. Details of provisions for processing and disposing of excavated materials and rock cuttings in accordance with permit requirements.
g. Procedure for maintaining correct horizontal and vertical alignment during shaft installation.
h. Casing diameter and thickness required but not less than that

indicated on the plans. Details of casing tip reinforcement.

i. Method to advance casing.
j. Methods and equipment proposed to prevent displacement of casing and/or shafts throughout shaft construction.
k. Details for obstruction removal.
l. The casing grouting plan and procedure if required.
m. Details of proposed methods to clean shaft after initial excavation.
n. Details of shaft reinforcement, including methods to ensure centering/required cover, reinforcement cage integrity during placement, placement procedures, cage support, tie downs, etc.
o. Details of concrete placement, including proposed operational procedures for concrete tremie or pump, concrete placement rates, initial concrete placement procedure, method for raising tremie during concrete placement, and overfilling of the shaft concrete. Also provide provisions to ensure proper final shaft cutoff elevation.
p. Action plan for correcting defects in the shaft. Defects include but are not limited to the following: tilted casing, partially or completely collapsed casing, partially or completely collapsed reinforcement cage, improper concrete placement, and equipment failure.
q. Required submittals, including shop drawing, mill certification and concrete mix designs.
r. Welding Quality Control plan conforming to the requirements of AWS D1.1:2002.
s. Details for CSL testing procedure including testing schedule, inspector's name, inspector's qualifications, required instrumentation and power sources.
t. Safety plan to be implemented to ensure employee safety. Provide worker safety procedures around the shaft excavation and in the shaft when personnel descend for inspection.
u. Details of environmental control procedures used to prevent loss of slurry, concrete or other shaft materials into waterways or other protected areas.
v. Wastewater and concrete disposal procedures.
w. Other information shown in the Plans, requested by the Engineer or deemed necessary by the Contractor.

The Engineer will evaluate the drilled shaft installation plan for conformance with the Contract Documents and will reject any portion of the plan that is unacceptable. Partial submittals will not be accepted for approval. Within 20 days after receipt of the complete plan, the Engineer will notify the Contractor of any additional information required and/or changes that may be necessary in the opinion of the Engineer to satisfy the Contract Documents. Submit agreed upon changes for reevaluation. The Engineer will notify the Contractor within 10 days after receipt of proposed changes of their acceptance or rejection. All approvals given by the Engineer are subject to trial and satisfactory performance in the field. Do not begin any drilled shaft work without an approved Drilled Shaft Installation Plan. Do not begin any drilled shaft work without the written

approval of the Engineer.

Identify all Critical Path Schedule Items in the drilled shaft installation plan. Provide adequate lead time to obtain concrete mix design approval and permanent metal casing delivery.

3. Submit the Crosshole Sonic Logging (CSL) results to the Engineer within 5 days of testing. Provide the following:

Crosshole Sonic Testing Report. A report that contains the following:

a. The CSL logs for all tested tube pairs. Identify the CSL log for each test tube pair indicating the orientation relative to the structure.
b. The traditional signal peak diagram (time versus depth).
c. The computed first pulse arrival time verses depth.
d. The computed pulse wave speed versus depth.
e. The computed relative pulse energy or amplitude versus depth.
f. Identification of defect zones, if any, on the CSL logs. Defect zones are defined by an increase in arrival time of more than 20% relative to arrival time in a nearby zone of good concrete.

514-2.01 MATERIALS. Use materials that conform to the following:

DS Concrete	Section 501
DS Grout	Subsection 701-2.04
Reinforcing Steel	Section 503
Steel for Casing	ASTM A709, Grade 50 or higher
CSL Tubes	ASTM A53

CONSTRUCTION REQUIREMENTS

514-3.01 GENERAL METHODS AND EQUIPMENT. Perform the excavations required for the shafts through all materials encountered to the dimensions and elevations shown in the Contract Documents. Use methods and equipment suitable for the intended purpose and the materials encountered. Provide equipment capable of constructing shafts to a depth equal to the deepest shaft shown in the plans plus three times the shaft diameter.

Construct drilled shafts according to the Contract Documents except when permitted otherwise by the Engineer. An alternate method of shaft construction may be proposed. Acceptance for other proposed shaft installation methods will be based upon the suitability of the method to the site conditions and the effect of the method on the structural system. Submit alternate methods of shaft construction to the Engineer for approval.

Maintain a construction method and soil log during shaft excavation. Submit copies of the log to the Engineer daily. Resolve all differences in the production logs between the Engineer and the Contractor within 24 hours of submittal to the Engineer. Provide at least the following items in the log:

1. Description and approximate top and bottom elevation of each soil or rock material encountered

2. Location of all obstructions and time spent removing the obstruction

3. Drilling penetration rate, down thrust, rotation speed, and torque

4. Seepage or groundwater

5. Remarks and comments

Barges, temporary work structures and roads may be required to install the drilled shaft foundation, piers, and bridge superstructure.

514-3.02 CONSTRUCTION METHOD. Use the permanent casing method.

Permanent Casing Method: Excavate through the casing and advance the casing until reaching the desired penetration. Overreaming the outside diameter of the casing before placing the casing may be necessary.

Casing may be placed in oversized holes and grouted in place using the pre-approved grouting procedure identified in Subsection 514-1.05. Grouting may include placement of a grout plug to seal the casing above the rock socket, as required due to the presence of fractured rock or unstable soil.

Vibratory and impact hammers may be used to advance casing. Casing that is driven or vibrated into place need not be grouted.

Oscillating and rotary type casing installation devices may be used with the Engineer's approval. Casing that is driven or vibrated into place need not be grouted.

After the concrete has cured a minimum of 7 days, cut the casing off at the prescribed elevation and leave the remainder of the casing in place.

514-3.03 POSITION AND ALIGNMENT. When drilling from a barge, provide a fixed template, adequate to maintain shaft position and alignment during all excavation and concreting operations. Do not use floating templates (attached to a barge). A fixed template for shafts drilled on land will not be required if the Contractor demonstrates satisfactorily to the Engineer that shaft position and alignment can be properly maintained. The Engineer will require a fixed template adequate to maintain shaft position and alignment during all excavation and concreting operations for shafts drilled on land when the Contractor fails to demonstrate to the Engineer's satisfaction that he can properly maintain shaft position and alignment without use of a template.

514-3.04 EXCAVATIONS AND EQUIPMENT. All shaft excavation from the mudline to the top of bedrock, including the rubble layer, is Unclassified Shaft Excavation. All shaft excavation from the top of bedrock to the bottom of the

shaft is Shaft Bedrock Excavation. Approximate mudline, approximate top of bedrock, and bottom of shaft elevations are shown on the Plans.

Shaft Bedrock Excavation begins when drilling operations using conventional equipment reach practical refusal. Practical refusal is defined as the point where the rate of hole advancement using earth augers with soil or rock teeth, drill buckets, and/or under reaming tools with the drilling equipment operating at maximum power, torque and downthrust, is less than 1 foot after 15 minutes of continuous drilling.

The Engineer will require Drilled Shaft Sidewall Overreaming when necessary.

1. Unclassified Shaft Excavation: all processes required to excavate a drilled shaft of the dimensions shown in the Contract Documents, completed and accepted. Include in the work all shaft excavation, whether the material encountered is soil, rock, boulders, weathered rock, stone, natural or man-made obstructions, or any other materials. Shaft Bedrock Elevation begins either when top of bedrock elevation is reached or when drilling operations using conventional equipment reach practical refusal. Practical refusal is defined as the point where the rate of hole advancement using earth augers with soil or rock teeth, drill buckets, and/or under reaming tools with the drilling equipment operating at maximum power, torque and downthrust, is less than 1 foot after 15 minutes of continuous drilling.

2. Shaft Bedrock Excavation: all processes required to excavate a drilled shaft of the dimensions shown in the Contract Documents, completed and accepted. Include in the work all shaft excavation, whether the material encountered is soil, rock, boulders, weathered rock, stone, natural or man-made obstructions, or any other materials. Payment for excavation below the point where Shaft Bedrock Excavation has been authorized will be for Shaft Bedrock Excavation only and will not include payment for Unclassified Shaft Excavation.

3. Drilled Shaft Sidewall Overreaming: the unclassified excavation required to enlarge the drilled shaft diameter to accommodate the installation of the permanent metal casing. Increase the shaft radius a maximum of 6 inches by overreaming.

If the Engineer determines that the material encountered while drilling the shaft excavation is unsuitable and/or is not the same as anticipated in the design of the drilled shaft, extend the drilled shaft excavations as required by the Engineer.

Dispose of unsuitable materials and excess materials that are removed from shaft excavations and deposit them at the bottom of the channel as nearly as possible to the location they were excavated from. Separate manufactured drilling muds and/or other admixtures from gravel, sand, and silt. Use a tremie tube system to deposit rocks, gravel, sand and silt material at the bottom of the channel. Dispose of drilling muds and/or other admixtures in a manner approved, in writing, by the Engineer and in accordance with applicable permit requirements.

Use excavation and drilling equipment having adequate capacity, power, torque, and downthrust to perform the work. Use excavation and overreaming tools of adequate design, size, and strength to perform the work. If the material encountered cannot be drilled using conventional earth augers and/or underreaming tools, provide special drilling equipment, including but not limited to rock augers, core barrels, rock tools, air tools, blasting materials, and other equipment as necessary to continue the shaft excavation to the size and depth required.

514-3.05 CASINGS. Use casings that are of ample strength to withstand handling and driving stresses and the pressure of concrete and surrounding earth materials. Reinforce the tip of the casing to ensure penetration through the rubble layer. Casing may be thickened or reinforced to withstand applied stresses. Internally brace casing during shipping.

Use casings that are smooth and water tight. Provide a casing that is continuous along the entire length of the shaft.

Ensure that the inside diameter of casing is not less than the specified size of shaft. Oversized casing may be used with the Engineer's approval. The Department will not provide extra compensation for excess concrete required to fill an oversize casing.

If the installed casing does not satisfy the requirements of Subsection 514-3.10, submit casing repair procedure to the Engineer for approval.

Galvanize casing from the top to a distance not less than 10 feet below the Mean Lower Low Water elevation. Galvanize according to AASHTO M111 and to a thickness of 4 mils. **Casings may be spray-metalized in accordance with the Structural Steel Painting Council (SSPC) Coating System Guide Number 23.00, Guide for Thermal Spray Metallic Coating Systems. Provide a minimum coating thickness of 10 mils on both the exterior and interior surfaces. Prepare all surfaces in accordance with SSPC-SP5, White Metal Blasting Cleaning. Do not galvanize the abutment drilled shaft casings.**

Special casing systems may be used with the Engineer's written approval. Design special casings so that no damage occurs to the drilled shaft foundation.

514-3.06 INSPECTION OF EXCAVATIONS Do not enter the shaft unless the casing is installed and adequate safety equipment and procedures have been provided.

Inspect the excavations for the following:

1. Dimensions and Alignment. Provide equipment for checking the dimensions and alignment of each shaft excavation. Verify the dimensions and alignment of the shaft excavation under the observation and direction of the Engineer. Check the following:

    a. Shaft excavation dimensions and alignment.
    b. Casing dimensions and alignment periodically throughout the installation process.
    c. Casing dimension and alignment in final position.

2. Depth. Reference the depth of the shaft during drilling using marks on the Kelly bar or other suitable methods. Measure final shaft depths with a suitable weighted tape or other approved methods after final cleaning.

3. Shaft Cleanliness Requirements. Clean the shaft so that at least 50 percent of the base of each shaft has less than ¾ inch of sediment at the time of concrete placement. Ensure that the maximum depth of sedimentary deposits or other debris does not exceed 1½ inches at any location on the bottom of the excavation. The Engineer will approve shaft cleanliness based on visual inspection for dry shafts. The Engineer will approve shaft cleanliness using divers, Shaft Inspection Device (SID) or other appropriate methods for wet shafts.

   Refer to Subsection 514-3.11 for SID requirements.

4. Casing. Visually inspect casings above water. Use a Shaft Inspection Device (SID), diver, or other methods as directed by the Engineer to examine the casings below water for defects.

   Refer to Section 514-3.11 for SID requirements.

514-3.07 REINFORCING STEEL CONSTRUCTION AND PLACEMENT.

1. Reinforcement Cage Construction and Placement: Tie all intersections of drilled shaft reinforcing steel with cross ties or "figure 8" ties. Use double strand ties or ties with larger tie wire when necessary. The Engineer will give final approval of the cage construction subject to satisfactory performance in the field.

   Assemble and place as a single unit the cage of reinforcing steel consisting of; longitudinal bars, ties, spirals, cage stiffener bars, crosshole sonic logging (CSL) tubes and all other components. Place the cage immediately after the Engineer inspects and accepts the shaft excavation and immediately prior to placing concrete. The Engineer will give final approval of the placement subject to satisfactory performance in the field.

2. Splicing Reinforcement Cage: If the bottom of the constructed shaft elevation is lower than the bottom of the shaft elevation in the plans, extend a minimum of one half of the longitudinal bars required in the lower portion of the shaft the additional length. Continue the tie bars throughout the extra depth and extend the stiffener bars to the final depth. Splice the longitudinal bar extensions as required.

3. Support, Alignment, and Tolerance: Tie and support the reinforcing steel in the shaft so that the reinforcing steel will remain within allowable tolerances as specified in Section 514-3.10.

Use concrete wheels or other approved, non-corrosive spacing devices near the bottom and at intervals not exceeding 15 feet up the shaft to ensure concentric spacing for the entire length of the cage. Do not use block or wire type spacers. Use a minimum of one spacer for each 30

inches of cage circumference.

Provide concrete or other Engineer-approved spacers at the bottom of the drilled shaft reinforcing cage. Maintain the specified distance between the bottom of the cage and the bottom of the shaft. Use one spacer per longitudinal bar unless directed otherwise by the Engineer. Use spacers sized to prevent vertical movement of the cage. Use spacers constructed of material equal in quality and durability to the shaft concrete. Submit spacer information to the Engineer for approval.

Check the elevation of the top of the steel cage before and after placing the concrete. If the cage is not maintained within the specified tolerances, correct it as approved by the Engineer. Do not construct additional shafts until modifying the reinforcement cage support in a manner satisfactory to the Engineer.

514-3.08 FLUID IN EXCAVATION AT TIME OF CONCRETE PLACEMENT. Prior to placing concrete in any shaft excavation, ensure that contaminated suspensions, which could impair the free flow of concrete from the tremie pipe, have not accumulated in the bottom of the shaft. Take samples of the fluid in the shaft from the base of the shaft and at intervals not exceeding 10 feet up the shaft, using an approved sampling tool. Ensure that the density of the fluid in the shaft excavation prior to concreting is less than 75 lb/ft^3. If desanding equipment is required, ensure that the sand content does not exceed 4 percent. Take whatever action is necessary to modify the fluid in the shaft excavation prior to placing the concrete to bring the fluid within the contract requirements.

514-3.09 CONCRETE PLACEMENT. Place concrete in accordance with Section 501 and the requirements herein.

At no expense to the Department, furnish the additional drilled shaft concrete (over the theoretical amount required to fill the shaft as shown in the Plans) required to complete filling shafts larger than required by the Plans or authorized by the Engineer.

If the pressure head is lost during concrete placement for any reason, the Engineer may direct the Contractor to perform integrity testing at no expense to the Department.

Cure the top surface of the shaft in accordance with Section 501.

Install grout in all voids between the casing and shaft excavation after placing shaft concrete. Grout permanent metal casing in conformance with the requirements of Section 501.

Pressure wash all concrete overflow from the outside surface of the shaft casing. Do not allow loose concrete and other debris generated during pressure washing the casing to flow into the channel.

514-3.10 CONSTRUCTION TOLERANCES. Conform to the following:

1. Ensure that the top of the drilled shaft is no more than 3 inches laterally from the position indicated in the plans.

2. Ensure that the vertical alignment of the shaft excavation does not vary by more than ¼ inch horizontally for each foot of depth.

3. After placing all the concrete, ensure that the top of the reinforcement cage is no more than 2 inches above and no more than 3 inches below plan position.

4. Ensure that the column and shaft reinforcement cages are concentric with the shaft within a tolerance of 1 inch. Ensure that concrete cover is within 1½ inches of the plan dimension.

5. Ensure that the top elevation of the drilled shaft concrete is within 1 inch of the top of shaft elevation shown in the plans.

6. Do not exceed a difference between the major and minor outside diameters at any point along the length of the permanent metal casing (out-of-roundness) of 1 percent of the nominal diameter. The circumference of the permanent metal casing shall not vary more than 3/16 inch from the nominal circumference.

7. Ensure that the cutting edges of excavation equipment are normal to the vertical axis of the equipment within a tolerance of ±3/8 inch per foot of shaft diameter.

8. The completed shaft excavation shall have a flat bottom as shown on the plans. The flat bottom of the shaft excavation shall be fully founded on rock and be level within ±3/8 inch per foot of shaft diameter.

9. Provide a solid concrete shaft without voids or sections of unsound concrete as determined by Crosshole Sonic Logging.

514-3.11 INSTRUMENTATION AND DATA COLLECTION.

1. Shaft Inspection Device: The Engineer may use a Shaft Inspection Device (SID) comprised of a television camera sealed inside a watertight jacket to inspect the bottoms of the shafts. Cooperate with the Engineer in using this device. Place the device in position for inspection and removing it after the inspection. Furnish 110 V single-phase current (minimum 30 A service), 220 V single- phase current (minimum 15 A service), and a 150 psi compressor (230 in^3/s minimum) to operate the SID.

   Notify the Department at least ten days prior to the desired pick-up date. Notify the Department at least ten working days prior to returning the SID.

   The Contractor is responsible for the device from the time it leaves its storage area until the time it is returned. During this time, insure the device

against loss or damage for the replacement cost ($500,000 minimum) or for the full insurable value if replacement cost insurance is not available. Return the device in good working condition to its proper location within 30 days after completing drilled shaft installation.

2. Crosshole Sonic Logging. Provide crosshole sonic logging (CSL) inspection of all drilled shaft foundations along their entire lengths in accordance with Subsection 514-1.05. Provide an independent CSL inspector with at least three years experience in CSL testing to inspect the drilled shaft and prepare the CSL report.

Secure CSL tubes (steel pipes) to the inside of the reinforcing steel cage on regular intervals not exceeding 3 feet. Place CSL tubes as near parallel and plumb as possible and around the reinforcement cage perimeter as indicated on the plans. Extend the CSL tube from the bottom of the shaft to at least three feet above the top of the shaft or as directed by the Engineer.

Do not damage CSL tubes. Prior to beginning CSL testing, assure that the test probes can pass through every tube to the bottom. If a tube is obstructed, at your expense core a hole that is near to the obstructed tube and extends to its full depth. The corehole should be large enough to accommodate the CSL probe.

Prior to coring, submit to the Engineer for approval a coring plan including corehole locations and coring equipment and procedures. Provide for complete core recovery and minimize abrasion and erosion of the core. Place the core hole at a position in the shaft that will not produce damage to the reinforcing steel in the shaft. Log the corehole and submit the log to the Engineer. Indicate in the log voids and defects located in the core hole. Preserve the cores and make them available for inspection by the Engineer. Commence downhole testing with the corehole treated as an access tube.
CSL tubes shall be schedule 40 pipes that provide an inside diameter of at least 2 inches. Provide CSL tubes with smooth, regular inside surface free of defects and obstructions (including pipe joints) to permit the free movement of a 1¼ inch diameter probe over the entire length of the tube.

Use mechanical couplers to extend CSL tubes. Seal all CSL tube joints. Do not weld CSL tube joints.

CSL tubes must be watertight. Provide a watertight cap at the bottom of the CSL tube. Provide a watertight, removable cap at the top of the CSL tube. Fill CSL tubes with potable water prior to or within 1 hour after placement of shaft concrete.

The exterior surface of CSL tubes must be free from corrosion, oil, and coatings so that a good bond is provided between the concrete and the tube.

Test the drilled shaft no sooner than 3 days and no later than 10 days after placement of drilled shaft concrete.

Provide the shaft installation and drilling record to the Engineer and CSL Inspector within 3 days of placing shaft concrete.

Perform CSL testing between all adjacent tube pairs and across at least two major diagonals. Perform additional diagonal testing if shaft defects are identified. Perform as many additional diagonal tests as needed to determine the extent of the shaft defect.

If the CSL results indicate a potential defect, the core the location of the defect as described above for blocked CSL tubes.

If the cores indicate the presence of a defect, repair the shaft at your expense and at no extra cost to the Department. If a defect is not observed in the cores, the Department will pay for all coring costs and compensation for the delay will be granted by an appropriate time extension. "

After CSL testing has been completed and accepted by the Engineer, remove water from the CSL tube, cut the tube flush with the top of the shaft, and fill the tube with DS Grout.

514-3.12 DRILLED SHAFT EXCAVATIONS CONSTRUCTED OUT OF TOLERANCE. Do not construct drilled shaft foundations in such a manner that the concrete shaft cannot be completed within the required tolerances. If the contract tolerances are not met, the Contractor may request design changes in the pier to incorporate shafts installed out of tolerance. The Contractor shall bear the costs of redesign and all related costs resulting from approved design changes to incorporate shafts installed out of tolerance. Furnish additional materials and work necessary, including engineering analysis and redesign, to implement corrections of out of tolerance drilled shafts at no expense to the Department.

Provide a proposal on correcting out of tolerance shafts to the Engineer. Do not begin any redesign until the proposal has been reviewed for acceptability and approved by the Engineer in writing.

A Professional Engineer registered in the State of Alaska must perform all redesign to correct for out of tolerance shafts. The Registered Professional Engineer performing the redesign is subject to the approval of the Engineer.

Repair all defects in the shaft identified by Crosshole Sonic Testing. Submit repair procedure to the Engineer for review and approval.

514-4.01 METHOD OF MEASUREMENT.

1. Drilled Shaft: This item will not be measured for payment.

2. Unclassified Shaft Excavation: The quantity to be paid for will be the length, in linear feet, of unclassified shaft excavation of the diameter

shown in the plans, completed and accepted. The length will be measured along the centerline of the shaft.

3. Shaft Bedrock Excavation: The quantity to be paid for will be the length, in linear feet, of shaft bedrock excavation of the diameter shown in the plans, completed and accepted. The length will be measured along the centerline of the shaft.

4. Casings: The sum of the lengths, in linear feet, of the casing in place in the completed structure. The length will be measured along the casing from the top to the bottom of the casing at each shaft location.

5. Instrumentation and Data Collection: This item will not be measured for payment.

514-5.01 BASIS OF PAYMENT.

1. Drilled Shaft: Price and payment will be full compensation for furnishing, erecting, operating, maintaining, dismantling and transporting all drilled shaft equipment necessary to drill foundation shafts and place the casing as indicated on the plans.

   Price and Payment will be full compensation for all Quality Control Inspection.

   Price and Payment will be full compensation for the design, fabrication, installation, maintenance and removal of all temporary work structure(s) required to construct the bridge substructure and superstructure.

   Payment of 85 percent of the amount bid for this bid item will be made when all equipment is at the site, assembled and ready to begin operation.

   Payment of 10 percent will be made when the all shafts have been drilled, all shaft concrete is in place to the top of the shaft, after Instrumentation and Data Collection is complete, and after all shafts have been accepted by the Engineer.

   Payment of the remaining five percent will be made after the temporary work structure(s) has been removed in its (their) entirety.

2. Unclassified Shaft Excavation: Price and payment will be full compensation for the shaft excavation; sidewall overreaming; disposal of excavated materials; preparation of the site as required; cleaning and inspecting shaft excavations; using desanding equipment as necessary; using drilling equipment; and furnishing all other labor and materials necessary to complete the work.

3. Shaft Bedrock Excavation: Price and payment will be full compensation for the shaft excavation; sidewall overreaming; disposal of excavated materials; preparation of the site as required; cleaning and inspecting shaft

excavations; using desanding equipment as necessary; using drilling equipment; and furnishing all other labor and materials necessary to complete the work.

4. Casings: Price and payment will be full compensation for all costs necessary for furnishing and placing the casing in the shaft excavation.

5. Instrumentation and Data Collection: Price and payment will include all labor, equipment, materials, transportation, storage, and insurance required for the instrumentation, data collection and reporting of shaft testing.

   Include the cost of transporting the SID from its storage location to the job site and back in the bid.

Payment will be made under:

Pay Item	**Pay Unit**
514(1) Drilled Shaft	Lump Sum
514(2A) Unclassified Shaft Excavation (9'-0" Dia.)	Linear Feet
514(2B) Unclassified Shaft Excavation (4'-0" Dia.)	Linear Feet
514(3A) Shaft Bedrock Excavation (9'-0" Dia.)	Linear Feet
514(3B) Shaft Bedrock Excavation (4'-0" Dia.)	Linear Feet
514(4A) Shaft Casing (9'-0" Dia.)	Linear Feet
514(4B) Shaft Casing (4'-0" Dia.)	Linear Feet
514(5) Shaft Instrumentation and Data Collection	Lump Sum

SECTION 603

CULVERTS AND STORM DRAINS

Special Provisions

603-1.01 DESCRIPTION. Add the following: This work shall also consist of installing culvert marker posts.

603-2.01 MATERIALS. Add the following to the third paragraph: For Item 603(9), Pipe, furnish either Corrugated Aluminum Pipe or Corrugated Polyethylene Pipe at marine outfalls.

Add the following: Culvert marker posts shall meet the requirements of Subsection 730-2.05, Flexible Delineator Posts. The color shall be blue with no other markings. The 2.5-inch by 6-foot post shall be rectangular in cross-section with reinforcing ribs capable of a minimum bending radius of 9 inches. It shall have a 2.25 inch by 6 inch panel of reflective sheeting Hi Silver (white) 3M intensity grade located at the top of the marker post on both sides.

Add the following Subsection:

603-3.06 CULVERT MARKER POSTS. Culvert marker posts shall be installed on the approach side of storm drain outfalls 30 inches and smaller, field inlets not in paved parking lots, all end sections to cross culverts, ends of approach culverts, or as directed by the Engineer. Forty-two (42) inches of post shall remain above the ground after driving.

603-4.01 METHOD OF MEASUREMENT. Add the following: Culvert marker posts will not be measured for payment.

603-5.01 BASIS OF PAYMENT. Delete the second paragraph and substitute the following: Excavation, shoring as required, dewatering as required, import bedding material, backfill, compaction, excess and unusable material disposal, and other earthwork incidentals for construction and all appurtenances, are included with the various culvert and stormdrain pay items. Also see Section 105-1.13.

Add the following: Culvert marker posts will not be paid for directly, but will be subsidiary to pipe items. (08/27/03)R42USC

SECTION 604

MANHOLES AND INLETS

Special Provisions

604-3.01 CONSTRUCTION REQUIREMENTS. Add the following after the first paragraph: Any proposed access manhole that falls within a concrete sidewalk or asphalt pathway must have a lid with a rough cobbled grit surface, or be specifically designed to hold a minimum of 1-inch of concrete or asphalt, as applicable.

Under the sentence "Reconstruct existing manhole by using one or more of the following methods," add the following:

8. Remove and dispose of the existing reducing slab and adjustment rings and install a new cover slab.

Add the following: Notify the Engineer a minimum of five (5) days prior to removing the frame and grate. The Engineer will notify the City of Unalaska Public Works Department. DOT&PF will have an Unalaska representative physically identify frames and grates to be salvaged. Deliver frames and grates designated to be salvaged to the to the Unalaska Public Works maintenance yard on Broadway. Frames and grates not designated for salvage shall become the Contractor's property.

When installing new pipe in an existing manhole, cleanly cut a hole by approved means at the invert elevation given on the Plans and 2 inches larger than the outside diameter of the new pipe. Then, grout joint with non-shrinking cement mortar.

Curb inlet structures shall have a 3-inch formed hole approximately 2 feet below the top of casting on the project centerline side to provide for direct drainage during subgrade construction to avoid embankment saturation. Keep the openings functional. This may require temporary dikes, RMC extensions, etc., as necessary. Fill these holes with grout upon final paving.

Cast standard drainage structure steps during structure pour or install them before concrete hardens.

604-4.01 METHOD OF MEASUREMENT. Add the following: Frames, grates, and lids will not be measured for payment.

604-5.01 BASIS OF PAYMENT. Delete the second paragraph and substitute the following: Excavation, shoring as required, dewatering as required, import bedding material, backfill, compaction, excess and unusable material disposal, and other earthwork incidentals for construction and all appurtenances, are included with the various manhole and inlet pay items. Also see Section 105-1.13.

Add the following: Frames, grates and lids are subsidiary to the drainage structure. (02/28/05)R43USC04

No separate payment will be made for the 6 and 8 Inch Perforated Corrugated Steel Pipe for Underdrain, including porous backfill and drainage geotextile, they will be subsidiary to Item 604(1) Storm Drain Manhole.

Concrete to be cast around structure S1-4 will be subsidiary to the struction, no separate payment will be made for concrete at structure S1-4.

Delete Item 604(1) Storm Sewer Manhole and add the following pay items:

Pay Item	**Pay Unit**
604(1) Storm Drain Manhole, Type __	Each

SECTION 605

UNDERDRAINS

Special Provisions

605-4.01 METHOD OF MEASUREMENT. Add the following: No measurement will be made for the perforated corrugated steel pipe, porous backfill, or drainage geotextile.

605-5.01 BASIS OF PAYMENT. Delete the first, second, and third paragraphs and substitute the following: Excavation, shoring as required, dewatering as required, porous backfill material, drainage geotextile, compaction, excess and unusable material disposal, and other earthwork incidentals for construction and all appurtenances, will not be paid for directly, but will be subsidiary to the underdrain pay item.

SECTION 606

GUARDRAIL

Special Provisions

606-2.01 MATERIALS. Delete "Flexible Markers" in its entirety and substitute the following:

Flexible Markers. Use flexible markers with an over all length of 72 inches. The marker shaft shall have a coil spring at the bottom and a flag at the top. The shaft and spring shall be one piece and made from galvanized spring steel. The flexible marker shall have an orange HDPE flag which provides approximately 20 square inches of surface area. Use stainless or galvanized steel attaching hardware. The following is an example of an acceptable flexible marker:

Model: FF2

Manufacturer: Nordic Fiberglass, Inc.
P.O. Box 27
Highway 75 South
Warren, MN 56762
Phone: (218) 745-5095
Fax: (218) 745-4990
E-mail: www.nordicfiberglass.com

If using another brand, submit specifications to the Engineer for approval prior to ordering the markers.

606-3.02 POSTS. Delete the first two numbered items in this Subsection and substitute the following:

1. Exclusive of end treatments, use one type of post in each run of guardrail.

606-3.06 REMOVAL AND RECONSTRUCTION OF GUARDRAIL. Add the following: Guardrail removed and to be replaced with new guardrail shall have the entire new run installed within **14** calendar days after removal.

Guardrail located within 50 feet of bridge ends shall have the new guardrail installed by the end of the shift in which the existing guardrail is removed.

606-3.07 REMOVAL AND DISPOSAL OF EXISTING GUARDRAIL. Delete the last sentence and substitute the following: Notify the Engineer a minimum of five (5) days prior to removing guardrail for disposal. The Engineer will notify the City of Unalaska and have a maintenance representative physically identify portions of guardrail to be salvaged. Deliver guardrail and associated hardware designated to be salvaged to

the Public Works maintenance yard on Broadway. Coordinate with Jim Dickson at 581-1260. Remaining items removed become Contractor's property. (06/12/03)R259M98

Add the following subsections:

606-3.09 FLEXIBLE MARKERS. For each slotted rail terminal, a flexible marker shall be attached to the extreme piece of rail. The flexible markers shall be attached using hardware and attachment methods recommended by the manufacturer.

606-3.10 LENGTH OF NEED VERIFICATION. After shaping the slopes and staking the proposed guardrail locations, notify the Engineer to field verify the beginning and ends. The staked location of the guardrail will be approved by the Engineer prior to installation. The Engineer may determine additional guardrail is necessary. (10/17/0205/29/02)R45aUSC

SECTION 608

SIDEWALKS

Special Provisions

608-1.01 DESCRIPTION. Add the following: This work also consists of constructing asphalt pathway(s) in conformance with the Plans.

608-2.01 MATERIALS. Delete paragraph number 2 and substitute the following:

2.	Asphalt Sidewalk or Asphalt Pathway Paving	
	Asphalt Cement, PG 52-28	Subsection 702-2.01
	Aggregate, Type II or III	Subsection 703-2.04
	Mix Design Requirements (ATM T-17)	
	Marshall Stability, pounds, min.	1,000
	Percent Voids, Total Mix	2-5
	Compaction, Blows/side	50

(02/01/00)R47USC

Standard Modification

608-3.03 CURB RAMPS. Replace this subsection with the following: Construct curb ramps according to the details and the locations shown on the Plans. Follow the construction requirements of subsection 608-3.01. Give the exposed concrete surface a coarse broom finish. Install detectable warnings. E25(1/01/06)

Add the following subsection:

608-3.04 DETECTABLE WARNINGS. Construct detectable warnings according to the details and the locations shown on the Plans. Install detectable warning tile by embedding tile flanges into cast in place concrete construction so there are no vertical changes in grade exceeding 0.25 inches or horizontal gaps exceeding 0.5 inches. Align pattern on a square grid in the predominant direction of travel. Install Armor-Tile ADA-C Series tactile detectable warning tile made of composite materials, safety yellow color, slip resistant surface, full length flanges on bottom, and truncated dome pattern, or approved equal.

Detectable warnings shall be manufactured and installed according to the Americans with Disabilities Act Accessibility Guidelines. E25(1/01/06)

Special Provisions

608-4.01 METHOD OF MEASUREMENT. Add the following: Asphalt pathway paving will be measured and paid under Section 401, Asphalt Concrete Pavement.

Curb ramps, including detectable warnings, ramp runs, backing curbs, flares, and landings necessary to provide a single street level access will be included in the measurement of Concrete Sidewalk.

608-5.01 BASIS OF PAYMENT. Add the following: Curb ramps, including detectable warnings, ramp runs, backing curbs, flares, and landings will not be paid for directly, but will be subsidiary to Item 608(1a) Concrete Sidewalk, 4 inches thick.

With the exception of reinforcing steel, all material contained within, embedded in or attached to the bridge sidewalk including expanded polyethylene, expansion joints, PVC conduit, junction boxes, and attachments are subsidiary to Item 608(1c) Concrete Sidewalk, Bridge Sidewalk.

Add the following pay item:

Pay Item	Pay Unit
608(1C) Concrete Sidewalk, Bridge Sidewalk	Square Yard

RIPRAP

Special Provisions

611-2.01 MATERIALS. Add the following after the first sentence: Apparent specific gravity will be determined by WAQTC FOP for AASHTO T85.
R277USC(11/07/05)

611-2.01 MATERIALS. Add the following:

1. Primary Riprap
   85-100% weighing 600-800 pounds (22")
   0-5% weighing up to 200 pounds (15")
   0-10% weighing more than 1200 pounds (26")

2. Secondary Riprap
   85-100% weighing 50-70 pounds (10")
   0-5% weighing up to 5 pounds (4")
   0-10% weighing more than 100 pounds (12")

Stone size will vary based on specific gravity, size shown assumes specific gravity of 2.65. Material shall meet the requirements of Section 703-1.01.

611-5.01 BASIS OF PAYMENT. Add the following:

Pay Item	Pay Unit
611(3) Primary Riprap	Ton
611(4) Secondary Riprap	Ton

SECTION 615

STANDARD SIGNS

Standard Modification

615-2.01 MATERIALS. Delete the first paragraph of Item 2, including subitems a., b., and c. and replace with:

2. Sign Fabrication. Use Type IV reflective sheeting (for lettering, symbols, borders, and background) on sheet aluminum panels for signs except the following:

   a. Orange Background Signs: Use either Type II or Type III orange reflective sheeting or use Type VII or Type IX fluorescent orange reflective sheeting. For temporary installations place reflective sheeting on sheet aluminum, plastic, or plywood panels.

   b. Railroad Crossbucks and Vertical Crossbuck Supports: Use white Type VIII or Type IX reflective sheeting for background of sign and strips.

   Non-Illuminated Overhead Signs with White Legends on Green Backgrounds: Use Type IX reflective sheeting for legends and background. Create the legend in one of the following ways:

      (1) Cut border and legend from white Type IX reflective sheeting and adhere to a green Type IX background, or

      (2) Cut stencil of border and legend out of green transparent acrylic film and use transparent adhesive to overlay the film on a white Type IX reflective background.

   d. Fluorescent Yellow-Green School Area Signs: Use Type VIII or Type IX reflective sheeting for background.

Add the following:

Reflective Sheeting Warranty. Supply manufacturer's warranty for reflective sheeting, including retention of fluorescent yellow-green (measured according to ASTM E 2301) for ten years according to the following criteria:

Minimum Fluorescent Luminance Factor	Y_F: 20%
Minimum Total Luminance Factor	Y_T: 35%

The warranty shall stipulate that: If the sheeting fails to meet the minimum fluorescence values within the first 7 years from the date of fabrication, the manufacturer shall, at the manufacturer's expense, restore the sign surface to its original effectiveness. If the reflective sheeting fails to meet the minimum fluorescence values within the 8th through the 10th year from the date of

fabrication, the manufacturer shall, at the manufacturer's expense, provide enough new replacement sign sheeting to the Department to restore the sign surface to its original effectiveness.

E26(1/1/06)

SECTION 618

SEEDING

Special Provisions

618-1.01 DESCRIPTION. Add the following: Seed new or disturbed slopes and other areas directed by the Engineer. Track the soil and apply seed, mulch, fertilizer, and water. Provide a living ground cover on slopes as soon as possible.

This work shall consist of ground preparation, hydraulic application or hand broadcasting of the seed, finishing work including raking seed into the soil, fertilizing and limestone application in conformance with the Plans and Specifications.

618-2.01 MATERIALS. Add the following to the list of material specifications:

Mulch	Subsection 727-2.01

618-3.01 SOIL PREPARATION. Add the following: Apply seed as detailed in subsection 618-3.03 immediately after the shaping of the slopes Prepare slopes for seed by "walking" a dozer transversely up and down the slopes, or by grading with a scarifying slope board, as determined by the Engineer. The resultant indentations shall be perpendicular to the fall of the slope. Complete slope preparation as soon as topsoil is placed on the slopes. Rounding the top and bottom of the slopes is acceptable to facilitate tracking and to create a pleasing appearance, but do not disrupt drainage flow lines.

618-3.02 SEEDING SEASONS. Add the following: Seeding shall be performed between May 15 and August 15.

618-3.03 APPLICATION. Delete the second and third paragraphs and add the following: Apply seed, mulch, and fertilizer as follows per acre. Apply seed and mulch in one application if using the hydraulic method.

Item	Ingredients	Application Rate (per 1000 sq ft)
Seed Mix	Alpine Kentucky Bluegrass	0.30 lbs
	Red Fescue	0.30 lbs
	Nortran Tufted Hairgrass	0.30 lbs
	Bering Hairgrass	0.24 lbs
	Annual Ryegrass	0.06 lbs
		1.20 lbs
Mulch	See below:	
<3:1		55 lbs
>3:1 to 2:1	add tackifier	70 lbs
Fertilizer	low-release 20-20-10	15 lbs

Each species of seed shall be supplied separately and not as mixtures. Mark each container with the weight and with the manufacturer's guaranteed analysis of the contents showing the percentage for each ingredient contained therein.

Do not remove the required tags from the seed bags.

618-3.04 PLANT ESTABLISHMENT AND MAINTENANCE. Delete second paragraph and replace with the following: Water seeded areas as required for proper germination and growth.

Add the following:

Fertilizing. Apply first application of fertilizer 30 or more days after the application of the seed and mulch. Fertilizer shall be reapplied the following season with water between May 31 and September 1 at a rate of one-half the initial application to areas as shown on Plans during the maintenance period.

Watering during establishment.

Ensure that the seeded areas stay moist during germination and seedling establishment (as defined by the grass plants attaining a height of approximately 3 inches). Be prepared to water the seeded areas 3 times a day if weather conditions warrant it, until seedlings have become established.

If the Contractor fails to apply adequate moisture during the germination period for 4 consecutive days, or after 2 notices without immediate response, the Engineer may declare affected seeding unacceptable. The Contractor will be required to reseed areas that have not been kept moist.

Maintenance period.

The maintenance period shall be one full growing season following their acceptance. One full growing season shall be defined as the period between May 1 and September 30 for the purpose of this Contract. Partial growing seasons will

not be counted against the one full growing season requirement.

The Contractor shall repair any damage to seeded areas within their respective maintenance periods upon request by the Engineer.

618-4.01 METHOD OF MEASUREMENT. Add the following: The amount of mulch, and fertilizer in this work, including any required reseeding, will be subsidiary to seeding and will not be measured separately for payment.

618-5.01 BASIS OF PAYMENT. Add the following: Partial payments shall be made at 40% upon seeding, 30% at the end of the first growing season in which seeding is done (first season's maintenance) and 30% upon final acceptance.

Plant establishment and maintenance for seeded areas shall be subsidiary to seeding.

The work described under subsection 618-3.01 Soil Preparation is subsidiary to seeding.

Water required for the hydraulic method of application is subsidiary to seeding.

(11/06/02)R52M98

SECTION 626

SANITARY SEWER SYSTEM

Special Provisions

626-1.01 DESCRIPTION. Add the following: For purposes of these specifications, "Sewer Utility" shall mean City of Unalaska, Department of Public Works and Department of Public Utilities; Telephone (907) 581-1260.

The Contractor shall provide as-builts in accordance with the conditions prescribed herein.

626-3.01 CONSTRUCTION REQUIREMENTS. Delete the following: "When sewer conduit is laid within a 10-foot horizontal radius of an existing or a new water main, and is above or 3 feet below the water main, use cast-iron pipe."

Add the following: The force main crossing the existing bridge is a primary collector line that is required to stay in service except as noted below. Temporary shutdowns required to make connections to the existing line shall be limited to 2-hours per connection. The construction shutdowns shall be scheduled to take place during low flow periods, between the hours of 10 PM and 6 AM. The Sewer Utility shall be given at least 7-days notice prior to executing a shutdown so they can be present to shut down pumping facilities and provide temporary storage during the interruption. The Contractor is responsible to purge the existing line of sewage prior to making the connection and to plug the ends to prevent sewage spills during construction.

Give at least 24-hours notice to the Sewer Utility and impacted residents before interrupting sewer service to any area. Restore disrupted sewer service as soon as possible, or make temporary services using hoses or other suitable methods.

If operations cause service interruptions in excess of those allowed for the scheduled shutdowns, the Contractor is responsible for all damages.

Sewer lines shall be laid to the lines and grades shown on the Plans plus or minus 0.03-feet. However, no flat or reverse grades will be permitted.

At a sufficient distance from encountering a known obstacle, the Contractor shall expose and verify the exact location and elevation of the obstacle so that alignment and/or grade of the new sewer can be suitably adjusted. Extra costs incurred by the Contractor due to inadequate verification of known obstacles shall be at his or her expense.

All adjustments to line and grade shall be done by carefully excavating trench bottom or sidewall earthen material or filling with suitable compacted earth under the body of the pipe.

The Contractor shall have standard survey instruments such as a laser or a transit and level for transferring alignment and grades from the offset hubs. The

Contractor shall employ a person who is qualified to use such standard survey instruments to the satisfaction of the Engineer, and that person shall have the responsibility for maintaining pipe line and grade. Both line and grade shall be checked and recorded in a field survey book for each piece of pipe and appurtenance laid. The Contractor shall record actual line and grade on as-built drawings, and, upon request, shall furnish to the Engineer a copy of the line and grade notes for the newly installed pipe and appurtenances.

Ductile iron pipe spigots shall be inserted the proper length into bells as recommended by the pipe manufacturer. Bell and spigot gaskets shall be properly lubricated with a non-toxic lubricant approved by the pipe manufacturer. Bells shall be located on the downstream side of the pipe joint.

Provide green 4-mil thick by 6-inch wide polyethylene underground warning tape with the words "Caution – Buried Sewer Line" 6-inches above the top of the buried pipe.

Polyethylene encasement shall be installed on ductile iron sewer line. Polyethylene encasement shall be installed in strict accordance with the methods described in the most current editions of AWWA C105/ANSI A21.1 and the Ductile Iron Research Associations publication "A Guide to the Installation of Ductile Iron Pipe".

Steel pipe shall be welded per latest AWS D1.1 by welders qualified per the American Welding Society for the type and position of the welds welded. Pipe joints shall be filled full depth to match the pipe being welded. All filler metal shall have a carbon content closely matching the base metal (maximum 0.20%). All SMAW electrodes shall be properly conditioned low hydrogen. Submit welder qualifications and welding procedures to the Engineer for approval.

Except where noted otherwise, as directed by the Engineer, and provided that they do not interfere with other work, the Contractor may abandon in-place existing sewer lines that are being replaced by new sewer lines. Existing lines scheduled to be abandoned in place shall be flushed, cleaned, and plugged in a manner meeting Alaska Department of Environmental Conservation standards.

Do not lower the sanitary sewer line as shown on the drawings without potholing to confirm the depth and then the obtaining approval to proceed from the Engineer.

626-3.02 TESTING. Delete the entire subsection and substitute the following:

General: The Contractor shall clean and flush all sanitary sewer pipe installed prior to testing and final inspection. With the Engineer present, test the sewer for grade, alignment, and leakage. Grade and alignment must conform to staking with no deviation allowed that would inhibit flow. No flow test will be required for lowering the sewer line.

1. Pipe Pressure Test: Within one day after the pipe is determined to be clean, and the pipe is backfilled and compacted in place except as required

for plugged ends, the pipe shall be pressure tested for leakage.

Hydrostatic Testing: All newly installed piping requires testing. All tests shall be witnessed by a representative of the Owner. The Contractor shall provide all necessary equipment, labor, materials, supplies, and assistance necessary to complete the test. Remove all air from the lines prior to pressure tests. Vent air from all high parts of the system while filling. Plug ends of line to be tested. If permanent air vents are not installed as part of this contract, the Contractor shall, at his expense, install corporation stops at such points so the air can be expelled as the line is slowly filled with water. All hydrostatic testing shall be performed through test copper. Pressure test ductile iron pipe at 50 psi for two hours. After the required test pressure has been reached, the pumping will be terminated. If the pressure remains constant for 30-minutes without the aid of a pump, the line will not be subjected to any future hydrostatic tests. Leakage on ductile iron pipe must be less than the calculated value

$$L = \frac{ND(P)^{0.5}}{7,400}$$

Where:

L = allowable leakage in gallons per hour
N = summation of mechanical and push on joints in length of pipe being tested
D = diameter of pipe in inches.
P = test pressure in pounds per square inch

The duration of each leakage test shall be two (2) hours, and during the tests the main shall be subjected to the constant test pressure as defined above. The test pump shall be valved to ensure that constant test pressure is maintained throughout the test and all excess water returned to the supply tank.

If the pressure decreases below the required test pressure during the two (2) hour period, the proceding portion of that test will be declared void. Cracked or defective pipe, gaskets, joints, or fittings discovered as a consequence of the hydrostatic tests shall be removed and replaced with sound material at the Contractor's expense. The test shall then be repeated until the results are satisfactory. A report with dates, times, procedures, witnesses, and other relevant information documenting performance of the tests shall be provided to the Engineer.

If the installation fails to meet test requirements, the Contractor shall determine at his own expense the source or sources of leakage, and he shall repair or replace the source of the leakage in a method approved by the Engineer.

Welded steel pipe shall be hydostatically pressure tested at 150 psi for a 2-hour duration after the initial test pressure has stabilized. No pressure loss or leakage shall be allowed. If pressure loss is observed, the leak shall be

located and repaired and the test shall be repeated until no pressure loss is observed.

2. Welded Pipe: Perform all welding and Nondestructive Examination (NDE) to meet AWS D1.1. Pipes shall be joined with complete penetration butt welds over the entire cross section. Prior to welding, submit for approval a welding plan consisting of the following:

   a. Quality Control personnel qualifications.
   b. Welding Procedure Specifications (WPS).
   c. Procedure Qualification Records (PCR).
   d. Welder Performance Qualification Records (WPQR) with documentation of current welder certification.
   e. Sample daily inspection sheet.
   f. Type and extent of NDE to be conducted, as required by the specifications.

   Perform all Quality Control inspection necessary to ensure the materials and workmanship meet the requirements of the contract documents.

   Correct all deficiencies in materials and workmanship revealed by Quality Control and Quality Assurance inspections without additional compensation.

   Furnish all completed Quality Control inspection documents to the Quality Assurance representative designated by the State.

Add the following subsection:

626-3.03 AS-BUILT DRAWINGS. The Contractor shall completely and accurately record all deviations, deletions, additions, and alterations to correctly depict existing utilities and sewer lines and appurtenances as actually installed. The as-built construction shall be marked on a clean set of plan sheets dedicated solely to keeping of this as-built information. When sanitary sewer construction is complete, the Contractor shall certify the accuracy of the sanitary sewer as-builts in writing and deliver the documents to the Engineer.

626-4.01 METHOD OF MEASUREMENT. Add the following: As-builts will not be measured for payment and the work will be considered incidental to other work required in this section.

Insulated Sanitary Sewer Conduit located on the bridge includes all pipe jackets, insulation, thermal insulation joint kits, hangers, supports, bracing, couplings, expansion assemblies, and appurtenances as required to install a complete workable system as detailed and required.

Cleanouts will include all work as detailed in the plans and will be measured as units, complete in place.

Connections to existing sewer lines include all work detailed in the plans and as

required to provide watertight connections, including manhole work. Connections will be measured as units, complete in place.

Lowering the sewer line will be measured as a complete unit in place and includes all work required for lowering the line including connections to the existing sewer line, installation of bends, pipe, fittings, rigid board insulation, and other work necessary for a complete workable system. Earthwork is incidental.

Air relief includes saddle, fittings, pipe, valve, supports and accessories required to construct an air relief system as detailed.

Backwater Valve will include all work as detailed in the plans and will be measured as units, complete in place.

Removal and or abandonment of existing pipe is considered incidental to other work and no separate payment will be made.

626-5.01 BASIS OF PAYMENT. Delete the second paragraph and substitute the following: Excavation, shoring as required, dewatering as required, import bedding material, backfill, compaction, testing, excess and unusable material disposal, and other earthwork incidentals for construction of sanitary sewers, and all sanitary sewer appurtenances, are included with the various sewer bid items.

Add the following pay items:

Pay Item	**Pay Unit**
626(3) Insulated Sanitary Sewer Conduit, 10-inch	Linear Foot
626(4) Construct Cleanout	Each
626(5) Connect to Existing Sewer Line	Each
626(6) Construct Air Relief	Each
626(7) Construct Backwater Valve	Each
626(8) Construct Valve Manhole	Each
626(9) Lower Sanitary Sewer Line	Lump Sum

SECTION 627

WATER SYSTEM

Special Provisions

627-1.01 DESCRIPTION. Add the following at the end of the second sentence: The work also includes demolishing and/or abandoning existing water lines as necessary for installation of new utilities.

Add the following: For purposes of these specifications, "Water Utility" shall mean City of Unalaska, Department of Public Works and Department of Public Utilities; Telephone (907) 581-1260.

The Contractor shall provide as-builts in accordance with the conditions prescribed herein.

In conjunction with working around and/or adjusting the Water Utility water valves, the Contractor shall exercise due care. Prior to commencement of work by the Contractor, the Water Utility shall check and correct deficiencies that may exist in any valve or valve box. The Engineer and Contractor shall witness the condition and location of each valve or valve box. Failure to participate in the inspection by the Contractor will result in his forfeiting all rights to deny damages at a later date during the course of the work. Notice that the Contractor is ready for the above inspection shall be in writing to the Water Utility and shall be submitted giving at least 48-hours notice. The Contractor shall furnish a copy of the notice to the Engineer.

It shall be the Contractors responsibility to protect and maintain all valves and valve boxes in an operable condition during all phases of construction. If at any time after inspection as outlined above, and before final inspection, the Water Utility finds a valve or valve box inoperable, the contractor shall repair it at their own expense.

627-2.01 MATERIALS. Add the following:

Butterfly Valves	Subsection 712-2.10A

627-3.01 GENERAL. Insert the following after the eighth paragraph: Furnish and install mechanical joint retainer glands where restrained joint pipe is required, per Section 707, on all ductile iron mechanical joint pipe fittings and valves.

Add the following at the end of the subsection: Except where noted otherwise, as directed by the Engineer, and provided that they do not interfere with other work, the Contractor may abandon in-place existing waterlines that are being replaced by new water lines. Those existing water line segments that are to be abandoned in place shall be capped with ductile iron mechanical joint caps at all points where the abandoned in place water line segments were connected to water lines and appurtenances.

Water valves shall be operated by City personnel only.

The waterline along Captains Bay Road is the main transmission line providing water to the City system. The water flow splits at the tee located at the intersection of Captains Bay Road and Airport Beach Road. One leg of the tee serves Amaknak Island and one leg of the tee serves Unalaska Island. The two legs are reconnected and networked at the far side of the water system. One of the legs of the tee serving the City system shall remain in service at all times except as noted below.

It is anticipated that the waterline serving Amaknak Island, including the South Channel crossing, will be shut down for an extended period during waterline upgrades and bridge construction. The PRV facility shall be fully operational prior to shutdown of this segment of line.

Temporary shutdowns required to make connections to the Unalaska transmission line shall be limited to 8-hours per connection. Shutdowns that isolate the Captains Bay source shall be confined to the months of either May or October. The Water Utility shall be given at least 7-days notice prior to executing a shutdown so they can be on hand to reroute flows and assure continued service as necessary. The Contractor shall closely coordinate with the City Water Utility regarding all shutdowns.

The Contractor is responsible for maintenance of water service throughout the duration of construction. The Contractor is responsible to notify affected users , the Water Utility, and the Department of Public Safety prior to any shutdowns. The following items have been specifically identified as requiring work:

1. Connection to the water main serving Unalaska Island is required in two locations. These are identified as the connection for Line "A" and Line "B" in the contract drawings. These connections must be made for activation of the PRV facility. The piping for the PRV facility shall be constructed and tested prior to making connections. The connection for Line "B" requires that the main water supply source be isolated from the City distribution system. To do this, the City will temporarily operate their wells. The well operation results in decreased service pressures, which eliminates service for the uppermost home on Haystack Hill. The following restrictions and/or requirements apply:

    a. Line "A". Connection shall be made between the hours of 10:00 PM and 6:00 AM. The connection period shall be limited to the shortest amount of time possible. The Contractor is offered the option of performing a hot tap connection or providing temporary service during the shutdown period. The isolation valve for this portion of pipe is located between City Hall and The Iliuliuk Clinic. Loss of service will be experienced at the Iliuliuk Clinic, the Department of Public Safety, a small business, and several homes adjacent to this segment of pipe. If a hot tap is not used, the Contractor will be responsible for coordinating with users and providing temporary water service during the shutdown period.

b. Line "B". Connection shall be made between the hours of 10:00 PM and 6:00 AM. The connection period shall be limited to the shortest amount of time possible. The pipe to Haystack Hill, which serves approximately 20-homes, will be out of service during this shutdown. The City will provide hoses, fittings, and connectors so that a hydrant jumper can be installed to provide service to Haystack during the shutdown period. The Hydrants are located along haystack Drive on the far side of Haystack Hill. The Contractor shall obtain the hose and accessories from the City and install the hose between hydrants. The Contractor shall provide protection for the hose where it is required to cross the road so that no vehicles make contact with or otherwise damage the hose or fittings. Protection shall be adequate to prevent any damage from vehicles. In addition, the uppermost house loses all service with this scenario. The Contractor shall provide temporary service or, at his option, housing in the form of accommodations at the Grand Aleutian Hotel, for this homeowner during the shutdown period. If temporary housing is provided, the Contractor shall also provide a meal allowance of $80 per day for each occupant of the house. The Contractor shall provide all coordination with the homeowner.

2. Abandonment of the lower portion of the Haystack Waterline near the PRV facility has the same issues as the Line "B" connection. With the exception of the time restrictions, the same requirements outlined for Line "B" apply.

3. The water main between Captains Bay Road and the northernmost project limits, which includes work near the bridge pilings and the Amaknak abutment, can be isolated once the new PRV facility is placed into operation. It is required that the new PRV facility be constructed and properly operating prior to construction on or near this section of pipe. This will isolate the line for connection of the 24" pipe identified as Line "C" in the contract drawings, lowering portions of the existing main to obtain adequate bury depth, lowering the water main to obtain sewer clearances, demolition of the existing Amaknak PRV facility and associated piping, construction of new water utilities near the north abutment, and bridge piling construction. The 1-inch water service serving Prime Alaska Seafoods located on Henry Swanson Drive will require temporary service for the duration of any shutdown. The method, operation, and maintenance of the temporary service will be the responsibility of the Contractor.

627-3.02 INSTALLATION OF CONDUIT. Add the following after the first paragraph: Pipe and material handling and storage shall be per manufacturers' recommendations and to the satisfaction of the Engineer. Store rubber gaskets in a cool, dark place out of exposure to sunlight.

Pipe installation shall be per ANSI/AWWA C600. The trench bottom shall be carefully graded to provide uniform support for the pipe and appurtenances. Ductile iron pipe spigots shall be inserted the proper length into bells as

recommended by the pipe manufacturer. Bell and spigot gaskets shall be properly lubricated with a non-toxic lubricant approved by the pipe manufacturer.

At a sufficient distance from encountering a known obstacle or tying into an existing water line, the Contractor shall expose and verify the exact location and elevation of the obstacle or existing water line so that alignment and/or grade of the new water line can be suitably adjusted. Extra costs incurred by the Contractor due to inadequate verification of known obstacles or tie-in lines shall be at his or her expense.

All adjustments to line and grade shall be done by carefully excavating trench bottom or sidewall earthen material or filling with suitable compacted earth under the body of the pipe.

A maximum 0.2-feet deviation from design elevation and alignment will be allowed. The pipe shall be generally straight to visual observation as determined by the Engineer.

The Contractor shall have standard survey instruments such as a laser or transit and level for transferring alignment and grades from the offset hubs. The Contractor shall employ a person who is qualified to use such standard survey instruments to the satisfaction of the Engineer, and that person shall have the responsibility for maintaining pipe line and grade. Both line and grade shall be checked and recorded in a field survey book for each piece of pipe and appurtenance laid. The Contractor shall record actual line and grade on as-built drawings, and, upon request, shall furnish to the Engineer a copy of the line and grade notes for the newly installed pipe and appurtenances.

Delete the first sentence of the seventh paragraph and substitute the following: Angular deflections of water line joints, as required for vertical grade changes or horizontal curves, shall be limited to 50% of the manufacturers' maximum recommended deflection.

Add the following after the last paragraph: Flange bolts and nuts shall be ANSI B18.2.2 "heavy hex". All flange bolts and mechanical joint tee bolts shall be of sufficient length that, when a bolt-up is complete, each bolt extends completely through its nut and at least ¼" beyond the nut, all around. If stud bolts are used for flange bolt-up, the same criteria shall apply to each end of the stud bolt.

Polyethylene encasement shall be installed on ductile iron water line. Polyethylene encasement shall be installed in strict accordance with the methods described in the most current editions of AWWA C105/ANSI A21.1 and the Ductile Iron Research Associations publication "A Guide to the Installation of Ductile Iron Pipe".

For ductile iron water lines, two bronze wedges or two electrical continuity straps shall be installed at each pipe and fitting joint. Straps shall be exothermically welded to clean, dry, freshly ground metal surfaces. All welds and uncoated surfaces shall be coated with a coal tar pitch to the satisfaction of the Engineer. Continuity straps shall be stranded Number 2 copper wire with rubber insulation.

Exothermic welding materials and procedures shall be subject to the acceptance of the Engineer.

Provide blue 4-mil thick by 6-inch wide polyethylene underground warning tape with the words "Caution – Buried Water Line" 6-inches above the top of the pipe.

627-3.03 FIRE HYDRANTS. Delete the first sentence of the third paragraph: "Connect the hydrant to the main with 6-inch ductile iron conduit or the same size as the main, whichever is smaller." and substitute the following: "Connect the hydrant to the main with 8-inch ductile iron for double pumper hydrant assemblies and 6-inch ductile iron for single pumper hydrant assemblies."

Insert the following at the end of this subsection: Install bollards with each hydrant as detailed on the plans.

627-3.04 VALVES. Delete the first paragraph in its entirety and substitute the following: "Install valves as shown on the Plans, on a firm base, and plumb. Remove all foreign matter from the interior before installation."

627-3.05 VALVE BOXES. Delete the first sentence of the first paragraph: "Install valve boxes over the gate valves as shown on the plans." and substitute the following: "Install valve boxes over the valves as shown on the plans."

627-3.06 TESTING WATER SYSTEM. Delete the fifth and sixth paragraphs and substitute the following paragraphs:

Open Bore Flush: Prior to any tests performed, clean water distribution piping by open bore flushing to an area that will not cause damage. Initial flushing through hydrant legs is not permitted. All deadends shall be flushed.

Hydrostatic Testing: All newly installed piping requires testing. All tests shall be witnessed by a representative of the Owner. Tests shall be performed after installation of services. The Contractor shall provide all necessary equipment, labor, materials, supplies, and assistance necessary to complete the test. Remove all air from the lines prior to pressure tests. Vent air from all high parts of the system while filling. If permanent air vents are not installed as part of this contract, the Contractor shall, at his expense, install corporation stops at such points so the air can be expelled as the line is slowly filled with water. All main valves, fire hydrant auxiliary valves, fire hydrant main valves, and plugs shall be tested. All intermediate valves within the section being tested shall be closed and reopened as directed by the Engineer during the actual test. Only static pressure will be allowed on the opposite side of the end valves in the section being tested. All hydrostatic testing shall be performed through test copper. Use of fire hydrant and service connections for testing will not be allowed. Pressure test at 150 psi for two hours. After the required test pressure has been reached, the pumping will be terminated. If the pressure remains constant for 30-minutes without the aid of a pump, the line will not be subjected to any future hydrostatic tests. Leakage must be less than the calculated value

$$L = \frac{ND(P)^{0.5}}{7,400}$$

Where: L = allowable leakage in gallons per hour
N = summation of mechanical and push on joints in length of pipe being tested
D = diameter of pipe in inches.
P = test pressure in pounds per square inch

The duration of each leakage test shall be two (2) hours, and during the tests the main shall be subjected to the constant test pressure as defined above. The test pump shall be valved to ensure that constant test pressure is maintained throughout the test and all excess water returned to the supply tank.

If the pressure decreases below the required test pressure during the two (2) hour period, the proceding portion of that test will be declared void. Cracked or defective pipe, gaskets, mechanical joints, fittings, valves, or hydrants discovered as a consequence of the hydrostatic tests shall be removed and replaced with sound material at the Contractor's expense. The test shall then be repeated until the results are satisfactory. A report with dates, times, procedures, witnesses, and other relevant information documenting performance of the tests shall be provided to the Engineer.

Continuity Tests: The Contractor shall perform electrical conductivity tests on all mains in the presence of the Engineer. The Contractor shall maintain a circuit of 600 amperes DC current for a period of fifteen (15) minutes. Input current shall not exceed ten percent (10%) of the return circuit. The Contractor shall supply all equipment necessary to maintain the circuit.

All continuity tests will be through wires brought to the surface or through ¾-inch minimum copper pipe connected to the main. The use of fire hydrants and valves as substitutes for wires will not be accepted. All wires brought to the surface to complete the continuity test shall be removed to a depth of two-feet below finished grade upon completion of the tests.

Test and Air Vent Copper Pipe Removal: After completion of testing, all test and air vent copper pipe shall be removed and the stop closed at the main, in the presence of the Engineer.

Report: The Contractor shall take a sample of the water in the main at the completion of all testing and have it analyzed at an approved testing laboratory to demonstrate that bacteria contamination is within acceptable limits. The Contractor shall furnish to the Owner an affidavit outlining the dates and times of the flushing, pressure test, and continuity tests with testing results. The names of witnesses as well as the Owner's representative shall be included with signatures on the certificate.

627-3.07 DISINFECTION. Delete the words "After acceptance of pressure and leakage tests," in the first sentence of the first paragraph and substitute the following: "After successful open bore flushing and hydrostatic pressure

testing,".

Insert the following sentence after the end of the third paragraph: A residual of not less than five (5) parts per million chlorine shall be produced in all parts of the water line and retained for the entire 24-hour retention period. Provide results of laboratory tests indicating that the residual chlorine values meet the minimum requirements.

Add the following subsection:

627-3.08 AS-BUILT DRAWINGS. The Contractor shall completely and accurately record all deviations, deletions, additions, and alterations to correctly depict existing utilities and water lines and appurtenances as actually installed. The as-built construction shall be marked on a clean set of plan sheets dedicated solely to keeping of this as-built information. When waterline construction is complete, the Contractor shall certify the accuracy of the waterline as-builts in writing and deliver the documents to the Engineer.

Final as-built drawings shall be submitted in electronic format (AutoCAD 2000) and shall include two hard copies printed on 22"x34" mylar. They shall be submitted within 60-days of the Notice of Substantial Completion. The drawings shall include swing ties (two each) to all valves, tees, fitting, and appurtenances. All pipe lengths shall be shown on the drawings. All pipe lengths shall be indicated on the drawings. Only clean drawings will be accepted. No marked up design drawings will be accepted.

Add the following subsection:

627-3.09 WATER MAIN HOT TAPS. If the Contractor elects to connect to the existing waterline using hot taps, the Contractor shall first submit procedures for hot tapping for review and approval by the Engineer. No hot tapping shall commence until the Engineer's written acceptance of Contractor's procedures is obtained. Hot tapping procedures that have been accepted by the Engineer shall be strictly followed in the field, unless emergency conditions require deviation from the accepted procedures. All hot tapping operations shall at all times be prudently conducted to ensure sanitation and uninterrupted service of live water lines. Furnish flanged tapping sleeves and install in strict accordance with manufacturer's instructions. Hot tapping supervisory personnel shall have a minimum of 5-years experience in hot tapping water mains, and shall be directly on site at all times when hot tapping operations are in progress.

627-4.01 METHOD OF MEASUREMENT. Add the following: As-builts will not be measured for payment and the work will be considered incidental to other work required in this section.

Add the following:

6. Butterfly Valves and Valve Boxes. By the number of valves and valve boxes adjusted or installed.

7. Construct PRV Facility. No measurement for "Construct PRV Facility" will be done. The PRV Facility will be measured as a completed unit in place, including all piping, valves, electrical, mechanical, reinforcing steel, structural concrete, structure, and other items as required to construct a complete unit as detailed on the plans. Measurement will include all work inside of a line locate 5-feet outside of the building grid lines. Buried conduits, communication cables, the drain pipe and other items associated with the building but outside the line 5-feet from the bulding will be considered incidental to other work. Measurement of for earthwork will be made under Division 200 of the Standard Specifications.

8. Lower Existing Water Main for Sewer Crossing. Lowering existing water mains for a sewer crossing will be measured as units complete in place without regard to the diameter of the water main or length required to be lowered. Connections to the existing water main are included with this item. Mechanical joint retainer glands, polyethylene encasement, continuity straps, continuity test leads, polyethylene warning tape, earthwork, concrete encasement of the sewer pipe, and other incidentals for a complete installation are included with this item.

9. Connect to Existing Water Main. Connections to existing waterlines include all work detailed in the plans and as required to provide watertight connections. Connections will be measured as units, complete in place. Connections include the price for hot tapping or providing temporary water service as required herein.

10. Lower Existing Water Main. Lowering the existing water main will be paid for on a linear foot basis between the points of connection to the unlowered existing main. Lowering the water main includes required piping, fittings, excavation, shoring as required, dewatering as required, import bedding and backfill material (as required by the Plans and/or these Special Provisions), backfill, compaction, final trimming, disposal of excess and unsuitable materials as required, and earthwork incidentals for construction of water lines, and all water appurtenances, shall be included with this item. Lowering the existing water main also includes associated connection(s) required to execute the work.

11. Relocate CARV Manhole. Relocation of the existing CARV manhole will be paid for on a lump sum basis and includes all work associated with the relocation and as necessary to provide a complete workable installation.

627-5.01 BASIS OF PAYMENT. Delete the following: "Excavation, bedding, and backfill are paid for under Section 204."

Add the following: Excavation, shoring as required, dewatering as required, import bedding material, backfill, compaction, excess and unusable material disposal, and other earthwork incidentals for construction of water lines and all appurtenances, are included with the various water bid items.

Mechanical joint retainer glands, polyethylene encasement, continuity straps,

continuity test leads, polyethylene warning tape, open bore flushing, testing, disinfection, and other incidentals for a complete water line installation are included the various water bid items.

Payment for concrete encasement of the pipe in the area receiving riprap will be made under Item 501(1), Class A Concrete.

Add the following pay items:

Pay Item	**Pay Unit**
627(11) Install __-Inch Butterfly Valve	Each
627(12) Fire Hydrant Installation (Double Pumper)	Each
627(13) Construct PRV Facility	Lump Sum
627(14) Lower Existing Water Main for Sewer Crossing	Each
627(15) Connect to Existing Water Main	Each
627(16) Lower Existing Water Main	Linear Foot
627(17) Relocate CARV Manhole	Lump Sum

SECTION 634

GEOGRID SOIL REINFORCEMENT

Special Provisions

634-2.01 MATERIALS. Add the following: Submit manufacturers literature showing conformance with the material requirements.

634-5.01 BASIS OF PAYMENT. Delete the table and insert the following:

Pay Item	Pay Unit
634(1) Geogrid	Square Yard

(ANH, 6/22/06)

SECTION 635

INSULATION BOARD

Special Provisions

635-2.01 MATERIALS. Delete "Sand Blanket. Subsection 703-2.12.", Add, "Aggregate Base Course, Type D-1. Subsection 703-2.03".

635-3.01 CONSTRUCTION REQUIREMENTS. Delete the last sentence of the first paragraph and substitute "Place an Aggregate Base Course, Type D-1 leveling course at least 2 inches thick."

Add the following paragraphs after the second paragraph: If no insulation is shown on the drawings, but the separation between the drainage facilities and existing water and sewer facilities is less than the following, then provide insulation between them.

Water	24 inches
Pressure or Gravity Sewer	18 inches

Third paragraph, delete the words, "sand blanket material", replace with, "Aggregate Base Course, Type D-1".

635-4.01 METHOD OF MEASUREMENT. Delete this Subsection in its entirety and substitute the following: By the square foot of insulation board in its final position, including transitions, complete and accepted.

Delete the sentence, "Sand blanket material is subsidiary.", and replace with "Aggregate Base Course, Type D-1 material is subsidiary."

635-5.01 BASIS OF PAYMENT. Add the following: Payment will be made under:

Pay Item	Pay Unit
635(2) Insulation Board, R-20	Square Foot

Delete this Section in its entirety and substitute the following:

SECTION 639

DRIVEWAYS

Special Provisions

639-1.01 DESCRIPTION. Construct approaches, residential or commercial driveways at the locations shown in the Plans.

639-2.01 MATERIALS. Use materials that conform to the standards for the main roadway.

639-3.01 CONSTRUCTION. Construct driveways and approaches to the dimensions shown on the Plans.

639-4.01 METHOD OF MEASUREMENT. By the number of driveways and approaches constructed as shown on the Plans or as directed. Pavement removal and excavation required beyond the limits of the adjacent mainline will be subsidiary.

639-5.01 BASIS OF PAYMENT. At the contract unit price shown in the bid schedule. The contract unit price for driveways and approaches shall be full compensation for furnishing equipment and labor necessary to complete the work as specified.

Materials required to construct driveways and approaches will be paid for separately under the respective items listed in the bid schedule.

Native material meeting the minimum requirements of Selected Material, Type C will not be paid for directly, but will be considered subsidiary to 639 items. (05/09/02)R58M98

Payment will be made under:

Pay Item No.	Pay Item	Pay Unit
639(2)	Commercial Driveway	Each

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SECTION 640

MOBILIZATION AND DEMOBILIZATION

Standard Modification

640-1.01 DESCRIPTION. Add the following:

6. Comply with the Alaska Department of Labor and Workforce Development (DOLWD) requirements for Worker Meals and Lodging, or Per Diem; as described in their July 25, 2005 memo WHPL #197 (A2) and the State Laborer's and Mechanic's Minimum Rates of Pay (current issue).

   Ensure subcontractors comply with the DOLWD requirements.

   Ensure facilities meet the Alaska Administrative Code 8 AAC 61.1010 and 8 AAC 61.1040 *Occupational Safety and Health Standards*, 18 AAC *31 Alaska Food Code*, and U. S. Code of Federal Regulations 29 CFR Section 1910.142 *Temporary Labor Camps.*

   Do not consider the cost of Meals and Lodging, or Per Diem in setting wages for the worker or in meeting wage requirements under AS 23.10.065 or AS 36.05.

640-4.01 METHOD OF MEASUREMENT. Delete the numbered paragraph 3 and substitute the following:

3. The remaining balance of the amount bid for Mobilization and Demobilization will be paid after all submittals required under the Contract are received and approved.

Add the following:

4. Progress payments for Worker Meals and Lodging, or Per Diem will be computed as equivalent to the percentage, rounded to the nearest whole percent, of the original contract amount earned.

640-5.01 BASIS OF PAYMENT. Add the following pay item: Payment will be made under:

Pay Item	Pay Unit
640(4) Worker Meals and Lodging, or Per Diem	Lump Sum

Delete Section 641 in its entirety and substitute the following:

SECTION 641

EROSION, SEDIMENT, AND POLLUTION CONTROL

641-1.01 DESCRIPTION. Plan, provide, inspect, and maintain control of erosion, sedimentation, water pollution, and hazardous materials contamination.

641-1.02 DEFINITIONS.

1. **BMP (Best Management Practices). A wide range of project management practices, schedules, activities, or prohibition of practices, that when used alone or in combination, prevent or reduce erosion, sedimentation, and/or pollution of adjacent water bodies and wetlands. BMP include temporary or permanent structural and non-structural devices and practices. The Department describes common BMPs in its *Alaska Storm Water Pollution Prevention Plan Guide.***

2. **ESCP (Erosion and Sediment Control Plan). The general plan for control of project-related erosion and sedimentation. The ESCP normally consists of a general narrative and a map or site plan. It is developed by the Department and included in the project plans and specifications. It serves as a resource for bid estimation and a framework from which the Contractor develops the project SWPPP. The ESCP is included in Appendix A and erosion and sediment control drawings are contained in the plan set, sheets H1-H5. Where shown on the erosion and sediment control drawings, gunther booms are intended to contain any turbidity with floating booms supporting silt curtains extending to the bottom of the water body and anchored as necessary to serve the intended function.**

3. **Final Stabilization. A point in time when all ground-disturbing activities are complete and permanent erosion and sediment controls are established and functional. The stabilized site is protected from erosive forces of raindrop impact and water flow. Typically, all unpaved areas except graveled shoulders, crushed aggregate base course, or other areas not covered by permanent structures are protected by either a uniform blanket of perennial vegetation (at least 70% cover density) or equivalent permanent stabilization measures such as riprap, gabions or geotextiles.**

4. **HMCP (Hazardous Material Control Plan). The Contractor's detailed plan for prevention of pollution that stems from the use, containment, cleanup, and disposal of hazardous material, including petroleum products generated by construction activities and equipment.**

5. **eNOI. Notice of Intent to commence ground-disturbing activities under the NPDES General Permit filed electronically.**

6. **eNOT. Notice of Termination of coverage under the NPDES General Permit filed electronically.**

7. **NPDES General Permit. The Storm Water General Permit for Large and Small Construction Activities, issued by the Environmental Protection Agency (EPA) under the National Pollutant Discharge Elimination System (NPDES). It requires an approved SWPPP and NOIs listed as active status by the EPA prior to ground-disturbing activities for the project.**

8. **SPCC Plan (Spill Prevention, Control and Countermeasure). The Contractor's detailed plan for oil spill prevention and control measures, that meets the requirements of 40 CFR 112.**

9. **SWPPP (Storm Water Pollution Prevention Plan). The Contractor's plan for erosion and sediment control and storm water management under the NPDES General Permit. The SWPPP is developed by the Contractor and describes site-specific controls and management of issues identified for the project. The approved SWPPP replaces the ESCP.**

641-1.03 SUBMITTALS. For all projects submit 2 copies each of your SWPPP and HMCP to the Engineer for approval. Submit 1 copy of your SPCC Plan (if required under Subsection 641-2.03) to the Engineer. Sign all submittals. Deliver these documents to the Engineer.

The Department will review the SWPPP and HMCP submittals within 14 calendar days. Submittals will be returned to you as either requiring modification, or as approved by the Department. The approved SWPPP must contain certifications, and be signed according to the Standard Permit Conditions of the NPDES General Permit. You must receive an approved SWPPP before you submit your eNOI to the EPA.

For projects that disturb 5 acres or more of ground, submit a copy of your approved and signed SWPPP, with the required permit fee to the Alaska Department of Environmental Conservation (ADEC) Storm Water Coordinator. Transmit proof of this submission to the Engineer.

For projects that disturb 1 acre or more, submit your signed eNOI to EPA. Submit copies of your signed eNOI receipt to the Engineer and to ADEC. Transmit proof of your ADEC submission to the Engineer. The Department will transmit the Department's eNOI to the EPA. Allow adequate time for state and federal processing, prior to commencing ground-disturbing activities.

The active status eNOIs, approved SWPPP, approved HMCP, and submitted SPCC Plan (when required) become the basis of the work required for the project's erosion, sediment, and pollution control.

Submit your signed eNOT to EPA with a copy to the Engineer when notified by the Engineer that the Project is stabilized. The Department will transmit the Department's eNOT to the EPA.

641-2.01 STORM WATER POLLUTION PREVENTION PLAN (SWPPP) REQUIREMENTS. Prepare a Storm Water Pollution Prevention Plan for all projects. Use the Department's ESCP to develop a SWPPP based on your scheduling, equipment, and use of alternative BMPs. Follow the format presented in the *Alaska Storm Water Pollution Prevention Plan Guide.* The plan must include both erosion control and sediment control measures. The plan must address first preventing erosion, then minimizing erosion, and finally trapping sediment before it leaves the project site.

The plan must address your site-specific controls and management plan for the construction site as well as for all material sites, waste disposal sites, haul roads, and other affected areas, public or private. The plan must also incorporate all the requirements of the project permits.

Specify the line of authority and designate your field representative for implementing SWPPP compliance.

Wastewater discharged from vessels shall be from USCG certified Type II MSD. Anchor systems shall be free of oil, grease, and other pollutants. No wheeled or tracked vehicles shall operate in open water. (ANH, 10/01/05, ACMP)

641-2.02 HAZARDOUS MATERIAL CONTROL PLAN (HMCP) REQUIREMENTS. Prepare a HMCP for the handling, storage, cleanup, and disposal of petroleum products and other hazardous substances. (See 40 CFR 117 and 302 for listing of hazardous materials.)

List and give the location of all hazardous materials, including office materials, to be used and/or stored on site, and their estimated quantities. Detail your plan for storing these materials as well as disposing of waste petroleum products and other hazardous materials generated by the project.

Identify the locations where storage, fueling and maintenance activities will take place, describe the maintenance activities, and list all controls to prevent the accidental spillage of oil, petroleum products and other hazardous materials.

Detail your procedures for containment and cleanup of hazardous substances, including a list of the types and quantities of equipment and materials available on site to be used.

Detail your plan for the prevention, containment, cleanup, and disposal of soil and water contaminated by accidental spills. Detail your plan for dealing with unexpected contaminated soil and water encountered during construction.

Specify the line of authority and designate your field representative for spill response and one representative for each subcontractor.

641-2.03 SPILL PREVENTION, CONTROL AND COUNTERMEASURE (SPCC) PLAN REQUIREMENTS. Prepare and implement a SPCC Plan that is certified by a licensed Professional Engineer, when required by 40 CFR 112, including:

1. **When oil spills may reach navigable waters; and**
2. **Your total above ground oil storage capacity is greater than 1,320 gallons.**

Comply with 40 CFR 112 and address the following issues in your SPCC Plan:

1. **Operating procedures that prevent oil spills;**
2. **Control measures installed to prevent a spill from reaching navigable waters; and**
3. **Countermeasures to contain, clean up, and mitigate the effects of an oil spill.**
4. **No hazardous material shall be stored below MHHW.**
5. **No vehicles or equipment shall be fueled or serviced within 100 feet of any wetlands or waters of the U.S. with the exception of "low mobility" equipment. Gas or diesel fueled pumps, engines, or generators shall not be fueled or serviced within 100 feet of waterbodies unless they are situated within a double catch basin designed to contain 110% capacity of the largest independent container. All containers shall be clearly marked with the contrents and grantee's name. Fueling and service vehicles shall be equipped with adequate materials to immediately contain and commence cleanup of spilled fuels and other petroleum products or hazardous materials. Any spills of hazardous materials, fuel or other petroleum products shall be immediately reported to DEC at (907) 269-7500 during working hours or 1 (800) 478-9300 during non-working hours.**
6. **Heavy equipment shall be inspected for leakage such as fuel, oil, hydraulic fluid, and any hazardous material on a daily basis. If such leakage is found, the equipment shall not be used, and must be removed from service until the leak is repaired. Cleanup spills immediately. (ANH, 10/1/05, ACMP)**

641-3.01 CONSTRUCTION REQUIREMENTS.

<u>Postings.</u>

On projects with 1 acre or more of ground disturbing activity, do not begin ground-disturbing work until the EPA has acknowledged receipt of your eNOI and Department's eNOI, and has listed them as active status. The EPA will post the status of the eNOIs on the EPA website. On projects with less than 1 acre of ground disturbing activity, where submittal of an eNOI to EPA is not required, do not begin ground disturbing work until authorized by the Engineer.

Post at the construction site:

1. **NPDES Permit number, if available, and a copy of the eNOI,**
2. **Name and phone number of your local contact person, and**
3. **Location of a SWPPP available for viewing by the public.**

The above notices must be posted at publicly accessible locations. At a minimum post notices at the BOP, EOP, near the intersection of the highway with any major side street, and the Project Office.

Comply with all requirements of the approved HMCP, the submitted SPCC Plan, and all state and federal regulations that pertain to the handling, storage, cleanup, and disposal of petroleum products or other hazardous substances. Contain, clean up, and dispose of all discharges of petroleum products and/or other materials hazardous to the land, air, water, and organic life forms. Perform all fueling operations in a safe and environmentally responsible manner. Comply with the requirements of 18 AAC 75 and AS 46, Oil and Hazardous Substances Pollution Control. Report oil spills as required by federal, state and local law, and as described in your SPCC Plan.

Comply with all requirements of the NPDES General Permit, implement all temporary and permanent erosion and sediment control measures identified in the SWPPP, and ensure that the SWPPP remains current. Maintain all temporary and permanent erosion and sediment control measures in effective operating condition.

Coordinate your BMPs with all Utility Companies doing work in the project area.

Inspections

Perform inspections and prepare inspection reports in compliance with the project SWPPP and the NPDES General Permit.

1. **Joint Inspections. Prior to start of construction, conduct a joint on-site inspection with the Engineer, the SWPPP Preparer, and the Contractor's field representative to discuss the implementation of the SWPPP.**

   Conduct the following additional joint on-site inspections with the Engineer:

   a. **During construction, inspect the following every 7 days and within 24 hours of the end of a storm exceeding 1/2 inch in 24 hours (as measured on the project site).**
      (1) Disturbed areas that have not been finally stabilized
      (2) Areas used for storage of erodible materials that are exposed to precipitation
      (3) Sediment and erosion control measures
      (4) Locations where vehicles enter or exit the site
      (5) Offsite materials sources and waste sites

   b. **During construction, ensure that the SWPPP preparer reviews the project site, materials sites, waste sites, and the SWPPP for conformance with the NPDES General Permit. Conduct these reviews at least once per month and after every major change in earth disturbing activities.**

   c. **Prior to winter shutdown, to ensure that the site has been adequately stabilized and devices are functional.**

   d. **At project completion, to ensure final stabilization of the project.**

2. Winter Inspections. During winter shutdown, conduct inspections at least once every month and within 24 hours of a storm resulting in rainfall of 1/2 inch or greater. The Engineer may waive monthly inspection requirements until one month before thawing conditions are expected to result in a discharge, if all of the following requirements are met:
   a. Below-freezing conditions are anticipated to continue for more than 1 month.
   b. Land disturbance activities have been suspended.
   c. The beginning and ending dates of the waiver period are documented in the SWPPP.

3. Inspection Reports. Prepare and submit, within 3 working days of each inspection, a report on state Form 25D-100, with the following information:
   a. A summary of the scope of the inspection
   b. Name(s) of personnel making the inspection
   c. The date of the inspection
   d. Observations relating to the implementation of the SWPPP
   e. Any actions taken as the result of the inspection
   f. Incidents of non-compliance

   Where a report does not identify any incidents of non-compliance, certify that the facility is in compliance with the SWPPP and NPDES General Permit. The Contractor and the Engineer will sign the report according to the Standard Permit Conditions of the NPDES General Permit. Include all reports as an appendix to the SWPPP.

Record Retention

Keep the SWPPP up to date at all times. The SWPPP shall denote the location, date of installation, date maintenance was performed, and the date of removal for BMPs. It shall also contain copies of inspection reports and amendments.

Maintain the following records as part of the SWPPP:
1. Dates when major grading activities occur;
2. Dates when construction activities temporarily or permanently cease on a portion of the site; and
3. Dates when stabilization measures are initiated.

Provide the Engineer with copies of SWPPP revisions, updates, records, and inspection reports at least weekly.

Retain copies of the SWPPP, and all other records required by the NPDES General Permit, for at least 3 years from the date of final stabilization.

Amendments

If unanticipated or emergency conditions threaten water quality, take immediate suitable action to preclude erosion and pollution.

Submit amendments to the SWPPP to correct problems identified as a result of any:
1. **Storm or other circumstance that threatens water quality, and**
2. **Inspection that identifies existing or potential problems.**

Submit SWPPP amendments to the Engineer within 7 days following the storm or inspection. Detail additional emergency measures required and taken, to include additional or modified measures. If modifications to existing measures are necessary, complete implementation within 7 days.

Stabilize all areas disturbed after the seeding deadline within 7 days of the temporary or permanent cessation of ground-disturbing activities.

Notice of Termination

Submit a signed eNOT to EPA and a copy to the Engineer:
1. **When the project site (including all material sources, disposal sites, etc.) has been finally stabilized and all storm water discharges from construction activities authorized by this permit have ceased, or**

2. **When the construction activity operator (as defined in the NPDES General Permit) has changed.**

If you fail to coordinate temporary or permanent stabilization measures with the earthwork operations in a manner to effectively control erosion and prevent water pollution, the Engineer may suspend your earthwork operations and withhold monies due on current estimates for such earthwork items until all aspects of the work are coordinated in a satisfactory manner.

641-4.01 METHOD OF MEASUREMENT. Section 109 and as follows:

Items 641(2) and (4) will be measured as specified in the contract or directive authorizing the work.

Item 641(5) will be measured by the specified price adjustments as determined by the Engineer.

Failure to:
1. **Pursue work required by the approved SWPPP,**
2. **Respond to inspection recommendations and/or deficiencies in the SWPPP, or**
3. **Implement erosion and sedimentation controls identified by the Engineer,**

will result in a permanent price adjustment under Item 641(5) Erosion and Pollution Control Price Adjustment as a deduction of $500 per day for each day of non-action. In addition, the Engineer may, after giving you written notice, proceed to perform such work and deduct the cost thereof, including project engineering costs under Item 641(5).

A price adjustment, equivalent to any penalties levied against the Department by the EPA or any other state and/or federal agencies for violations of the Clean Water Act and the NPDES General Permit, will be made if the Department is issued a Notice of Violation (NOV) by these agencies. This price adjustment will be the actual cost of any fines levied against the Department. An amount equal to the maximum fine for the violation will be withheld temporarily until the actual cost of the fine is known. The difference, excluding any price adjustments will be released by the Engineer upon satisfactory completion of the requirements of the NPDES General Permit. The Contractor is responsible for the payment of the Contractor's fines.

641-5.01 BASIS OF PAYMENT. The Bid Schedule will include either Items 641(1), (2), and (5) or Items 641(1), (3), (4), and (5).

1. **Item 641(1) Erosion and Pollution Control Administration. At the contract lump sum price for administration of all work under this Section. Includes, but is not limited to, plan preparation, plan amendments and updates, inspections, monitoring, reporting and record keeping.**

2. **Item 641(2) Temporary Erosion and Pollution Control. At the prices specified in the Contract or as provided in the Directive authorizing the work to install and maintain temporary erosion, sedimentation, and pollution control measures.**

3. **Item 641(3) Temporary Erosion and Pollution Control. At the lump sum price shown on the bid schedule to install and maintain all temporary erosion, sedimentation, and pollution control measures required to complete the project according to the Plans and according to the BMP, the ESCP and the original approved SWPPP and HMCP.**

4. **Item 641(4) Temporary Erosion and Pollution Control Amendments. At the prices specified in the Directive for extra, additional, or unanticipated work to install and maintain temporary erosion, sedimentation, and pollution control measures. All work paid under this Item will be shown as amendments to the original approved SWPPP or HMCP.**

5. **Item 641(5) Erosion and Pollution Control Price Adjustment. If this item is shown on the bid schedule the total value of this contract will be adjusted as a pay deduction according to subsection 641-4.01.**

Temporary erosion and pollution control measures that are required at Contractor-furnished sites are subsidiary.

Work that is paid for directly or indirectly under other pay items will not be measured and paid for under this Section, including but not limited to dewatering, shoring, bailing, installation and removal of temporary work pads, temporary accesses, temporary drainage pipes and structures, diversion channels, etc.

Perform temporary erosion and pollution control measures that are required due to your negligence, carelessness, or failure to install permanent controls as a part of the work as scheduled or ordered by the Engineer, or for your convenience, at your own expense.

Permanent erosion and pollution control measures will be measured and paid for under other contract items, when shown on the bid schedule.

Payment will be made under:

PAY ITEM	PAY UNIT
641(1) Erosion and Pollution Control Administration	Lump Sum
641(2) Temporary Erosion and Pollution Control	Contingent Sum
641(3) Temporary Erosion and Pollution Control	Lump Sum
641(4) Temporary Erosion and Pollution Control Amendments	Contingent Sum
641(5) Erosion and Pollution Control Price Adjustment	Contingent Sum

SECTION 642

CONSTRUCTION SURVEYING AND MONUMENTS

Special Provisions

642-1.01 DESCRIPTION. Delete the sentences that begin "Furnish and install..." and "Adjust existing monuments..."

642-3.01 GENERAL CONSTRUCTION REQUIREMENTS. Delete the text after item 2 and replace with the following: Cross sections necessary for determination of excavation and embankment quantities, including intermediate and/or remeasure cross sections as needed. Before beginning common excavation, cross section the original ground surface. Before beginning rock excavation, cross section the top of rock surface.

Delete the text of item 9.

Add the following after Item 10: Prior to any work on the project, stake and reference the construction centerline. Reference the existing centerline at 100 foot on tangents, and 50 foot intervals on curves, super elevations, transitions and cross-slopes. The reference stake shall be a minimum of 1 inch x 2 inch by 2 feet and be offset 4 to 8 feet from the shoulder on the right side of the roadway. They shall show the offset distance to centerline and the station from the beginning of the project. Ensure that the stakes are visible from the roadway by clearing as necessary.

Install a reference sign every 500 feet. These reference signs shall meet the following requirements:

1. mounted a minimum of 5 feet above the shoulder,
2. located a minimum of 10 feet from the edge of shoulder,
3. marked with the station from the beginning of the project, in 6 inch high black lettering on an orange background.

Provide centerline and shoulder profiles extending 300 feet beyond the limits of the pavement removal and dig-out areas. The Engineer may require such adjustments to the planned roadway grades. This shall not be considered extra work. Provide this profile information to the Engineer (electronically in Excel format) immediately upon its completion, along with checked computations on all level loops, but in no case later than 7 calendar days before slope staking or blue topping.

642-3.02 CROSS SECTION SURVEYS. Delete the text of item 13.

642-3.03 MONUMENTS. Delete the entire subsection.

642-3.05 FINAL TRAVERSE. Delete the entire subsection.

SECTION 643

TRAFFIC MAINTENANCE

Special Provisions

643-1.01 DESCRIPTION. Add the following as a third paragraph: Illuminate construction activities listed in Table 643-3 during hours of night work on roads open to the public within project limits. (03/15/06)ES14

643-1.02 DEFINITIONS. Add the following paragraphs after paragraph titled "Construction Phasing Plan":

Balloon Light: Light surrounding by a balloon-like enclosure kept inflated by pressurized air or helium, and producing uniform light through 360 horizontal degrees. The top half of the balloon enclosure shall be constructed of an opaque material.

Night Work: Work occurring between sunset and sunrise on all days except the "No Lighting Required" period shown in the table below:

Latitude	**No Lighting Required**		**Nearby**
(degrees)	**Start**	**End**	**Cities**
< 61	Lighting Required All Year		Everything S of Hope
61	June 11	July 1	Anchorage, Valdez, Girdwood, Wasilla, Palmer, Glennallen
62	June 2	July 13	Talkeetna
63	May 27	July 17	Cantwell, Paxson, McGrath
64	May 22	July 21	Delta Junction, Nome, Tok
65	May 18	July 25	Fairbanks
66	May 14	July 29	Circle City
67	May 10	August 2	Coldfoot, Kotzebue
68	May 7	August 6	Galbraith Lake
69	May 3	August 9	Happy Valley
70	April 30	August 12	Deadhorse
71	April 27	August 15	Barrow
72	April 24	August 19	

(03/15/06)ES14

Add the following: ASDS. Alaska Sign Design Specifications, latest edition. (ANH 11/15/04)

643-1.03 TRAFFIC CONTROL PLAN. Replace the last paragraph with the following: A waiver may be requested of regulation 17 AAC 25 regarding oversize and overweight vehicle movements within this project in writing. If the waiver is approved, movements of oversize and overweight vehicles in or near traffic within the project limits will be done according to the provisions of an approved Traffic Control Plan. Maintain a minimum12 foot lateral separation between the nonstreet legal vehicles and the motoring public. The Traffic Control plan shall specify the traffic control devices required for these operations.
(02/10/06)R222USC04

Add the following: The Traffic Control Plan shall require weekly meetings attended by the Project Engineer, Worksite Traffic Supervisor, and Contractor's Project Superintendent.

643-1.04. WORKSITE TRAFFIC SUPERVISOR. Add the following to Item 2. Duties:

i. Supervise lighting of Night Work.

(03/15/06)ES14

Standard Modification

643-2.01 MATERIALS. Under Item 16. Flagger Paddles, replace the last sentence with the following: Use reflective sheeting that meets AASHTO M 268 Type VIII or IX. Use background colors of fluorescent orange on one side and red on the other side. E29(3/15/06)

Special Provisions

643-2.01 MATERIALS. Add the following:

17. Flexible Markers. Refer to subsection 606-2.01 Materials.

643-3.01 GENERAL CONSTRUCTION REQUIREMENTS. Add the following: Whenever construction activity encroaches onto the safe route in a traffic control zone, station a flagger at the encroachment to assist pedestrians and bicyclists past the construction activity.

Standard Modification

643-3.01 GENERAL CONSTRUCTION REQUIREMENTS. Add the following: Immediately notify the Engineer of a traffic related accident that occurs within the project limits as soon as becoming aware of the accident.
(03/15/06)E29

Special Provisions

643-3.04 TRAFFIC CONTROL DEVICES. Delete the first sentence of the eighth paragraph and substitute the following: Items paid under this Section remain the Contractor's property unless stated otherwise.

Add the following to item 1. Embankments.: Close trenches and excavations at the end of each continuous work shift.

Add the following to item 3. Fixed Objects.: Remove obstructions greater than 4 inches above the nominal foreslope grade or pedestrian route at the end of each continuous work shift.

Delete item 4.b. and replace with the following: Flagger Certification by ATSSA

Add the following to item 4.: A flagger shall be posted on the channel bank in advance of the construction zone during channel closure at a location acceptable to the Engineer. Flaggers posted on the channel bank shall be equipped with and instructed in the use of the following:

a. A personal flotation device approved by the U.S. Coast Guard.
b. A battery powered bull horn.
c. A polypropylene rescue throw rope, 100 feet in length.

Flaggers shall inform channel traffic of the channel closure.

Delete item 6 and replace with the following:

6. Street Sweeping. Keep free of loose material paved portions of the roadway and haul routes open to the public, including sections of roadway off the project where the Contractor's operations have deposited loose material using a street sweeper that can collect materials rather than eject them to the shoulder of the road.

7. Power Brooming. Keep free of loose material paved portions of the roadway and haul routes open to the public, including sections of roadway off the project where the Contractor's operations have deposited loose material using a power broom that can eject them to the shoulder of the road.

Change items 7 and 8 to 8 and 9 respectively.

Add the following:

10. ET-2000 LET. The price listed in the Traffic Control Rate Schedule will be full compensation for the purchase, installation, maintenance during construction, removal and salvaging of the ET-2000 LET unit(s). After a one time use, deliver the salvaged unit(s) to the nearest DOT &PF Maintenance and Operations' district office, or as directed by the Engineer.

Standard Modification

643-3.04 TRAFFIC CONTROL DEVICES. In the sixth paragraph and also in Item 4.b., delete: "ATTSA" and replace with: ATSSA (American Traffic Safety

Services Association). E29(3/15/06)

Special Provisions

643-3.05 AUTHORITY OF THE ENGINEER. Replace the first sentence with the following: When existing conditions adversely affect the public's safety or convenience, the Contractor will receive an oral notice. A written notice will follow the oral notice according to subsection 105-1.01 Authority of the Engineer.

Add the following after the second sentence: In no case shall this time exceed 24 hours.

643-3.06 TRAFFIC PRICE ADJUSTMENT. Add the following: Traffic Price Adjustment shall also apply to unacceptable driving conditions, such as but not limited to, severe bumps, "washboarding," potholes, excessive dust or mud, dirty or out of place traffic control devices, or missing traffic control devices shown on an approved traffic control plan. The Engineer will make the sole determination as to whether the roadway or pedestrian facility is acceptable for full unimpeded use by the public. Failure to maintain an acceptable infrastructure or traffic control plan shall result in a price adjustment equal to 100 percent of the applicable rate shown in Table 643-1, for the time the roadway or pedestrian facility is in an unacceptable condition.

Boating Traffic: When the South Channel waterway is not open to unrestricted public use other than those cases described in Subsection 643-3.08, Construction Sequencing, the Contractor shall have payment for this contract reduced under Item 643(23), Traffic Price Adjustment. This reduction shall be made at the rate of $40 per minute of restriction due to waterway channel closure measured to the next higher quarter hour. The Engineer will determine whether the channel is open to full use.

Delete Table 643-1 and substitute the following:

TABLE 643-1
ADJUSTMENT RATES

Dollars/Minute of Delay/Lane
$40

643-3.08 CONSTRUCTION SEQUENCING. Delete the last sentence and substitute the following:

Coordinate traffic restriction times and magnitude with local transportation dependent businesses.

No Traffic Restrictions: Unless otherwise determined by the Engineer and on an approved Traffic Control Plan (TCP), roads other than Henry Swanson Drive shall not be restricted between 0600 hours to 0800 hours and 1600 hours to1800 hours, Monday through Friday.

Allowable Restrictions: Lane restrictions, if allowed shall be conducted so that no more than a 5 minute accumulated stopped delay, 20 vehicles, or 500 feet of traffic is detained, whichever occurs first, before releasing the detained motorists. During paving operations a 10 minute stopped delay, 80 vehicles, or 1/4 mile (2,640 feet) of traffic detained, will be allowed for motorists except school buses.

During blasting operations, a single blast will be allowed each day with up to 30 minutes of delay to accomplish the blast, clear the roadway, perform inspections, and restore traffic.

Delays greater than 10 minutes will only be allowed from 8 PM to 6 AM during the months of April and May.

If a queue of traffic develops at a stop, the entire queue must be emptied to include the last car that entered the queue at the time the queue is released.

Noise Ordinance: Comply with City of Unalaska ordinances, in particular 11.08.020 Enumeration of Nuisances, "(2) Making or causing to be made any unnecessary or unusual noise which annoys, injures, or endangers the comfort, repose, health or other institution reserved for the sick. (3) Operating or using any pile driver, power shovel, pneumatic hammer or other apparatus the use of which is attended by loud or unusual noise, between the hours of 10:00 p.m. and 7:00 a.m." The City of Unalaska has indicated that they may amend or suspend the noise ordinance to accommodate blasting at night. DO NOT CONDUCT BLASTING OR SIMILAR NOISY OPERATIONS BETWEEN 10:00 P.M. AND 7:00 A.M. UNTIL THE ENGINEER HAS CONFIRMED IN WRITING THAT THE CITY OF UNALASKA HAS AMENDED THE NOISE ORDINANCE TO ALLOW THE WORK.

School Bus Schedule: Obtain the local school bus schedule and coordinate his work efforts to ensure the school buses are not delayed through the construction zone. This plan shall be submitted, as a TCP, to the Engineer for approval before the implementation of the school bus coordination plan.

Allowable Water Closures: Partial or full channel closures within the project limits will be permitted only for the following events and durations or as directed by the Engineer:

1. Maximum of ~~four~~ (4) hours for placement of each girder.

2. If construction materials, cables, rebar, large pieces of concrete, or other materials that may present a hazard to boaters are dropped in the channel, a channel closure shall be in effect until the material is removed. (10/01/91)R96

3. A ~~ten~~ (10) day advance notification of a planned channel closure shall be submitted to the Engineer.

643-3.09 INTERIM PAVEMENT MARKINGS. In the second paragraph,

delete the words "or cover them with black removable preformed marking tape."

Replace the first sentence in the last paragraph with the following: Apply final pavement markings according to subsection 670-3.01, Construction Requirements of these Special Provisions.

Standard Modification

Add the following new subsection:

643-3.10 LIGHTING OF NIGHT WORK Illuminate the night work areas specified in Table 643-2 to the light levels specified.

Table 643-3 does not provide a comprehensive list of operations that require lighting. Provide lighting for other operations when necessary.

Table 643-3
Night Work Illumination Level and Area of Coverage

Type of Work or Equipment	Lighting Configuration
Paving, Milling, Striping, Pavement Marking Removal, Rumble Strip Installation	At least 2 machine-mounted balloon lights with a cumulative wattage of at least 4000 watts. Provide additional lights or wattage if necessary to provide complete coverage.
Rolling, pavement sweeping	At least 4 sealed beam halogen lamps in the front and four in the back. Each should be at least 55 watts.
Flagging	Two balloon lights of at least 2000 watts each located within 30 feet of the normal flagger location. Locate one on the right side of the road beyond the flagger and the other on the left side of the road in front of the flagger.
Truck Crossings (meaning where haul vehicles cross or enter a road): 1) with roads with ADTs over 10,000 or 2) that are controlled by portable traffic signals or flaggers	Two balloon lights of at least 2000 watts each located on the main road, one on the far right side of the intersection, the other on the near left. Locate lights within 30 feet of the edges of the side street. If there is a flagger at the crossing, locate the lights to also meet the requirements for flagging.

Use balloon lighting as the main light sources. Do not use floodlights without prior approval by the Engineer. When approved, install floodlighting in a manner that minimizes glare for motorists, workers, and residents living along the roadway. Locate, aim, louver, and/or shield light sources to achieve this goal.

The Engineer shall be the sole judge of when glare is unacceptable, either for traffic or for adjoining residences. When notified of unacceptable glare, modify the lighting system to eliminate it.

If the Contractor fails to meet required lighting equipment or provides lighting that creates unacceptable glare at any time, the Contractor shall cease the operations that requires illumination until the condition is corrected.

Lighting equipment shall be in good operating condition and in compliance with applicable OSHA, NEC, and NEMA codes.

Provide suitable brackets and hardware to mount lighting fixtures and generators on machines and equipment. Design mountings so lights can be aimed and positioned as necessary to reduce glare. Locate mounting brackets and fixtures so they don't interfere with the equipment operator or overhead structures. Connect fixtures securely in a manner that minimizes vibration.

Ensure ground, trailer, and equipment mounted light towers are sturdy and freestanding without the aid of guy wires. Towers shall be capable of being moved to keep pace with the construction operation. Position ground and trailer mounted towers and trailers to minimize the risk of being impacted by traffic on the roadway or by construction traffic or equipment.

Raise trailer or equipment mounted lights to maximum height, except do not exceed the clearance required for overhead objects such as overhead signals, overhead signs, trees, aerial utilities, or bridges. Aim and adjust lights to provide the required light levels. Provide uniform illumination on the hopper, auger, and screed areas of pavers. Illuminate the operator's controls on all machines uniformly.

Furnish each side of non-street legal equipment with a minimum of 75 square inches high intensity retroreflective sheeting in each corner, so at least 150 square inches of sheeting is visible from each direction. Provide red sheeting on the rear of the equipment and yellow sheeting elsewhere.

Existing street and highway lighting and conventional vehicle headlights do not eliminate the need for the Contractor to provide lighting meeting the requirements of Table 643-2.

Provide sufficient fuel, spare lamps, spare generators, and qualified personnel to ensure that all required lights operate continuously during nighttime operations. Ensure generators have fuel tanks of sufficient capacity to permit operation of the lighting system for a minimum of 12 hours. In the event of failure of the lighting system, discontinue the operation until the required level and quality of illumination is restored.

Maintain a supply of at least 20 emergency flares for use in the event of emergency or unanticipated situations. Comply with local noise ordinances.

Install all post-mounted electroliers located within the clear zone, on NCHRP 350-compliant breakaway bases.
(03/15/06)ES14

Standard Modifications

Add the following new subsection:

643-3.11. HIGH VISIBILITY CLOTHING. Ensure workers within project limits wear an outer visible surface or layer that complies with the following requirements:

1. Tops. Wear fluorescent vests, jackets, or coverall tops at all times. Furnish each vest, jacket, or coverall top with at least one 360 degree horizontal retroreflective band around the torso; and two vertical retroreflective bands that begin at the horizontal band or lower in front, reach over the shoulder, and end at the horizontal band or lower in back. Furnish each jacket and coverall top with two horizontal retroreflective bands on each sleeve; one above and one below the elbow.

2. Bottoms. Wear fluorescent red-orange pants or coverall bottoms during nighttime work (sunset to sunrise). Worksite traffic supervisors, employees assigned to traffic control duties, and flaggers wear fluorescent orange-red pants or coverall bottoms at all times. Furnish each pants or coverall bottom with two horizontal retroreflective bands on each leg.

3. Raingear. Raingear tops and bottoms, when worn as the outer visible surface or layer, shall conform to the requirements listed in this subsection 643-3.11.

4. Exceptions. When workers are inside an enclosed compartment of a vehicle, they are not required to wear high visibility clothing.

5. Standard. High visibility garments shall conform to the requirements of ANSI/ISEA 107-2004, Class 2 for tops or Class E for bottoms, and Level 2 retroreflective material.

   Retroreflective bands are made of material conforming to either:

   a. A 2 inch wide strip, fluorescent yellow-green color, made of retroreflective microprisms; or
   b. A 2 inch wide strip, silver color, made of retroreflective lenses bonded to a durable cloth backing; and on 2 long edges apply 1 inch wide strips, fluorescent yellow-green color, made of durable cloth material. Total width of band is 4 inch.

6. Labeling. Garments shall be labeled according to Section 10.2 of ANSI/ISEA-107-2004; except garments may be labeled to conform to ANSI/ISEA 107-1999 until 1/1/08.

7. Condition. Furnish and maintain vests, jackets, coveralls, rain gear, hard hats, and other apparel in a neat, clean, and presentable condition. Maintain retroreflective material to Level 2 standards. (1/01/06)E28

Special Provisions

643-4.01 METHOD OF MEASUREMENT. Add the following item:

Detour. By the lump sum

Add the following:

Replace the second sentence of Item 2 with the following: Special Construction Signs are measured by the total area of legend bearing sign panel, as determined under subsection 615-4.01 and compensation for a 24 hour period shall be made under Construction Signs in the Traffic Control Rate Schedule.

Add the following: No measurement required to provide a 24-hour toll free (1-800-###-####) "hotline road report" telephone with a prerecorded message, and weekly notices with daily updates. Work will be subsidiary to Item 643(1) or 643(2), Traffic Maintenance. . (02/10/06)R222USC04

Standard Modification

643-5.01 BASIS OF PAYMENT. Add the following: Payment for high visibility clothing for workers is subsidiary to other items. (3/15/06)E29

Special Provisions

643-5.01 BASIS OF PAYMENT.: Add the following items:

16. Work Zone Illumination. Payment for work zone illumination and any required adjustments to work zone illumination is subsidiary to other items. ES14(3/15/06)

17. Item 643(20) Detour. Payment will be made at the contract lump sum price, and will include all work necessary to construct, maintain, demolish, and dispose of the detour as shown on the Detour Plan and Profile drawing, sheet K-9, including signing, barricades, precast concrete barrier, gabion baskets, earthwork, base course, emulsified asphalt treated base, high float surface treatment, pavement markings, flagging between station 34+00 and 39+00 and/or any flagging beyond this station range that is necessary because of rock that was blasted and pushed out of this station range, and other detour related traffic control.

Add the following: The Engineer does not require a change order/directive for Item 643(25) Traffic Control.

The Engineer will pay for Item 643(15), Flagging on a contingent sum basis at the rate of $40.00/hour. The Engineer does not require a change order/directive for the flagging pay item. Flagging associated with Change Order work will be paid

at the prices agreed to in the Change Order, or on a time and materials basis in accordance with Subsection 109-1.05. (07/07/05)R222USC04

No separate payment for keeping existing signs in service until they are no longer needed or temporary relocation of existing signs will be made. This work is subsidiary to Item 615(1), Standard Sign.

No separate payment for removal of existing sign post foundations or work required to abandon them in place will be made, but shall be subsidiary to Item 615(1), Standard Sign.

No separate payment for salvaging activities detailed in Subsection 615-3.01 will be made. This work will be subsidiary to Item 615(1), Standard Sign.

TRAFFIC CONTROL RATE SCHEDULE

Traffic Control Device	Pay Unit	Unit Rate
Construction Signs	Each/Day	$5.00
Special Construction Sign	Square Foot	$20.00
Type II Barricade	Each/Day	$ 3.00
Type III Barricade	Each/Day	$ 10.00
Traffic Cone or Tubular Marker	Each/Day	$ 1.00
Drums	Each/Day	$ 3.00
Sequential Arrow Panel	Each/Day	$55.00
Portable Concrete Barrier	Each	$60.00
Temporary Crash Cushion	Each	$500.00
ET-2000	Each	$3,500.00
Pilot Car	Hour	$65.00
Watering	M-Gallon	$ 20.00
Street Sweeping	Hour	$150.00
Power Broom	Hour	$75.00
Plastic Safety Fence	Linear Foot	$0.75
Portable Changeable Message Board Sign	Calendar Day	$150.00
Temporary Sidewalk Surfacing	Square Foot	$1.15
Flexible Markers	Each	$50.00
Removal of Pavement Markings	Linear Foot	$1.25
Temporary Guardrail	Linear Foot	$21.00

Delete Items 643(15) and 643(20) and add the following pay items:

Pay Item	**Pay Unit**
643(15) Flagging	Contingent Sum
643(20) Detour	Lump Sum

SECTION 644

SERVICES TO BE FURNISHED BY THE CONTRACTOR

Special Provisions

644-2.01 FIELD OFFICE. Delete this Subsection in its entirety and substitute the following: Furnish and maintain a suitable office for the Engineer, available for occupancy from two weeks prior to commencing work, through 30 days after issuance of the notice of project completion as defined in subsection 105-1.15. The following office requirements shall be met:

1. A minimum of 1,000 square feet of floor area. The office area shall be divided so that it contains an office room separated by a closable door. The office room shall have a minimum of 160 square feet of floor area.

2. A thermostatically controlled interior heating system with necessary fuel.

3. Adequate electrical lighting and 120 volt, 60 hertz power, with a minimum of six (6) electrical outlets.

4. A minimum of 100 square feet of window area and adequate ventilation.

5. Adequate parking for a minimum of 16 vehicles, with one handicap parking space meeting the requirements of Americans with Disabilities Act Accessibility Guidelines (ADAAG).

6. Attached indoor plumbing with sanitary lavatory facilities and potable drinking water provided.

7. Provide Engineering communications service to the field office with the minimum capability:

   3 phone/facsimile lines (separate numbers for each)
   High speed Internet service with cable modem.

   The Department will provide all phones, facsimile and wireless connection equipment.

8. If a part of the Contractor's building, it shall be completely partitioned off from the balance of the structure and provided with a separate outside door equipped with a lock.

9. Located within 2 miles of the project.

10. The Engineer's office shall be accessible by disabled individuals from the designated handicap parking space in accordance with the requirements of Americans with Disabilities Act Accessibility Guidelines (ADAAG).

11. Weekly janitorial service consisting of emptying trash receptacles, vacuuming office area and cleaning restrooms and counter areas.

12. Provide one mobilization and one demobilization of the Engineer's office equipment and furniture.

644-2.02 FIELD LABORATORY. Delete sub-item g of item 2 and substitute the following:

g. 500 gallon capacity tank with a pressure pump or a commercial pressurized system.

Add the following:

7. Supply 240 volt, 60 hertz power, a 100 pound propane bottle, and a 500 gallon capacity water tank with a pressure pump or a commercial pressurized system for a State provided portable asphalt lab at a location designated by the Engineer.

8. **The Department will transport their laboratory equipment to and from Unalaska Island. The Contactor shall transport the Engineer's laboratory equipment from the Unalaska Airport to the site of the field office and laboratory and transport the laboratory equipment back to the Unalaska Airport when requested by the Department.**

Add the following: Electricity, propane and water supplied for the State provided portable asphalt lab will not be paid for separately, but will be subsidiary to Item 644(2) Field Laboratory.
(11/19/02)R63USC

644-2.05 VEHICLES. Delete the second and third paragraphs and substitute the following: Furnish five (5) full-size four-wheel drive pickup(s) or sport utility vehicle(s) and one (1) full-size four-wheel drive sport utility vehicle (Suburban or equal) for exclusive use of the Department throughout the project. Provide vehicles less than three (3) model years old, in good condition and with less than 36,000 miles on the odometer.

Furnish fuels, maintenance, and insurance. If you are working after October 1, provide studded snow tires for the vehicles you provide for the Department's use. Equip vehicles used by the Department with CB radios and yellow lightbars wired into the vehicle's electrical system with a dash mounted switch easily accessible to the vehicle operator. Provide Code 3; Model 6005H (formerly PE 6200 LE) lightbars, or approved equal. Approved equals shall have the following characteristics:

Four (4) 55 watt rotators with amber filters
1200 flashes per minute
Two diamond mirrors
55 inches in length

You are responsible for normal wear and tear, and any other incidental damage including broken windshields, occurring during the Department's operation and use. The Department is responsible for damage to any vehicle caused by its own negligence during operation.

644-3.01 METHOD OF MEASUREMENT. Delete the third paragraph and substitute the following:

Vehicle. Per each vehicle provided. If a replacement vehicle is necessary, no additional measurement will be made.

644-4.01 BASIS OF PAYMENT. Add the following:

Engineering Communications. Payment for communication usage services shall be based on paid receipts to the service provider plus 15%. Costs associated with initial connection, providing equipment and disconnection shall be subsidiary to 644(1) Field Office.

Payment will be made under:

Pay Item	Pay Unit
644(8) Vehicle	Each
644 (9) Engineering Communications	**Contingent Sum**

(02/03/03)R245USC

Add the following Section:

SECTION 645

TRAINING PROGRAM

Special Provisions

645-1.01 DESCRIPTION. This Training Special Provision implements 23 CFR 230, Subpart A, Appendix B.

As part of the Equal Employment Opportunity Affirmative Action Program, provide on-the-job training aimed at developing full journey status in the type of trade or job classification involved. The number of individuals to be trained and the number of hours of training to be provided under this contract will be as shown on the bid schedule.

645-2.01 OBJECTIVE. Training and upgrading of minorities and women toward journey status is the primary objective of this program. Enroll minorities and/or women, where possible, and document good faith efforts prior to the hire of non-minority males in order to demonstrate compliance with this Training Special Provision. Specific good faith efforts required under this Section for the recruitment and employment of minorities and women are found in the Federal EEO Bid Conditions, Form 25A-301, items 7.b, 7.c, 7.d, 7.e, 7.i, 7.j and 7.l, located in the "green yellow pages" of this document.

645-3.01 GENERAL. Determine the distribution of the required number of apprentices/trainees and the required number of hours of training among the various work classifications based upon the type of work to be performed, the size of the workforce in each trade or job classification, and the shortage of minority and female journey workers within a reasonable area of recruitment.

Training will be provided in the skilled construction crafts unless the Contractor can establish before contract award that training in the skilled classifications is not possible on a project; if so, the Department may then approve training either in lower level management positions such as office engineers, estimators, and timekeepers, where the training is oriented toward construction applications, or in the unskilled classifications, provided that significant and meaningful training can be provided. Some offsite training is permissible as long as the training is an integral part of an approved training program and does not comprise a significant part of the overall training.

Credit for offsite training hours indicated above may only be made to the Contractor where the apprentices/trainees are concurrently employed on the project and the Contractor does one or more of the following occurs: contributes to the cost of the training, provides the instruction to the apprentice/trainee, or pays the apprentice's/trainee's wages during the offsite training period.

Where feasible, 25 percent of apprentices or trainees in each occupation shall be in their first year of apprenticeship or training.

Prior to award of the contract, submit Form 25A-311, Training Utilization Report, indicating the training program to be used, the number of apprentices/trainees to be trained in each selected classification, the number of hours of training to be provided, and the anticipated starting time for training in each of the classifications.

Training must begin within 2 weeks of the anticipated start date(s); unless otherwise authorized by a Directive. Such authorization will be made only after submission of documentation by the Contractor, and approval by the Engineer, of efforts made in good faith which substantiate the necessity for a change.

Contractors may use a training program approved by the U.S. Department of Labor, Bureau of Apprenticeship & Training (USDOL/BAT), or one developed by the Contractor and approved prior to contract award by the Alaska Department of Transportation and Public facilities (ADOT&PF) Training Program Representative, using Form 25A-310.

The minimum length and type of training for each classification will be established in the training program selected by the Contractor. Training program approval by the Department for use under this Section is on a project by project basis.

It is expected that each apprentice/trainee will begin training on the project as soon as feasible after start of work utilizing the skill involved and remain on the project as long as training opportunities exist or until training has been completed. It is not required that apprentices/trainees be continuously employed for the duration of the contract.

If, in the judgment of the Contractor, an apprentice/trainee becomes proficient enough to qualify as a journey worker before the end of the prescribed training period and the Contractor employs that individual as a journey worker in that classification for as long as work in that area remains, the individual's training program will be considered completed and the balance of training hours required for that apprentice/trainee shall be waived.

Furnish each ADOT&PF training program trainee a copy of the program (Form 25A-310) to be followed during training on the project, and with a written certification showing the type and length of training completed on the project. Existing USDOL/BAT apprentices should already have a copy of their program. No employee shall be employed for credit as an apprentice/trainee in a classification in which that employee has previously worked at journey status or has previously completed a training course leading to journey status.

Periodically review the training and promotion potential of minority and women employees and shall encourage eligible employees to apply for such training and promotion.

Provide for the maintenance of records and the furnishing of periodic reports documenting the progress of each apprentice/trainee. Submit Form 25A-313 by

the 15th of each month and provide each ADOT&PF trainee written evaluation reports for each unit of training provided as established on Form 25A-310.

645-3.02 WAGES. Trainees in ADOT&PF approved training programs will be paid prevailing Davis-Bacon fringe benefits plus at least 60 (but less than 100) percent of the appropriate minimum journey rate specified in the contract for the first half of the training period, at least 75 (but less than 100) percent for the third quarter of the training period, and at least 90 (but less than 100) percent for the last quarter of the training period. Trainee wages shall be identified on Form 25A-310. Apprentices in USDOL/BAT training programs shall be paid in accordance with their approved program. Beginning wages of each trainee/apprentice enrolled in a Section 645 Training Program on the project shall be identified on Form 25A-312.

645-3.03 SUBCONTRACTS. In the event the Contractors a portion of the work is subcontracted, he the Engineer shall determine how many, if any, of the apprentices/trainees are to be trained by the subcontractor. Any such subcontracts shall include this Section 645, Form 25A-311 and Form 25A-310, where appropriate. However, the responsibility for meeting these training requirements remains with the Contractor; compliance or non-compliance with these provisions rests with the Contractor and sanctions and/or damages, if any, shall be applied to the Contractor according to subsection 645-5.01, Basis of Payment.

645-4.01 METHOD OF MEASUREMENT. The Contractor will be credited for each approved apprentice/trainee employed on the project and reimbursed on the basis of hours worked, as listed in the certified payrolls. There shall be no credit for training provided under this Section before the Contractor's submittal and approval by the Engineer of Form 25A-312 for each apprentice/trainee trained under this Section. Upon completion of each individual training program, no further measurement for payment shall be made.

645-5.01 BASIS OF PAYMENT. Payment will be made at the contract unit price for each hour of training credited. Where a trainee or apprentice, at the discretion of the Contractor, graduates early and is employed as a journey worker according to the provisions of subsection 645-3.01, the Contractor will receive payment only for those hours of training actually provided.

This payment will be made regardless of other training program funds the Contractor may receive, unless such other funding sources specifically prohibits the Contractor from receiving other reimbursement.

Payment for training in excess of the number of hours specified on the approved Form 25A-311, may be made only when approved by the Engineer through Change Order.

Noncompliance with these specifications shall result in the withholding of progress payments until good faith efforts documentation has been submitted and acceptable remedial action has been taken.

Payment will be at the end of the project following the completion of training

programs approved for the project. No payment or partial payment will be made if the Contractor fails to do the following and where such failure indicates a lack of good faith in meeting these requirements:

1. provide the required hours of training (as shown on the approved Form 25A-311),

2. train the required number of trainees/apprentices in each training program (as shown on the approved Form 25A-311), or

3. hire the apprentice/trainee as a journey worker in that classification upon completion of the training program for as long as work in that area remains.

Failure to provide the required training damages the effectiveness and integrity of this affirmative action program and thwarts the Department's federal mandate to bring women and minorities into the construction industry. Although precise damages to the program are impractical to calculate, they are at a minimum, equivalent to the loss to the individuals who were the intended beneficiaries of the program. Therefore, where the Contractor has failed, by the end of the project, to provide the required number of hours of training and has failed to submit acceptable good faith efforts documentation which establishes why the Contractor was unable to do so, the Contractor will be assessed an amount equal to the following damages to be deducted from the final progress payment:

Number of hours of training not provided, times the journey worker hourly scale plus benefits. The journey worker scale is that for the classification identified in the approved programs. (10/29/91)S16

Payment will be made under:

Pay Item	**Pay Unit**
645(1) Training Program, Trainees/Apprentices	Labor Hour

SECTION 646

CPM SCHEDULING

Special Provisions

646-2.01 SUBMITTAL OF SCHEDULE Replace this subsection with the following: Submit a detailed initial CPM Schedule at the preconstruction conference for the Engineer's acceptance as set forth below.

The construction schedule for the entire Project shall not exceed the specified contract time. Allow the Engineer 14 days to review the initial CPM Schedule. Revise promptly. The finalized CPM Schedule must be completed and accepted before beginning work on the Project.

646-3.01 REQUIREMENTS AND USE OF SCHEDULE. Delete item 2. 60-Day Preliminary Schedule.

Delete the first sentence of item 3. Schedule Updates. and substitute the following: Hold job site progress meetings with the Engineer for updating the CPM Schedule. Meet with the Engineer monthly, or as deemed necessary by the Engineer. (12/13/02)R261M98

Add the following Section:

SECTION 647

EQUIPMENT RENTAL

Special Provisions

647-1.01 DESCRIPTION. This item consists of furnishing construction equipment, operated, fueled and maintained, on a rental basis for use in construction of extra or unanticipated work at the direction of the Engineer. Construction equipment is defined as that equipment actually used for performing the items of work specified and shall not include support equipment such as, but not limited to, hand tools, power tools, electric power generators, welders, small air compressors and other shop equipment needed for maintenance of the construction equipment.

The work is to be accomplished under the direction of the Engineer, and operations shall be according to the Engineer's instructions. The Engineer's instructions shall be to the Contractor's supervisory personnel only, not to the operators or laborers. In no case shall the Engineer's instructions be construed as making the Department liable for the Contractor's responsibility to prosecute the work in the safest and expeditious manner.

647-2.01 EQUIPMENT FURNISHED. In the performance of this work, furnish, operate, maintain, service, and repair equipment of the numbers, kinds, sizes, and capacities set forth on the Bid Schedule or as directed by the Engineer. The operation of equipment shall be by skilled, experienced operators familiar with the equipment.

The kinds, sizes, capacities, and other requirements set forth shall be understood to be minimum requirements. The number of pieces of each equipment to be furnished and used shall be as the Engineer considers necessary for economical and expeditious performance of the work. The equipment shall be used only at such times and places as the Engineer may direct.

Equipment shall be in first-class working condition and capable of full output and production. The minimum ratings of various types of equipment shall be as manufactured and based on manufacturer's specifications. Alterations will not be considered acceptable in achieving the minimum rating. Equipment shall be replaced when, in the opinion of the Engineer, the condition is below that normal for efficient output and production.

Equipment shall be fully operated, which shall include the operators, oilers, tenders, fuel, oil, air hose, lubrication, repairs, maintenance, insurance, and incidental items and expenses.

647-2.02 EQUIPMENT OPERATORS AND SUPERVISION PERSONNEL. Equipment operators shall be competent and experienced and shall be capable of operating the equipment to its capacity. Personnel furnished by the Contractor shall be, and shall remain during the work hereunder, the Contractor's employees.

Furnish, without direct compensation, a job superintendent or the Contractor's representative together with other personnel as are needed for Union, State, or Federal requirements and in servicing, maintaining, repairing and caring for the equipment, tools, supplies, and materials provided by the Contractor and involved in the performance of the work. Also, furnish without direct compensation, transportation as appropriate for the personnel.

647-3.01 CONSTRUCTION REQUIREMENTS. The performance of the work shall be according to the instructions of the Engineer, and with recognized standards and efficient methods.

Furnish equipment, tools, labor, and materials in the kinds, number, and at times directed by the Engineer and shall begin, continue, and stop the operations involved in the work only as directed by the Engineer.

Normally, the work is to be done when weather conditions are reasonably favorable, six (6) days a week, Mondays through Saturdays, holidays excepted.

The Engineer will begin recording time for payment each shift when the equipment begins work on the project. The serial number and brief description of each item of equipment listing in the bid schedule and the number of hours, or fractions to the nearest one-quarter hour, during which equipment is actively engaged in construction of the project shall be recorded by the Engineer. Each day's activity will be recorded on a separate sheet or sheets, which shall be verified and signed by the Contractor's representative at the end of each shift, and a copy will be provided to the Contractor's representative.

647-4.01 METHOD OF MEASUREMENT. The number of hours of equipment operation to be paid for shall be the actual number of hours each fully operated specified unit of equipment, or each fully operated specified combination of units of equipment, is actually engaged in the performance of the specified work on the designated areas according to the instruction of the Engineer. The pay time will not include idle periods, and no payment will be made for time used in oiling, servicing, or repairing of equipment, or in making changeovers of parts to the equipment. Travel time to or from the project, will not be authorized for payment.

647-5.01 BASIS OF PAYMENT. Payment for Item 647(1A) will be paid on a contingent sum basis at the rate of $125/hour. This shall be full compensation for furnishing, operating, maintaining, servicing and repairing the equipment, and for all incidental costs related to the equipment. Furnishing and operating of equipment of heavier type, larger capacity, or higher horsepower than specified will not entitle you to any extra compensation. (11/12/98) R15USC

8/24/05

Payment will be made under:

Pay Item	Pay Unit
647(1A) Wide Pad Dozer, 65-HP Minimum	Contingent Sum

Add the following Section:

SECTION 651

EAGLE AND STELLER'S EIDER MONITORING

Special Provisions

651-1.01 DESCRIPTION. This work shall consist of engaging a Professional Services Contractor to provide a monitor to observe eagle activity at nests and Steller's eiders when in-water work is underway in order to comply with this section and Section 107.

651-2.01 MATERIALS. A video camera with a minimum 10 power zoom lens shall be used to monitor and record eagle nest activity.

651-3.01 GENERAL REQUIREMENTS. The monitor shall work directly for the contract manager of the professional services contract. She/he shall be trained by the Professional Services Contract Manager or another qualified representative in the techniques of monitoring and observing eagles and Steller's eiders. The Professional Services Contract Manager will be responsible for preparing an eagle and Steller's eider monitoring plan in conjunction with the Contractor's work plan when it involves work within the restricted area or any timing restriction period.

The Professional Services Contract Manager shall meet one of the following criteria.

1. Have a bachelor of science degree in biology, environmental science or ecology and be presently working in that profession.
2. Have 2 years experience monitoring and observing eagles or other birds of prey or studying their habitat.

The on-site monitor shall be an employee of the Professional Services Contract Manager and shall be at least 18 years of age and physically able to perform all aspects of work.

651-4.01 METHOD OF MEASUREMENT. Item 651(1), Eagle and Steller's Eider Monitoring will be measured in the manner specified in the directive authorizing the work.

651-5.01 BASIS OF PAYMENT. Payment for Item 651(1), Eagle and Steller's Eider Monitoring will be full compensation to accomplish the work, as specified in the authorizing directive. Payment will be made under:

Pay Item	Pay Unit
651(1) Eagle and Steller's Eider Monitoring	Contingent Sum

SECTION 660

SIGNALS AND LIGHTING

Special Provisions

Replace 660-1.01 first and second paragraphs with the following:

660-1.01 DESCRIPTION. Furnish and install, modify, remove, or salvage one or more highway lighting systems, marine navigation lighting system, or combinations thereof, as specified.

Where an existing system is to be modified, reuse the existing material in the revised system as shown on the Drawings or specified in the Special Provisions, and salvage or dispose of all other materials. (DAH/06/22/06)

660-2.01 MATERIALS.

1. Equipment List(s) and Drawings. Delete item a in its entirety and the last sentence in item d and substitute the following:

   Materials on the *Approved Products List*: The Approved Products List does not apply to the 660 items. Provide catalog cuts of materials to the Engineer for review and approval.

   b. Materials Not Requiring Certification: Only submit these materials for review and approval if they are included on the Materials Certification List (MCL).

Add the following item:

Navigation Lighting. Submit a Navigation Lighting Package including:

i. catalog cuts that include the manufacturer's name, model number and conformance specifications.
ii. An equipment and parts list for all materials required for installation, including conduit and mounting hardware.
iii. Mounting details showing mounting points and required mounting hardware.
iv. Manufacturer's maintenance and operations manuals.

Submit the Navigation Lighting Package prior to submitting shop drawings for bridge items affected by installation of the navigation lighting.

2. As-Built Plans. Add the following:

The Engineer will deliver one copy each to State Maintenance and Operations; Technical Services; and attach the appropriate sheets of the last set in clear plastic envelopes to the inside of each controller assembly and load center.

CONSTRUCTION REQUIREMENTS

660-3.01 GENERAL. Delete items 3 through 8 in their entirety and substitute the following:

3. Excavating and Backfilling. Complete all excavation and backfill required to install the signal and lighting components embedded in the roadway as shown in the Plans, including foundations, conduits, junction boxes, and loop detectors. Complete this work according to the requirements of Section 643. Place excavated materials where it will not interfere with surface drainage.

   Support and protect conduits and utilities scheduled to remain in service when you encounter them during excavation.

   Excavate trenches wide enough to install the number of conduits specified side by side, to provide clearances of at least 2½ -inches around two-inch conduits and at least two-inches around conduits larger than two-inches, and to compact the bedding and backfill materials according to these specifications.

   To install conduits, excavate trenches deep enough to allow for six inches of bedding material, the depth of the largest conduit, and the minimum burial depth specified between the top of the conduit and finished grade of the ground above the conduit. Keep the longitudinal profile of trench bottoms free of irregularities that would prevent the assembled conduit run from continuously contacting the top of the bedding material.

   Dispose of, according to Subsection 203-3.01, all excavated materials that remain after completing all backfill work and all excavated material not meeting the requirements of Selected Material, Type C, as defined in Subsection 703-2.07.

   Dewater excavations immediately before and during embedding and backfilling operations. Backfill excavations with materials that meet the following requirements

   a. Around formed foundations and the tops of pipe pile foundations, use material that meets the requirements of Selected Material, Type A that passes through a 3 inch sieve,
   b. Within the limits of the typical section, embed conduits and backfill trenches using material that meets the requirements of the lift in which it is located, reusing excavated materials if it meets the requirements of the applicable lift,
   c. In all other locations, embed conduits and backfill trenches using material that meets the requirements of Selected Material, Type C, reusing excavated materials if it meets this requirement.
   d. Import, when ordered, embedment and backfill materials that satisfy the preceding materials requirements.

Embed conduit(s) between two six inch lifts of material gleaned free of rocks exceeding a one-inch maximum dimension. Grade and compact the first lift to provide a surface that continuously contacts the assembled conduit run.

Within six feet of paved surfaces and around foundations, backfill in uniform layers no more than six-inches deep and compact each layer according to Subsection 203-3.04. In all other locations, compaction may be as approved by the Engineer.

4. Welding. Complete all welding according to subsection 504-3.01.8. Welding and approved shop drawings.

Submit shop drawings of the proposed work with the welding plans for approval. The shop drawings shall include material specifications, component dimensions, the types of welds that will be made, and the proposed type and extent of weld inspection.

Repair the holes, which were used to mount equipment, in reused poles and mast arms by welding in disks flush with the adjoining surface. For the disk material, use steel that matches the ASTM designation, grade, and thickness of the steel used to fabricate each pole. Cut disks that match the dimensions of the hole being repaired from pieces of steel plate bent to match the pole's radius at the hole. Grind the welds smooth and flush with the adjoining pole and disk surfaces. Repair the damaged finish according to subsection 660-3.01.8.

5. Removing and Replacing Improvements. Complete the following work at your expense.
   a. Remove all improvements that block completion of the work detailed in the Plans as specified herein.
   b. Reconstruct with new materials the nonreusable improvements you remove to complete the work, the repairs of which are not covered by other items in the contract.
   c. Replace with new materials the reusable items you damage, which are specified for reuse.
   d. Reconstruct with new materials all improvements you damage or remove, which do not conflict with the work and are not scheduled for removal.

Nonreusable improvements consist of cast in place items, including: asphalt concrete pavement, sidewalks, curb and gutter, lawns, and traffic markings. Reusable improvements include the items that were made before they were installed. You may not, however, reuse crushed aggregate base material as backfill in the base course if excavation depth exceeds the thickness of the base course.

Complete all reconstruction work, including materials, according to the applicable sections of the Alaska SSHC, and leave the work in a satisfactory and serviceable condition. In completing the reconstruction

work, match the alignments, widths, thicknesses, shapes, sizes, cross sections, and finishes of the existing improvements.

If you remove a portion of sidewalk or curb and gutter, remove an entire segment between the weakened plane contraction joints or between an expansion joint and a weakened plane contraction joint.

Before removing a segment of Portland or asphalt cement concrete material, cut completely through the material with a saw along the outline of the area to be removed. Make cuts neat and true and prevent shatter outside the area removed.

To replace lawns, leave the top of the backfilled excavation low enough to install four inches of compacted topsoil. Match the top of the topsoil with the bottom of the vegetative mat. Apply seed and keep the seeded areas watered according to Section 618.

Remove, keep alive, and replant trees, shrubs, and plants according to Section 621. Replace the trees, shrubs, and plants that do not survive with plants of like size and type.

6. Salvaging and Reusing Electrical Equipment. When the Plans include existing electrical equipment scheduled for removal or relocation, remove and store the equipment listed in the following paragraph without damaging it. Deliver all removed equipment not scheduled for reuse to the nearest District Maintenance Station or place specified in the Plans or Special Provisions. Notify the district superintendent or person specified by telephone one-week before your planned delivery date.

Salvage the controller assemblies, signal heads, mounting brackets, luminaires, lighting standards, signal posts and poles, mast arms, optical detectors, load centers, light emitting diode optical units, and the lids of junction boxes scheduled for removal and all other materials scheduled for relocation. Replace at your expense all salvaged equipment damaged or destroyed before or during delivery or reinstallation.

Controller assemblies and load centers include the cabinet and all equipment contained in the cabinet before Contract award.

Remove from the highway right-of-way all materials associated with the equipment removed or relocated and not scheduled for reuse, including conduits, junction boxes, conductors, and foundations. Raze the tops of foundations abandoned in place according to subsection 660-3.02. Fill the holes left by removing junction boxes and foundations with selected material type A and compact them as directed.

With approval, after removing all conductors, you may abandon buried conduits that do not interfere with other construction with a credit taken by the Department. Remove the ends of all abandoned conduits from the junction boxes that will remain in service.

Within 15 days of the Notice to Proceed, complete an inventory of the materials that will be salvaged in the presence of the Engineer. Note the location and condition of the materials. When you find material specified for reuse in an unserviceable condition, the Engineer will determine whether to repair it or replace it with new material, which will be paid for as extra work under subsection 109-1.05. Retain a copy of the inventory and give the original documents to the Engineer.

When the Plans specify reinstalling existing equipment at new locations and installing State furnished equipment, complete the following work at your expense.

a. For poles, install new foundations, furnishing the new nuts, bolts, washers, and conduits needed to complete the installations.
b. For lighting poles, install new illumination tap wires and fused disconnect kits.
c. For luminaires, clean the luminaires inside and out and install new lamps of the same wattage.
d. For signal heads, furnish and install the mounting brackets needed to complete the relocation, and clean the signal heads inside and out.
e. For poles and undisturbed poles from which the Plans specify removing equipment, repair the holes that were made to mount equipment according to subsection 660-3.01.4. Welding and repair the finishes according to subsection 660-3.01.8.

When ordered, the Engineer will pay for repairing damaged finishes on existing equipment according to subsection 660-3.01.8 as extra work.

If you decide to use new equipment rather than reusing the equipment specified, notify the Engineer of the change and include a submittal per subsection 660-2.01.1.

7. Field Tests. All electrical circuits must pass the following tests before the Engineer will accept the work for payment. Perform these tests in the presence of the Engineer, and document the results of each test on a per circuit basis. Retain a copy of all test results and give the original documents to the Engineer. Furnish all equipment needed to perform these tests.

Replace or repair at your expense, and in an approved manner, faulty materials and work revealed by these tests. After making repairs, repeat all tests on the repaired circuit and continue this process until all circuits have passed all required tests. The Department reserves the right to have you retest circuits, and to use the retest results to accept or reject individual circuits.

a. Grounds. Before completing the circuitry and functional tests, physically examine conduits ends, junction box lids, load centers, and the foundations for signal posts and poles, lighting poles, and

controller cabinets to ensure the grounding system required by subsections 660-3.06 and 661-3.01 has been installed and all splices and connections are mechanically firm.

b. Continuity. Test each loop detector circuit for continuity at the roadside junction box before splicing the loop detector to the lead-in cable. Each loop detector must have a resistance less than 0.5 ohms.

After splicing the loop detectors to the lead-in cables, test each pair at the controller or detector cabinet. Each pair must have a value less than 5 ohms for single pair lead-in cables and 10 ohms for multi-pair lead-in cables. The continuity test ohm reading at the cabinet must be greater than the ohm reading measured for the loop detector at the junction box.

c. Insulation Resistance (megohm) Test. Complete this test to verify the integrity of each conductor's insulation after pulling the conductors and cables into position and before terminating the conductors. At 500 volts DC, each conductor's insulation shall measure a minimum resistance of 100 megohms or the minimum specified by the manufacturer. With single conductors, complete the test between each conductor and ground. In each multi-conductor cable, complete the test between conductors and between each conductor and ground.

After splicing the loops to the lead-in cables, measure each pair in the lead-in cables at the controller or detector cabinet between one conductor and the cabinet ground rod.

d. Inductance Test. Measure each detector loop and lead-in cable system at the controller or detector cabinet. The inductance must be in the range of 50 to 500 microhenries.

e. Circuit. Energize every signal indication circuit with lamps installed before installing the load switches.

f. Functional. Perform the following tests on each signal and lighting system after the component circuits have satisfactorily passed the tests for continuity, grounding, insulation integrity, and circuitry.

1) For each new traffic signal system, complete at least 24 hours of flashing operation, followed by not less than 5 days of continuous, satisfactory operation. The Engineer may decide to omit the flashing portion of the test for modified signal systems and for new signals that replaced existing signals that remained in operation during the construction phase.

If the Engineer omits flashing operation and the system

performs unsatisfactorily, correct the condition and repeat the test until the system runs for five days with continuous, satisfactory operation.

Begin the signal functional tests between 9:00 a.m. and 2:00 p.m. on any day, except a Friday, Saturday, Sunday, a legal holiday, or the day before the legal holiday.

Before each system turn-on, aim signal faces according to subsection 660-3.08 and ensure all equipment specified in the Plans is installed and operable, including: pedestrian signals and push buttons; signal backplates and visors; vehicle detectors; highway lighting; and regulatory, warning, and guide signs.

2) Perform the functional test for each highway lighting system and sign illumination system until the systems burn continuously 5 days without the photocell, followed by a 5-day operational test using the photocell.

3) Perform the functional test for each flashing beacon system for not less than 5 days of continuous, satisfactory operation.

4) Perform a continuous 5-day burning test on each pedestrian overpass and underpass lighting system before final acceptance.

A shut down of the electrical system due to a power interruption does not constitute discontinuity of the functional test if the system functions normally when power is returned.

8. Repairing Damaged Finishes. Examine new, reused, and State-furnished equipment for damage to its finish before you put the equipment into service. Repair the damaged finishes found according to the following:

a. Galvanized. Repair damaged areas more than 12-inches away from welds and slip fit areas, by applying a minimum 7.8 mils of zinc-based alloy applied according to ASTM A780.

If the damaged areas are within 12-inches of welds and slip fit areas, make the repair by applying a minimum 7.8 mils of zinc-rich paint applied according to ASTM A780.

b. Painted. Repair damage to painted finishes according to the following

(1) Wash the equipment with a stiff bristle brush using a solution containing two tablespoons of heavy-duty

detergent powder per gallon of water. After rinsing, wire brush surfaces to remove poorly bonded paint, rust, scale, corrosion, grease, or dirt. Remove dust or residue remaining after wire brushing before priming.

(2) Factory or shop cleaning methods may be used for metals if equal to the methods specified herein.

(3) Immediately after cleaning, coat bare metal with pre-treatment, vinyl wash primer, followed by 2 prime coats of zinc chromate primer for metal.

(4) Give signal equipment, excluding standards, a spot-finishing coat on newly primed areas, followed by 1 finishing coat over the entire surface.

(5) Give non-galvanized standards 2 spot-finish coats on newly primed areas.

Paint coats may be applied either by hand brushing or by approved spraying machines. Perform the work in a neat and workmanlike manner. The Engineer reserves the right to require the use of brushes for the application of paint, should the work done by the paint spraying machine prove unacceptable.

Add the following new item 9:

9. Regulations and Code. Complete all work according to the standards of the NEC, the NESC, and local safety codes as adopted and amended by the authority having jurisdiction.

660-3.02 FOUNDATIONS. Under item 1. Cast-in-Place Foundations., add the following to the first paragraph: See AKDOT South Channel bridge drawings for Electrolier foundations. (DAH/06/22/06) Locate the tops of all traffic signal post and pole foundations flush with the adjacent finished: walkway, shoulder, or surrounding ground.

Cast-in-Place Foundations. In subparagraph f, revise the second sentence to read: Before placing the form or reinforcing steel cage, remove all loose material from the bottom of the hole to ensure the foundation rests on firm, undisturbed ground.

In the second sentence of sub-item i delete "prior to grouting." and substitute "before attaching the skirt."

In the first sentence of sub-item j, delete "concrete pile caps" and substitute "foundations"

Delete item k and add the following new items k and l:

k. Install the bottoms of the bottom leveling nuts in a level plane

within one-inch of the top of foundations. Generously lubricate the bearing surface and internal threads of top nuts with beeswax and tighten the top nuts according to the anchor bolt tightening procedure included in the subsection 660-3.08.5 High Tower Lighting System Installation.

1. Attach a 4 AWG, bare, solid copper wire as a grounding electrode conductor to the #4 spiral bar in the reinforcing steel cage. Use an irreversible compression connector or cadweld to make the attachment. Protect the attachment during concrete placement. In foundations that lack reinforcing steel cages, install 21 feet of coiled 4 AWG, bare, solid copper wire as the grounding electrode. Route the conductor to protrude near the top, center of the foundations. Slide a minimum six-inch long, non-metallic, protective sleeve over the conductor. Allow one-inch of the sleeve and 24-inches of conductor to protrude from the foundations.

Replace subsection 660-3.03 with the following:

660-3.03 CONDUIT. All electrical conductors shall be installed in conduit, except for overhead wiring, wiring inside poles, and when otherwise specified. Use rigid metal conduits (RMC) and fittings for raceways, including bored casings. Use rigid, nonmetallic conduit (RNMC), including polyethylene and fiberglass when specified in the Plans. Use Aluminum conduit for weather-exposed conduit in the navigation light system. Install conduits of the sizes specified along the routes detailed on the Plans. When routing is not shown, route conduits as directed by the Engineer. (PD, 9/26/05)

1. Install conduits at least 30-inches below the finished grade of the ground above the conduit, except conduits that will be sealed under a minimum 4-inch thick Portland cement concrete sidewalk may be installed a minimum of 18-inches below the top back of curb or surface above the conduit, whichever is lower.

2. Install conduits that cross unpaved-areas and paved roadways that will be overlaid in excavated trenches. Excavate, bed conduits, and backfill trenches according to subsection 660-3.01.3, Excavating and Backfilling.

3. Install conduit(s) under paved roadways and approaches that will not be overlaid by boring or drilling methods. Jacking conduits into position is allowed. However, if subsurface conditions prevent the successful completion of the work, you must install the conduit(s) by boring or drilling methods without additional compensation.

4. Sweep both rigid metal and polyethylene conduits through the open bottom of junction boxes by installing 90-degree rigid metal elbows on the ends of conduit runs. To each elbow, install a nipple that terminates 5 to 12-inches above the bottom edge of each junction box.

5. Install the tails of loop detectors without elbows through the walls of junction boxes at elevations that ensure the loops drain into the box. Extend the ends a minimum of 2-inches beyond the inside wall of the box.

6. Drill a 3/8-inch drain hole in the bottom of the lower straight section of all elbows and in the bottom of conduits at the low points of all conduit runs. Smooth the edges of the drilled holes on the inside of elbows to prevent scraping the conductors. Cover the holes with a wrap of approved filter cloth secured with two self-clinching nylon cable ties.

7. Keep conduits clean at all times. Install grounding bushings and approved plastic insert type plugs on the ends of all conduit runs before backfilling around the conduit ends.

8. At the low points of conduit runs, install sumps containing a minimum 2 cubic-feet of coarse concrete aggregate material that conforms to subsection 703-2.02. Compact the aggregate sumps as directed to prevent settlement of the trench backfill.

9. Install conduits that must cross existing facilities such as storm-drain pipes, duct systems, and other underground utilities at the minimum depths specified, going under the facilities if necessary. Install additional drains and aggregate sumps at the low spots, if any.

10. Position conduits in trenches, junction boxes, and foundations to provide clearances of at least 2½ -inches around two-inch conduits and at least 2-inches around conduits larger than 2-inches.

11. Fabricate rigid metal conduits less than 10 feet long from standard lengths of conduit. Cut conduits squarely to ensure the threading die starts squarely on the conduit. Cut the same number of threads as found on the factory threaded ends. Ream the inside of all conduit-ends cut in the shop or field to remove burrs and sharp edges. Do not use slip joints or pieces of running thread pipe.

12. Coat drilled holes, shop and field cut threads, and the areas with damaged zinc coating with zinc rich paint.

13. When standard couplings cannot be used to join conduit components, use approved threaded unions.

14. Bury a continuous strip of 4 mils thick, six-inch wide polyethylene marker tape above all underground conduit runs. Install the tape 9-inches (± 3 inches) below finished grade, using two strips side-by-side to mark road crossings. Furnish tapes with a black legend on a red background.

15. If you encounter obstructions during jacking or drilling operations, obtain approval and cut small holes in the pavement to clear the obstruction. Locate the bottom inside face of the bore pit no closer than the catch point of a 1-¼ to 1 slope (a horizontal to vertical ratio) from the edge of

pavement. Do not leave these pits unattended until you have installed an approved means of protection.

16. When the Plans specify using polyethylene conduit, install RMC in structures and foundations, between type 2 and 3 load centers and the nearest junction box, and on the surfaces of poles and other structures.

17. In foundations, install 90-degree elbows and conduits of the size and quantity shown on the Plans. Extend the conduits a maximum of 2-inches above the top of the foundations for posts and poles with breakaway bases and 4-inches above the top of foundations for fixed base structures.

18. Seal conduits leading to electrical equipment mounted on soffits, walls, and other locations below the grade of the serving junction box with an approved duct-sealing compound.

19. Install expansion fittings in all conduits that cross expansion joints.

20. Install a polypropylene pull rope with a minimum 200-pound tensile strength in all future use or spare conduits, and reinstall the plugs. Double back at least two feet of pull rope into both ends of each conduit.

21. You may install conduits larger than the sizes specified. If used, it must be for the entire length of the run. Reducing couplings or bushings are not allowed. Complete all work associated with installing conduits larger than specified without extra compensation.

22. Clean existing conduits that will remain in service using a heavy-duty air compressor that delivers at least 125 cubic feet of air per minute at a pressure of 110 pounds per square inch. Clean the conduits before pulling in new cables and after removing cables specified to be removed or replaced as follows:
    a. When the conduits contain cables that will remain in service, leave the cables in place during the cleaning, and
    b. Ream empty conduits with a mandrel or cylindrical wire brush before blowing them out with compressed air.

23. When you modify existing conduit runs, complete the work as required for new installations using the same sizes and types of conduit. When you extend existing conduits, add no more than 90 degrees of horizontal bend to the extension.

24. When you install a junction box in a continuous run of existing conduit, remove a length of conduit in each conduit run and complete the work of installing the conduits, elbows, and nipples as required for a new installation.

25. When you adjust existing junction boxes to a new grade, remove all cables and replace the nipples as required to provide the clearances specified for new installations.

26. Remove the ends of abandoned conduits from junction boxes that will remain in service.

Replace subsection 660-3.04 with the following:

660-3.04 JUNCTION BOXES. Install pre-cast reinforced concrete junction boxes of the types specified. For junction boxes that contain traffic signal conductors, furnish cast iron lids with the word TRAFFIC inscribed into them. For junction boxes that contain lighting conductors exclusively, furnish cast iron lids with the word LIGHTING inscribed into them.

When shown, install junction boxes at the station and offset locations specified. When lateral locations are not specified, install junction boxes eight feet from the face of curb or edge of pavement. If the eight feet offset falls

1. In a pedestrian facility separated less than seven feet from the roadway face of curb or edge of pavement, increase the offset and install the junction boxes on the backside of the facility. When you lack the right of way to install them outside the pathway, install them at locations as directed, avoiding curb ramps, curb ramp landings, and the middle of walkways.
2. In a pedestrian facility separated at least seven feet from the roadway face of curb or edge of pavement, reduce the offset and install the junction box next to the facility.
3. Outside the right of way, install the boxes just inside the right of way line.
4. In a raised median, install junction boxes near the center of the median.
5. In a ditch bottom or area that collects drainage, install the junction boxes at locations as directed.
6. Behind guardrails that shield slopes steeper than 3:1 (a horizontal to vertical ratio), install junction boxes between posts and at least five feet back from the face of rail.
7. On top of underground utilities or storm drains, install the junction boxes at locations as directed.

Longitudinally, install junction boxes adjacent to the loop detectors or pole they serve, except avoid installing type 1A junction boxes in driveways and in locations subject to use by heavy trucks. When shown near the ends of medians, install junction boxes at least ten feet from the median end. When the offsets for electroliers and flashing beacon posts place them near the junction boxes that serve them, install the junction boxes on the side of the electroliers and posts downstream of traffic flow.

Limit the distance between adjacent junction boxes to the following dimensions:

1. 400 feet for conduits that contain signal interconnect cable only.
2. 300 feet for conduits that exclusively contain two loop lead-in cables or a single cable other than signal interconnect.
3. 190 feet for conduits that contain more cables than those listed in the two preceding limitations.
4. If the three preceding limitations require installing additional junction boxes not shown on the Plans, the Engineer will pay for them as extra

work, otherwise, installing additional junction boxes will be at your expense.

After grading the roadside, vertically adjust those junction boxes that do not conform to the following criteria. In unpaved areas that will not be seeded, in areas adjacent to pedestrian facilities, and in paved medians, install the tops of junction boxes one-inch below finished grade. In seeded areas, install the tops of junction boxes to two-inches below the seeded surface.

Bond all junction box lids to an equipment-grounding conductor according to subsection 660-3.06. Attach the jumpers to the lids with brass or stainless steel hardware.

Install a stone drain under each junction box. All drains shall consist of coarse aggregate for concrete that conforms to subsection 703-2.02. Minimum drain dimensions include an 18" depth and a length and width equal to those of the junction box it drains. Compact the aggregate material as directed to prevent junction box settlement.

In every new and reused junction box, install an electronic marker that consists of an antenna encapsulated in a 4-inch diameter red polyethylene ball. Furnish markers that conform to the American Public Works Association standards for locating power. Markers shall respond to locator devices up to 5-feet away, work at all temperatures, and contain no internal power source.

660-3.05 WIRING. Delete the second paragraph in its entirety and substitute the following:

Do not pull conductors into conduits until the following conditions are met:

1. The prescribed clearances around conduit ends are provided,
2. Crushed rock sumps are installed under junction boxes,
3. Conduit ends protrude above the bottom of junction boxes within the prescribed range,
4. New conduits are free of all materials that became lodged in them during the completion of the work,
5. Reused conduits are cleaned according to subsection 660-3.03,
6. Junction boxes are set to grade, and
7. Grounding bushings are installed on the ends of metallic conduits.

Delete item 3 in its entirety and substitute the following:

3. Pull, as a unit, the conductors specified to be installed into clean conduits, leaving existing conductors that will remain in service in place.

Add the following line to Table 660-1 under subitem a. of item 9.

LOOP DETECTOR NUMBER	COLORED PAIR
Usually a spare pair	Orange and Black

Delete items 11 and 12 in their entirety and substitute the following:

11. Encapsulate illumination cable splices in rigid 2-piece plastic molds filled with an insulating and sealing epoxy resin. Furnish molds large enough to complete the splices and encase the cable jackets in the epoxy resin. Furnish molds rated for 600 volts AC operation and feature fill and vent funnels for epoxy resin. Fill the splice mold bodies with epoxy resin that is resistant to weather, aromatic and straight chain solvents, and that will not sustain combustion.

12. Encapsulate loop lead-in and telemetry cable splices in rigid, transparent, PVC molds filled with re-enterable polyurethane electrical insulating and sealing compound. Furnish splice kits rated for 1000 volts AC operation and direct burial.

Provide re-useable four piece molds that are held together with stainless steel hose clamps. Two pieces form a cylinder and two flexible end caps seal the ends and allow the conductor entry. Use molds with dimensions suitable for the splice made, encase the cable jackets, and have fill and vent funnels.

Insert a loose woven polyester web that allows a full ¼-inch of insulating compound to flow between the splice and the inside of the mold. Fill the PVC molds with re-enterable polyurethane electrical insulating and sealing compound that cures transparent, is nontoxic, is non-corrosive to copper, and does not support fungi or mold growth.

Add the following items:

18. Retrofit reused poles with new tap wires, fused disconnect kits, and fuses.

19. Whenever you can not terminate the conductors specified in the Plans in circuit breakers due to their size, splice a piece of #8 AWG power conductor onto the end of each conductor using an overlap type, irreversible compression connector. Insulate the splice with heat shrink tubing. Complete the splice in the space between the top of the load center foundation and the bottom of the cabinet. Limit the length of the #8 AWG conductor to 5 feet.

Replace Subsection 660-3.06 with the following:

660-3.06 BONDING AND GROUNDING. Bond and ground all branch circuits according to the NEC and the following requirements. Make all non-current carrying but electrically conductive components, including: metal conduits, junction box lids, cabinets, transformer cases, and metal posts and poles, mechanically and electrically secure to an equipment grounding conductor. Make fixtures mounted on metal poles, including signal components and luminaires, mechanically and electrically secure to the pole.

Install grounding bushings with insulated throats on the ends of all metallic

conduits.

Install a bare stranded copper wire for the equipment-grounding conductor in all conduits, except those conduits you install for future use. Install size 8 AWG conductors, except in those conduits that contain circuit conductors larger than 8 AWG. In this case, install a wire equal in size to the largest circuit conductor. Attach the grounding conductors to the grounding bushings, leaving 12 inches of slack between each bushing. Connect grounding conductors together using irreversible compression type connectors to form a fully interconnected and continuous grounding system.

Retrofit all existing spare conduits that will contain new cables exclusively with new grounding bushings. When the Plans require you to install or remove conductors from existing conduits, retrofit them with new grounding conductors sized according to the preceding paragraph.

Bond junction box lids to the grounding conductor using copper braid with a cross-sectional area equal to an 8 AWG conductor. Connect bonding jumpers to the grounding conductors using irreversible compression type connectors. Replace all missing or damaged conduit and junction box lid bonding jumpers.

Join the equipment grounding conductors from the conduits to the 4 AWG grounding electrode conductor using irreversible compression connectors at Portland cement concrete foundations. For pile foundations, attach the equipment grounding conductor from the conduit to the pile cap adapter with a listed mechanical grounding connector.

When you install signal poles, signal posts, and lighting standards with frangible coupling bases, run a four feet long grounding conductor from the grounding bushing on the conduit to the grounding lug located in the hand hole of each pole.

Bond slip-base type standards and pedestals by using 2 conductors from the conduit, one attached with a ground rod clamp to an anchor bolt and the other connected to the grounding lug located in the hand hole of each pole.

Ground one side of the secondary circuit of a transformer.

Install a ¾ inch by 10 feet copper clad ground rod inside each controller cabinet foundation and a 6 AWG bare stranded copper wire for the grounding electrode conductor.

Replace subsection 660-3.08 with the following:

660-3.08 SIGNAL AND LIGHTING INSTALLATION REQUIREMENTS. Install signal and lighting equipment according to the details shown on the Plans and the following:

Determine the shaft lengths of lighting to provide the plan mounting heights of luminaires.

Furnish all work to install foundations for relocated poles, including: conduit, excavation, reinforcing steel, class A concrete, anchor bolts, nuts, and washers.

1. Electrolier Installation. Before installing electroliers, check the socket position of each luminaire to verify it matches the position indicated in the instructions for the light distribution type shown on the Plans.

   Install electroliers with mast arms with a slight rake by plumbing the side of the pole opposite the mast arm. After the pole has been plumbed, level the luminaire as recommended by the manufacturer.

   Install electroliers without mast arms with the centerline of the pole plumb.

660-4.01 METHOD OF MEASUREMENT. Add the following:

Item 660(31) Navigation Lighting System. By the complete, installed system of navigation luminaires, and associated raceway and wiring.

660-5.01 BASIS OF PAYMENT. Add the following: The amount bid for an item shall include full compensation for:

1. All excavation, bedding, and backfill to install the components shown in the Plans. Dewatering excavations is a subsidiary obligation of completing the excavation work.

2. Removing and repairing existing improvements to complete the work, the repairs of which are not covered by other items in the contract.

The Engineer will pay for the disposal of all surplus and unusable excavation and for all imported backfill and bedding material at their respective contract unit prices, or as extra work if the contract does not include these items.

The costs of repairing damage to finishes on new equipment are a subsidiary obligation.

The costs of maintaining the existing and temporary electrical system to keep them fully operational are a subsidiary obligation of the 660 items included in the contract.

Lighting systems included in this project consist of the Highway Lighting System and the Navigation Lighting System. The Highway Lighting System consists of, but is not limited to, typical roadway luminaires, poles and their foundations, mast arms, and associated raceway and wiring. The Navigation Lighting System consists of, but is not limited to, the navigation luminaires, and associated raceway and wiring.

Bid Item Descriptions:

Item 660(1), Highway Lighting System Complete – Lump sum for installation of Highway Lighting System as shown on the drawings inclusive of luminaries, poles, foundations, associated junction boxes, conduits, conductors, terminations, connectors, related materials, installation and testing, temporary power to existing lighting during construction, retirement of existing lighting.

Item 660(2), Navigation Lighting System Complete – Lump sum for installation of Navigation Lighting System as shown on the drawings inclusive of luminaries, swing brackets, support structures, associated junction boxes, conduits, conductors, terminations, connectors, related materials, installation and testing, temporary power to existing lighting during construction, retirement of existing lighting.

Payment will be made under:

Pay Item	**Pay Unit**
660(31) Navigation Lighting System Complete	Lump Sum

SECTION 661

ELECTRICAL LOAD CENTERS

Special Provisions

Change first paragraph 661-3.01 to read:
661-3.01 CONSTRUCTION REQUIREMENTS. Install load centers at the location and position shown on the Plans. Any deviation from the plan location must be coordinated with and approved by the serving utility and the Engineer. Provide temporary connections to existing bridge lighting. Retire temporary connections at completion and acceptance of new bridge lighting.

Change 661-4.01 to read:
661-4.01 METHOD OF MEASUREMENT. Payment shall be for completion of work as described in Pay Item Descriptions:

Item 661 (2), Load Center, Type 1A – The quantity of meter bases, mounting poles, ground wires and cable connections to be paid for shall be the actual number of completed and accepted installations shown on the drawings. Both underground service and overhead aerial wiring shall be subsidiary to this pay item and includes the feeder from the transformer to the existing Bridge lighting. This is a temporary connection which shall be removed after the new Bridge is in service.
(DAH/06/22/06)

ADDENDUM No. 1
ATTACHMENT No. 12

SECTION 670

TRAFFIC MARKINGS

Delete this section in it's entirety and substitute the following:

670-1.01 DESCRIPTION. Furnish and place traffic markings of the type, color, dimensions, and at the locations shown on the Plans. Meet these specifications and the applicable portions of the Alaska Traffic Manual.

670-2.01 MATERIALS. Use materials that conform to the following:

Traffic Paint	**Subsection 708-2.03**
Glass Beads	**Subsection 712-2.08**
Preformed Pavement Markings	**Subsection 712-2.14**
Raised and Recessed Pavement Markers	**Subsection 712-2.15**

Construct the iron casting for the raised pavement markers of modular iron meeting ASTM A 536.

670-3.01 CONSTRUCTION REQUIREMENTS. Install interim pavement markings meeting Section 643 if permanent markings are not installed prior to opening the roadway to traffic.

1. **Paint.**

   a. **Apply paint only to pavements that are clean, dry, and warmer than 40 °F.**

   b. **Remove all dirt, oil, grease, and other foreign matter from the surfaces to be painted in a satisfactory manner.**

   c. **Apply the paint at the rate of 80 ft^2/gal (approximately 20 mils wet film thickness). This rate is effectively 22 gallons of paint per mile of solid 4-inch stripe. A tolerance not to exceed 10% is allowed for film thickness or yield.**

   d. **Apply glass beads over the wet painted stripes in a uniform pattern at the rate of 6 pounds (± 0.1 pound) of beads per gallon of paint. Pressure-apply the beads using a mechanical dispenser mounted not more than 12 inches behind the paint dispenser.**

   e. **Use approved equipment for highway lane striping that is specifically designed and manufactured for that purpose by a company experienced in the design and manufacture of such equipment. Minimum requirements include the capability of striping two 4-inch yellow centerlines and one 4-inch white edge line simultaneously. Apply markings with clear-cut edges, true and smooth alignment, and uniform film thickness.**

2. **Preformed Marking Tapes (PMT).** Apply the PMT material as directed by the manufacturer by either the inlay or overlay method. Use the inlay method whenever new asphalt concrete is placed. Use the overlay method to apply markings to existing pavement.

   Store all PMT materials between 60 °F and 85 °F for at least 24 hours prior to installation. During installation, maintain field stockpiles at the required storage temperature.

   For the inlay method, embed the pavement markings in the asphalt concrete surface with a conventional steel wheeled roller. Apply when the surface temperature of the mat is the warmest possible without deforming the marking. The minimum allowable surface temperature, taken within 3/8 inch of the top of the mat, is 140 °F.

   If the application of the PMT materials falls behind the paving operation to the extent that the markings are not being applied at the minimum acceptable temperature, slow the paving operation to match the rate of the marking laydown. Resume full paving operations after demonstrating that you have sufficiently skilled personnel to install the markings within the required temperature limits.

   When applying pavement markings by the overlay method, ensure the surface is clean and dry and is at least 60 °F and rising. Broom the surface clean. Remove any dust using compressed air. Apply a coat of primer/adhesive activator according to the manufacturer's recommendations. Install and roll the markings with a minimum 200-pound pneumatic roller.

3. **Raised and Recessed Pavement Markers.** Install raised and recessed pavement markers per the manufacturer's instructions.

   Cut or dado the finished pavement surface with a concrete saw to produce a slot with dimensions as shown on the Plans or recommended by the manufacturer. Clean and dry the slots using compressed air. Install a reflective marker of the color indicated with an epoxy adhesive recommended by the marker manufacturer.

670-3.04 PAVEMENT MARKING REMOVAL. Remove all existing traffic markings that are in conflict with the striping details shown on the Plans, an approved TCP, or any temporary striping as directed. Do not paint over existing markings. Do not use open flame on the final paving lift.

Remove pavement markings to the fullest extent possible without materially damaging the pavement surface, color, or texture. As the work progresses, remove sand or other material deposited on the pavement as a result of removing markings. Remove accumulations of sand or other material that might interfere with drainage

or constitute a hazard to traffic.

Before making any change in the traffic pattern, remove or obliterate pavement markings that may create confusion to motorists.

Where using blast cleaning to remove pavement markings or objectionable material within 10 feet of a lane occupied by public traffic, immediately remove the residue (including dust) after contact between the sand and the surface being treated. For such removal, use a vacuum attachment operating concurrently with the blast cleaning operation or by other approved methods.

Repair any damaged pavement or surfacing caused by the pavement marking removal operation.

670-3.05 PRELIMINARY SPOTTING. Provide the necessary control points at intervals including all changes of direction and changes in the basic configuration of striping, such as at the beginning and ending of no-passing zones on a 2-way, 2-lane roadway. Use these points in preliminary spotting of lines before striping is commenced. Perform preliminary spotting of the lines to be painted and obtain approval for all spotting before striping begins. Preliminary spotting is required for all longitudinal striping, with spacing of spots not to exceed 50 feet.

Reference the lines and markings to be replaced at their existing locations prior to performing any work that may disturb them.

670-3.06 TOLERANCES FOR LANE STRIPING.

1. **Length of Stripe. ±6 inches in 40 feet**

2. **Width of Stripe. ±1/4 inch**

3. **Lane Width. ±4 inches from the widths shown on the Plans (measured from the edge of pavement or edge of traveled way to center of lane line or between the centers of adjacent lane lines)**

4. **Stripes on Tangent. Do not vary more than 1 inch laterally within a distance of 100 feet when using the edge of the stripe as a reference.**

5. **Stripes on Curves. Uniform in alignment with no apparent deviations from the true curvature**

6. **All Stripes. Keep the center of the stripe within 4 inches from the planned alignment.**

Traffic markings not within the above tolerances are unacceptable under Subsection 105-1.11.

670-3.07 CONTRACTOR'S WARRANTY. Provide a warranty that all preformed marking tape PMT will stay in place and maintain a minimum retroreflectivity of 150 millicandles for the white lines and 125 millcandles for the yellow lines. The period of the warranty shall be two years.

The warranty period will start on the date that the engineer accepts the work and authorizes payment.

The warranty shall recite that the contractor will repair or replace at the discretion of the Department and at no additional cost to the Department , all PMT that fails to bond or drops below the required minimum retroreflectivity within six months of the request to do so.

When the agency makes written request to the contractor for repair or replacement, the Warranty period will stop until the requested repair(s) or replacement(s) are made and accepted.

(a) **Reflectivity- If reflectivity becomes a concern at any time during the Warranty period, the Engineer will measure the retroreflectivity of the area in question using a Mirolux 12, a 100 foot (30m) retroreflectometer, or similar device. The roadway surface will not be cleaned in preparation for taking readings, but areas of obvious contamination or debris will be avoided.**

(b) **Color Stability- The PMT shall retain its color throughout the Warranty period. Yellow striping will be compared to the PR-1 chart, and shall meet 33538 Federal Yellow. White striping shall have a minimum daylight reflectance of 84 throughout the Warranty period.**

(c) **Adhesion- For the purpose of the Warranty a cumulative 5% or greater loss of line due to non-adhesion on any 328 foot (100m) segment of marking shall constitute failure of the material in that segment.**

(d) **Care of the work prior to the Warranty period- Monitor the installation until the beginning of the Warranty period. If any tape comes up or becomes dislodged before the Warranty is in effect, replace it with specification material at no cost to the Department.**

(e) **Replacement of PMT- All PMT to be replaced shall be grooved-in below the surface of the asphalt. The bottom of the groove shall have a smooth flat finish. This shall be accomplished using a gang-stacked cutting heads having diamond tipped cutting blades. The spaces between each blade shall be such that a 10 mil rise in the finished groove between the blades.**

670-5.01 BASIS OF PAYMENT. At the contract price per unit of measurement for those items listed below that appear on the bid schedule.

Accept payment as full compensation for cleaning of pavement, painting traffic markings, providing traffic control, interim pavement markings, removal of pavement markings, application of preformed pavement markings, glass beads,

installing raised or recessed pavement markers, furnishing paint, glass beads, preformed marking tape and all other materials necessary to complete the work prescribed in this Section.

When using PMT Payment includes furnishing the Warranty. Payment for the installation of PMT will be limited to 80% of the amount due until the Department has received a signed Warranty.

For traffic markings which do not conform to the requirements of this Section but which are allowed to remain in place, payment will be adjusted as follows:

1. **Lump Sum. When payment is on a lump sum basis the price reduction will be the product of the lump sum price times the length of non-conforming markings divided by the total length of markings. For the purpose of this calculation, stripe lengths will be considered as continuous with no deduction for skips or breaks, for each 4-inch width stripe being applied, except that a double centerline stripe (No Pass) will be considered as one stripe.**

Payment will be made under:

Pay Item	Pay Unit
670(6) Preformed Pavement Markings	Lump Sum

(JH, ANH, 12/05/06)

Add the following Section:

SECTION 681

ELECTRICAL DISTRIBUTION AND TELECOMMUNICATIONS RELOCATION

Special Provisions

681-1.01 DESCRIPTION. The South Channel Bridge construction project consists of the construction of a permanent replacement bridge and the removal of the existing roadway bridge. Existing City of Unalaska (CITY) electric distribution and communication facilities are attached to the existing bridge and shall be relocated onto the new bridge. Permanent electric and communication facilities shall be constructed on the permanent replacement bridge. Retirement of existing relocated and temporary facilities shall occur upon completion and acceptance of the permanent electrical and communication installation.

The Contractor shall be responsible for furnishing the labor, equipment, and materials (other than listed on the CITY Furnished Materials Listing) necessary to construct electrical and telecomm duct banks, junction boxes, switching cabinet pads, transformer pads, vaults, and associated grounding assemblies. The electrical duct banks will consist of multiple conduits as shown on the Drawings. Upon completion and acceptance of the duct system, the Contractor will install electrical distribution facilities including cable, terminations, vaults, switching cabinets, transformers and other electrical equipment.

During construction, the Contractor shall maintain the existing 35kV circuit across the bridge in an operating condition at all times. This existing 35kV cable across the bridge is one leg of a critical loop that supplies power to Unalaska. To maintain this circuit may require temporary construction of either an overhead (not preferred by CITY), an underground circuit, or staging of the Contractor's work at the Contractors option. The existing 35kV circuit may be de-energized during construction, and the temporary circuit, if utilized may be de-energized during construction, however, a 34.5 kV circuit must be available at all times to be energized if required by the City. A penalty of $1,000 per day will be assessed for not having a 35kV circuit available to be energized across the bridge project.

681-1.02 REFERENCES. In order to resolve questions on safety regulations, installation practices, and testing procedures the Contractor shall consult and become familiar with the applicable parts of the current editions of the following standards and codes:

1. Alaska State Safety Code
2. City of Unalaska Safety Code
3. Arctic and Sub Arctic Construction - Utilities, US Army Corps of Engineers
4. National Electrical Code

5. National Electrical Safety Code

6. National Electrical Manufacturer's Association

7. Occupational Safety Health Act

8. Underwriters Laboratories

681-1.03 GENERAL REQUIREMENTS.

1. Terminology. Terminology used in this specification is as defined in IEEE Std 100.

2. Service Conditions. Items provided under this section shall be specifically suitable for the following service conditions.

   a. Altitude 0-300 ft.

   b. Ambient Temperature –20 to +86 degrees F

   c. Frequency 60 Hz

   d. Seismic Parameters per International Building Code, 2002.

3. Conflicts. In case of conflicts between the requirements of referenced codes, standards and the construction documents, the most stringent requirement shall govern. Bring any conflicts to the attention of the Engineer, prior to proceeding with the work.

4. Safety. The Contractor shall be responsible for all the safety issues under his control.

   All work shall be accomplished within the requirements of Federal Occupational Safety and Health Act Standards (OSHA).

681-1.04 SUBMITTALS. Contracting Officer Approval is required for submittals that vary from the specifications and drawings. Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for re-submittal. Allow two(2) weeks for initial review. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. If a subsequent submittal is necessary, process the same as the initial submittal. Allow two(2) weeks for reprocessing each submittal. No extension of Contract Time will be authorized because of failure to transmit submittals to the Engineer sufficiently in advance of the Work to permit processing. Three copies of the following items described below in 8-1/2 by 11 inch binders having a minimum of three rings from which material may readily be removed and replaced, including a separate section for section. Sections shall be separated by heavy plastic dividers with tabs, with all data sheets signed and dated by the person supervising the pull.

1. Schedule: Contractor shall provide a schedule as required by section 108-1.03 at least 30 days prior to start of construction. This work plan shall describe in detail the equipment, manpower, and schedule the Contractor

will use to complete the project and coordinate with other work on the project.

2. Data.

a. Manufacturer's Catalog Data. Catalog cuts, brochures, circulars, specifications, product data, and printed information in sufficient detail and scope to verify compliance with the requirements of the contract documents.

b. Material, Equipment, and Fixture Lists. A complete itemized listing of equipment and materials proposed for incorporation into the work. Each entry shall include an item number, the quantity of items proposed, and the name of the manufacturer of each such item.

c. Installation Procedures. As a minimum, installation procedures for transformers, substations, switchgear, underground cable, terminations, and splices.

Procedures shall include cable pulling plans, diagrams, instructions, and precautions required to install, adjust, calibrate, and test the devices and equipment.

3. Drawings.

a. Electrical Distribution System. Detail drawings consisting of equipment drawings, illustrations, schedules, instructions, diagrams manufacturer's standard installation drawings and other information necessary to define the installation and enable the Department to check conformity with the requirements of the contract drawings.

If departures from the contract documents are deemed necessary by the Contractor, complete details of such departures shall be included with the detail drawings. Approved departures shall be made at no additional cost to the Department.

Detail drawings shall show how components are assembled, function together and how they will be installed on the project. Data and drawings for component parts of an item or system shall be coordinated and submitted as a unit. Data and drawings shall be coordinated and included in a single submission. Multiple submissions for the same equipment or system are not acceptable except where prior approval has been obtained from the Engineer. In such cases, a list of data to be submitted later shall be included with the first submission. Detail drawings shall consist of the following:

(1) Detail drawings showing physical arrangement, construction details, connections, finishes, materials used in fabrication, provisions for conduit or busway entrances,

access requirements for installation and maintenance, physical size, electrical characteristics, foundation and support details, and equipment weight. Drawings shall be drawn to scale and/or dimensioned. All optional items shall be clearly identified as included or excluded.

(2) Internal wiring diagrams of equipment showing wiring as actually provided for this project. External wiring connections shall be clearly identified.

Detail drawings shall as a minimum depict the installation of the following items:

(1) Medium and Low -voltage cables and accessories including cable installation plan.
(2) Conduit and duct bank layouts.
(3) Transformers
(4) Surge arresters.
(5) Section Cabinets.
(6) Vaults.
(7) Navigation and Highway lights and supports.
(8) Conduit layouts.

b. As-Built Drawings. The as-built drawings shall be a record of the construction as installed. The drawings shall include the information shown on the contract drawings as well as deviations, modifications, and changes from the contract drawings, however minor. The as-built drawings shall be a full sized set of prints marked to reflect deviations, modifications, and changes. The as-built drawings shall be complete and show the location, size, dimensions, part identification, and other information. Additional sheets may be added. The as-built drawings shall be jointly inspected for accuracy and completeness by the Contractor's quality control representative and by the Engineer, prior to the submission of each monthly pay estimate. Upon completion of the work, the Contractor shall provide three full size copy of the onsite marked-up set and three set of full sized plots from the corrected AutoCAD drawings and the Autocad drawings on CD in AutoCAD version 2005 format or a more recent format. If, upon review, the as-built drawings are found to contain errors and/or omissions, they will be returned to the Contractor for correction. The Contractor shall correct and return the as-built drawings to the Engineer for approval within 10 calendar days from the time the drawings are returned to the Contractor.

4. Reports.

a. Factory Test. Certified factory test reports shall be submitted when the manufacturer performs routine factory tests. Results of factory tests performed shall be certified by the manufacturer, or an

approved testing laboratory, and submitted within 7 days following successful completion of the tests.

b. Field Testing. Submit a proposed field test plan, 20 days prior to testing the installed system. No field test shall be performed until the test plan is approved. The test plan shall consist of complete field test procedures including tests to be performed, test equipment required, and tolerance limits. The manufacturer's pass-fail criteria for tests specified in paragraph 681-3.17 FIELD TESTING shall be included.

c. Test Reports. Six copies of the information described below in 8-1/2 by 11 inch binders having a minimum of three rings, including a separate section for each test. Sections shall be separated by heavy plastic dividers with tabs.

(1) A list of equipment used, with calibration certifications.

(2) A copy of measurements taken.

(3) The dates of testing.

(4) The equipment and values to be verified.

(5) The condition specified for the test.

(6) The test results, signed and dated.

(7) A description of adjustments made.

d. Cable Installation Reports. Six copies of the information described below in 8-1/2 by 11 inch binders having a minimum of three rings from which material may readily be removed and replaced, including a separate section for each cable pull. Sections shall be separated by heavy plastic dividers with tabs, with all data sheets signed and dated by the person supervising the pull.

(1) Cable Installer Qualifications. The Contractor shall provide at least one onsite person in a supervisory position with a documentable level of competency and experience to supervise all cable pulling and splicing operations. A resume shall be provided showing the cable installers' experience in the last three years, including a list of references complete with points of contact, addresses and telephone numbers.

(2) Site layout drawing with cable pulls numerically identified.

(3) A list of equipment used, with calibration certifications. Identify the manufacturer and quantity of lubricant used on

pull.

(4) The cable manufacturer and type of cable.

(5) The dates of cable pulls, time of day, and ambient temperature.

(6) The length of cable pull and calculated cable pulling tensions.

(7) A continuous recording of the actual cable pulling tensions encountered during pull.

5. Certificates.

a. Materials and Equipment. Where materials or equipment are specified to conform to the standards of the Underwriters Laboratories (UL) or to be constructed or tested, or both, in accordance with the standards of the American National Standards Institute (ANSI), the Institute of Electrical and Electronics Engineers (IEEE), or the National Electrical Manufacturers Association (NEMA), the Contractor shall submit proof that the items provided conform to such requirements. The label of, or listing by, UL will be acceptable as evidence that the items conform. Either a certification or a published catalog specification data statement, to the effect that the item is in accordance with the referenced ANSI or IEEE standard, will be acceptable as evidence that the item conforms. A similar certification or published catalog specification data statement to the effect that the item is in accordance with the referenced NEMA standard, by a company listed as a member company of NEMA, will be acceptable as evidence that the item conforms. In lieu of such certification or published data, the Contractor may submit a certificate from a recognized testing agency equipped and competent to perform such services, stating that the items have been tested and that they conform to the requirements listed, including methods of testing of the specified agencies. Compliance with above-named requirements does not relieve the Contractor from compliance with any other requirements of the specifications.

6. Licensing Requirements. The Contractor doing this work shall be a licensed electrical contractor in the State of Alaska with an Electrical Administrator in the Unlimited Linework Category. The Contractor's field staff will be monitored for proper certification, such as electrician's licenses. All instructions regarding the quality of the work and staff qualifications shall be relayed to the Contractor by the Engineer.

7. Operations and Maintenance Manuals.

a. Electrical Distribution System. Three copies of operation and

maintenance manuals in binders and on CD shall be submitted within 7 calendar days following the completion of tests and including assembly, installation, operation and maintenance instructions, spare parts data which provides supplier name, current cost, catalog order number, and a recommended list of spare parts to be stocked. A brief description of all equipment, basic operating features, and routine maintenance requirements shall also be included. Documents shall be bound in a binder marked or identified on the spine and front cover. A table of contents page shall be included and marked with pertinent contract information and contents of the manual. Tabs shall be provided to separate different types of documents, such as catalog ordering information, drawings, instructions, and spare parts data. Index sheets shall be provided for each section of the manual when warranted by the quantity of documents included under separate tabs or dividers.

Three additional copies of the operation and maintenance manual shall be provided within 30 calendar days following the City approval of the manuals.

681-1.05 DELIVERY, STORAGE, AND HANDLING. Devices and equipment shall be visually inspected by the Contractor when received and prior to acceptance from conveyance. Stored items shall be protected from the environment in accordance with the manufacturer's published instructions. Damaged items shall be replaced. Oil filled transformers and switches shall be stored in accordance with the manufacturer's requirements. Wood poles held in storage for more than 2 weeks shall be stored in accordance with ANSI 05.1. Handling of wood poles shall be in accordance with ANIS 05.1, except that pointed tools capable of producing indentations more than 1-inch in depth shall not be used. Metal poles shall be handled and stored in accordance with the manufacturer's instructions and in such a way as not to damage corrosion resistant finishes.

Conduit shall be stored to prevent damage or contamination prior to installation. Conduit shall not be laid directly on the ground or floor. Conduit shall be kept clean, dry as possible, and free from damaging or deteriorating elements. Temporary storage and installation of electrical duct banks shall be in accordance with NEMA Bulletin TCB-2 (1990), "Users Manual for the Installation of Underground Plastic Duct".

681-1.06 EXTRA MATERIALS. One additional spare fuse or fuse element for each furnished fuse or fuse element shall be delivered to the Engineer when the electrical system is accepted. Two complete sets of all special tools required for maintenance shall be provided, complete with a suitable tool box. Special tools are those that only the manufacturer provides, for special purposes (to access compartments, or operate, adjust, or maintain special parts).

681-1.07 VERIFICATION OF DIMENSIONS. The exactness of dimensions given on the Drawings is not guaranteed. The Contractor shall field verify the accuracy of the dimensions. In cases of correlation with other work, field verify

dimensions relating to the contiguous work. Errors due to the Contractor's failure to verify dimensions shall be rectified promptly, at the Contractor's own expense.

681-2.01 MATERIALS. Products shall conform to the following requirements. Material and equipment shall be the standard product of a manufacturer regularly engaged in the manufacture of the product and shall be standard equipment of the manufacturer's latest design. These materials shall be new, not used, manufacturer's seconds, or rejects. When two (2) or more units of the same class of material are required, they shall be like products of the same manufacturer.

681-2.02 CITY FURNISHED MATERIALS. CITY shall supply the following materials:

A. Temporary Transformer T8A-T1.

681-2.03 NAMEPLATES.

1. General. Each major component of this specification shall have the manufacturer's name, address, type or style, model or serial number, and catalog number on a nameplate securely attached to the equipment. Nameplates shall be made of noncorrosive metal. Equipment containing liquid dielectrics shall have the type of dielectric on the nameplate. Section switch nameplates shall have a schematic with all switch positions shown and labeled. As a minimum, nameplates shall be provided for transformers, circuit breakers, meters, switches, and switchgear.

2. Liquid-Filled Transformer Nameplates. Power transformers shall be provided with nameplate information in accordance with IEEE ANSI/IEEE C57.12.00. Nameplates shall indicate the number of liters and composition of liquid-dielectric, and shall be permanently marked with a statement that the transformer dielectric to be supplied is non-polychlorinated biphenyl. If transformer nameplate is not so marked, the Contractor shall furnish manufacturer's certification for each transformer that the dielectric is non-PCB classified, with less than 2 ppm PCB content in accordance with paragraph 681-2.18 LIQUID DIELECTRICS. Certifications shall be related to serial numbers on transformer nameplates. Transformer dielectric exceeding the 2 ppm PCB content or transformers without certification will be considered as PCB insulated and will not be accepted.

681-2.04 CORROSION PROTECTION.

1. Provide stainless steel for metal components of equipment. Hardware, fasteners and hinges shall be stainless steel.

2. Finishing. Painting required for surfaces not otherwise specified and finish painting of items only primed at the factory shall not be acceptable. All equipment shall arrive on site with factory applied corrosion resistant finish. Provide factory recommended paints or finishes for touch-up of installed equipment finishes.

681-2.05 CABLES.

1. Medium-Voltage Cables.

   Cables shall be Pirelli 35 kV 100% Copper - One Third Neutral P/N QBB020A where 35kv cables are shown on the drawings. No exceptions

   Cables shall be Pirelli 15 kV 100% Copper - One Third Neutral P/N Q78020A where 15kv cables are shown on the drawings. No exceptions.

2. Low-Voltage Cables.

   A. Cables shall be rated 600 volts and shall conform to the requirements of NFPA 70, and must be UL listed for the application or meet the applicable section of either ICEA or NEMA standards.

   B. Insulation. Insulation shall be chemically cross-linked polyethylene, type XHHW, in accordance with NFPA 70, NEMA WC7, and UL listed for the application.

681-2.06 CABLE JOINTS, TERMINATIONS, AND CONNECTORS.

1. Medium-Voltage Cable Joints. Medium-voltage cable joints shall comply with IEEE Std 404 and IEEE Std 592. Joints shall be the standard products of a manufacturer and shall be either of the factory preformed type or of the kit type containing tapes and other required parts. Joints shall have ratings not less than the ratings of the cables on which they are installed. Splice kits may be of the heat-shrinkable type for voltages up to 15 kV, of the pre-molded splice and connector type, the conventional taped type, or the resin pressure-filled overcast taped type for voltages up to 35 kV; except that for voltages of 7.5 kV or less a resin pressure-filled type utilizing a plastic-tape mold is acceptable. Joints used in manholes, handholes, vaults, and pull boxes shall be certified by the manufacturer for waterproof, submersible applications.

2. Medium-Voltage Separable Insulated Connectors. Separable insulated connectors shall comply with IEEE Std 386 and IEEE Std 592 and shall be of suitable construction or standard splice kits shall be used. Separable insulated connectors are acceptable for voltages up to 35 kV. Connectors shall be of the load-break type as indicated, of suitable construction for the application and the type of cable connected, and shall include cable shield adaptors. Separable insulated connectors shall not be used as substitutes for conventional permanent splices. External clamping points and test points shall be provided.

3. Low-Voltage Cable Splices. Low-voltage cable splices and terminations shall be rated at not less than 600 Volts. Splices in conductors No. 10 AWG and smaller shall be made with an insulated, solderless, pressure type connector, conforming to the applicable requirements of UL 486A.

Splices in conductors No. 8 AWG and larger shall be made with noninsulated, solderless, pressure type connector, conforming to the applicable requirements of UL 486A and UL 486B. Splices shall then be covered with an insulation and jacket material equivalent to the conductor insulation and jacket. Splices below grade or in wet locations shall be sealed type conforming to ANSI C119.1 or shall be waterproofed by a sealant-filled, thick wall, heat shrinkable, thermosetting tubing or by pouring a thermosetting resin into a mold that surrounds the joined conductors.

4. Terminations. Terminations shall be in accordance with IEEE Std 48, Class 1 or Class 2; of the molded elastomer, wet-process porcelain, prestretched elastomer, heat-shrinkable elastomer, or taped type. Acceptable elastomers are track-resistant silicone rubber or track-resistant ethylene propylene compounds, such as ethylene propylene rubber or ethylene propylene diene monomer. Separable insulated connectors may be used for apparatus terminations, when such apparatus is provided with suitable bushings. Terminations shall be of the outdoor type, except that where installed inside outdoor equipment housings which are sealed against normal infiltration of moisture and outside air, indoor, Class 2 terminations are acceptable. Class 3 terminations are not acceptable. Terminations, where required, shall be provided with mounting brackets suitable for the intended installation and with grounding provisions for the cable shielding, metallic sheath, and armor.

   Factory Preformed Type. Molded elastomer, wet-process porcelain, pre-stretched, and heat-shrinkable terminations shall utilize factory pre-formed components to the maximum extent practicable rather than tape build-up. Terminations shall have basic impulse levels as required for the system voltage level. Leakage distances shall comply with wet withstand voltage test requirements of IEEE Std 48 for the next higher Basic Insulation Level (BIL) level. Anti-tracking tape shall be applied over exposed insulation of preformed molded elastomer terminations.

681-2.07 CONDUIT AND DUCTS. Ducts shall be single, round-bore type, with wall thickness and fittings suitable for the application as specified on the drawings. The Contractor shall provide fiberglass, HDPE, or galvanized rigid steel conduit including the necessary sweeps expansion joints, stops, couplings, caps, pull lines, and hardware.

1. Metallic Conduit. Galvanized rigid steel conduit (GRSC) shall comply with UL 6 and ANSI C80.1. Metallic conduit fittings and outlets shall comply with UL 514A and NEMA FB 1. Metal conduit and fittings used for below grade applications shall have a factory-applied 20 mil PVC, plastic resin, or epoxy coating system, or be field wrapped with 0.01 inch thick pipe-wrapping plastic tape applied with a 50 percent overlay.

2. Non-metallic Ducts.

   a. High Density Polyethylene (HDPE) Duct. Smooth-wall coilable

black duct designed as a flexible, continuous conduit system for outside plant wire and cable, for continuous maximum temperatures not exceeding 60C. Duct material shall be HDPE resin conforming to ASTM D-3350, PE334420 C or E. Duct ovality shall be less than 7 percent. Duct shall be indelibly embossed with manufacturer's name, material, type, and size. Coordinate with CITY for standard colors HDPE duct for all power and spare conduits.

(1) Direct Burial and Concrete Encased
   i. Low-voltage: UL 651B, Schedule 40 HDPE, coilable plastic duct pre-assembled with cable or empty, with adapter fittings as required for connection to rigid metal conduit.
   ii. Medium voltage: Heavy-duty duct conforming to nominal dimensions of ASTM D-2239 SIDR 11.5.

b. Fiberglass duct. Champion XW, or equal, as shown on the drawings.

(1) Fiberglass conduit and hanger racks shall be the product of standard manufacturers, such as Champion, B-Line or approved equal for use in electrical service.

(2) Fiberglass conduit and fittings shall be jointed by means of a primer solvent and welding cement, approved by the conduit manufacturer, to provide a watertight and root-proof joint. Primer and welding cement shall be applied in strict adherence with manufacturer's recommended practices. Follow the temperature restrictions dictated by the manufacturer. Where applicable, conduits shall be cut Fiberglass conduit and hanger racks shall be the product of standard off square with a hacksaw. The cut end shall be face flat and properly reamed with a reamer designed for the purpose of removing the sharp edge.

3. Conduit Sealing Compound. Compounds for sealing ducts and conduit shall have a putty-like consistency workable with the hands at temperatures as low as 35 degrees F, shall neither slump at a temperature of 300 degrees F, nor harden materially when exposed to the air. Compounds shall adhere to clean surfaces of fiber or plastic ducts; metallic conduits or conduit coatings; concrete, masonry, or lead; any cable sheaths, jackets, covers, or insulation materials; and the common metals. Compounds shall form a seal without dissolving, noticeably changing characteristics, or removing any of the ingredients. Compounds shall have no injurious effect upon the hands of workmen or upon materials.

The Contractor shall provide fiberglass, HDPE, and the galvanized rigid steel conduit including the necessary sweeps expansion joints, stops, couplings, caps, pull lines, joining compound, and hardware.

4. Fiberglass Fittings. Conduits and fittings shall be jointed by means of a primer solvent and welding cement (Contractor furnished) to provide a watertight and root-proof joint. Primer and welding cement shall be applied in strict adherence with manufacturer's recommended practices. Follow the temperature restrictions dictated by the manufacturer. Where applicable, conduits shall be cut off square with a hacksaw. The cut end shall be face flat and properly reamed with a reamer designed for the purpose of removing the sharp edge.

5. Tools and Equipment. Only tools and equipment designed for the particular use and operation shall be used. Tools and equipment shall be kept in good condition. Worn or broken tools shall be removed from the job immediately.

6. Pull Rope and Conduit Plugs. A 3/16-inch diameter polyethylene or polypropylene pull rope, with a minimum breaking strength of 700 pounds, shall be left in each conduit. A conduit plug shall be furnished by the Contractor and placed on each conduit end with the pull rope securely tied to internal portion of the plug. Pull ropes shall be new and continuous with no spliced sections.

7. Marker Tape. Refer to Section 660-3.03 for Specifications of marker tape.

8. Identification. Each conduit run destination shall be identified by 3/4-inch letters on 3-inch by 5-inch metal or plastic tag secured to the conduit, identifying the terminus of the conduit run, for example: "To SC 000".

9. Duct Spacer. Mechanical duct spacers shall be used to ensure clearances are maintained, whenever the separation between ducts is less than 18 inches. Spacers shall be interlocked horizontally only. Along the length of the duct run spacers shall be staggered at least 6" vertically and shall be placed at an interval of 5' (or 4 spacers per 20' duct length). For 3" separation, use Wunpeece High Impact Polystyrene Spacers, Model 4W30 or Model 5W30, based on duct diameter. A full line of other duct spacers and bore spacers, as needed, are available from Underground Devices, Inc. and shall be utilized to ensure proper clearances are maintained.

681-2.08 MANHOLES, HANDHOLES, AND PULLBOXES. Manholes, handholes, and pullboxes shall be as indicated. Strength of manholes, handholes, and pullboxes and their frames and covers shall conform to the requirements of IEEE C2 and be traffic rated where applicable. Precast-concrete manholes shall have the required strength established by ASTM C 478, ASTM C 478M. Frames and covers shall be made of gray cast iron and a machine-finished seat shall be provided to ensure a matching joint between frame and cove with finishes to all metal surfaces as specified in section 681-2.03 CORROSION PROTECTION. Cast iron shall comply with ASTM A 48, Class 30B, minimum. Handholes, and Pullboxes shall consist of precast reinforced concrete boxes, extensions, bases, and covers.

681-2.09 PAD-MOUNTED TRANSFORMERS. Pad-mounted transformers

shall comply with ANSI C57.12.26 and shall be of the loop feed type. Pad-mounted transformer stations shall be assembled and coordinated by one manufacturer and each transformer station shall be shipped as a complete unit so that field installation requirements are limited to mounting each unit on a concrete pad and connecting it to primary and secondary lines. Stainless steel pins and hinges shall be provided. Barriers shall be provided between high- and low-voltage compartments. High-voltage compartment doors shall be interlocked with low-voltage compartment doors to prevent access to any high-voltage section unless its associated low-voltage section door has first been opened. Compartments shall be sized to meet the specific dimensional requirements of ANSI C57.12.26. Pentahead locking bolts shall be provided with provisions for a padlock.

1. High-Voltage Compartments: The high-voltage compartment shall be dead-front construction. Primary switching and protective devices shall include loadbreak switching, oil-immersed, current-limiting, bayonet-type fuses, medium-voltage separable loadbreak connectors, universal bushing wells and inserts or integral one piece bushings and surge arresters. Fuses shall comply with the requirements of paragraph METERING AND PROTECTIVE DEVICES. The switch shall be mounted inside transformer tank with switch operating handle located in high-voltage compartment and equipped with metal loop for hook stick operation. Fuses shall be interlocked with switches so that fuses can be removed only when the associated switch is in the "OPEN" position. Adjacent to medium-voltage cable connections, a nameplate or equivalent stenciled inscription shall be provided inscribed "DO NOT OPEN CABLE CONNECTORS UNLESS SWITCH IS OPEN." Surge arresters shall be fully insulated and configured to terminate on the same bushing as the primary cable by means of a loadbreak, feed-through bushing insert.

2. Transformer Tank Sections. Transformers shall comply with IEEE ANSI/IEEE C57.12.00, ANSI C57.12.21, and ANSI C57.12.26 and shall be of the mineral oil-insulated type. Transformers shall be suitable for outdoor use and shall have 2 separate windings per phase. Standard NEMA primary taps shall be provided. Where primary taps are not specified, 4, 2-1/2 percent rated kVA high-voltage taps shall be provided 2 above and 2 below rated, primary voltage. Operating handles for primary tap changers for de-energized operation shall be located within high-voltage compartments, externally to transformer tanks. Adjacent to the tap changer operating handle, a nameplate or equivalent stenciled inscription shall be provided and inscribed "DO NOT OPERATE UNDER LOAD." Transformer ratings at 60 Hz shall be as follows:

Single-phase capacity.....As noted on drawings.
Impedance.....5 percent.
Temperature Rise.....120 degrees F.
High-voltage winding.....As noted on drawings.
High-voltage winding connections.....Loop Feed.
Low-Voltage winding.....As noted on drawings.
Low-voltage winding connections.....3-Bushing.

3. Low-Voltage Compartments. Neutrals shall be provided with fully-insulated bushings. Clamp type cable terminations, suitable for copper or aluminum conductors entering from below, shall be provided as necessary.

4. Accessories. High-voltage warning signs shall be permanently attached to each side of transformer stations. Voltage warning signs shall comply with IEEE C2. Copper-faced steel or stainless steel ground connection pads shall be provided in both the high and low voltage compartments. Drain valve with built-in sampling device shall be provided for each transformer station. Insulated-bushing-type parking stands shall be provided adjacent to each separable load-break elbow to provide for cable isolation during sectionalizing operations.

681-2.10 METERING AND PROTECTIVE DEVICES.

1. Circuit Breakers, Low Voltage.

   a. Molded-Case Circuit Breakers: NEMA AB 1 and UL 489.

2. Fuses, Medium-voltage, Including Current-Limiting.

   a. Construction. Units shall be suitable for outdoor use. Fuses shall have integral blown-fuse indicators. All ratings shall be clearly visible.

   b. Ratings. Expulsion-type power fuses shall have ratings in accordance with ANSI C37.46 and as follows:

      Nominal voltage.....7.2/12.5 kV.

      Rated maximum voltage.....15 kV.

      Maximum symmetrical interrupting capacity.....50 kA.

      Rated continuous current.....200 Amp.

      BIL.....95 kV.

   c. E-rated, Current-Limiting Power Fuses. E-rated, current-limiting, power fuses shall conform to ANSI C37.46.

   d. C-rated, Current-Limiting Power Fuses. C-rated, current-limiting power fuses shall open in 1000 seconds at currents between 170 and 240 percent of the C rating.

3. Fuses, Low-Voltage, Including Current-Limiting. Low-voltage fuses shall conform to NEMA FU 1. Time delay and non-time delay options shall be as shown. Equipment provided under this contract shall be provided with a complete set of properly rated fuses when the equipment manufacturer utilizes fuses in the manufacture of the equipment, or if current-limiting fuses are required to be installed to limit the ampere-interrupting capacity

of circuit breakers or equipment to less than the maximum available fault current at the location of the equipment to be installed. Fuses shall have a voltage rating of not less than the phase-to-phase circuit voltage, and shall have the time-current characteristics required for effective power system coordination.

a. Cartridge Fuses. Cartridge fuses, current-limiting type, Class RK1/RK5 shall have tested interrupting capacity not less than 200,000 amperes. Fuse holders shall be the type that will reject Class H fuses.

b. Class R fuses shall conform to UL 198E.

c. Transformer Circuit Fuses. Transformer circuit fuses shall be Class RK1 or RK5, current-limiting, time-delay with 200,000 amperes interrupting capacity.

4. Watthour Meters. Watthour meters shall conform to ANSI C12.10, except numbered terminal wiring sequence and case size may be the manufacturer's standard. Watthour meters shall be of the socket mounted outdoor type.

681-2.11 SECTION CABINETS. Free-standing, self-supporting, suitable for pad mounting and constructed of materials meeting the requirements of section 681-2.04 CORROSION PROTECTION. Covers: Continuous hinge, held closed by, flush latch operable by screwdriver, hasp and staple for padlock. Provide interior metal panel for mounting terminal blocks and electrical components. All metal will be stainless steel. Finish with manufacturer's standard enamel. Switch terminals shall be equipped with 600A-rated bushings and fuse terminals equipped with 200A-rated bushing wells in accordance with ANSI/IEEE Std. 386 to accept all standard insulated connectors and inserts. Parking stands shall be provided adjacent to each bushing and bushing well. Grounding provisions shall be located in each compartment, each separated by full-length steel barriers with a 22-gauge floor to exclude foliage and animals. Match the voltage, number of phases and amperage rating of each feeder requiring section cabinets; minimum short circuit RMS Symmetrical, 14,000A. Furnish with fuses, minimum size 200A for 15kV feeders, where indicated. The fuse shall be accessible only when de-energized and isolated for full-view non-loadbreak disconnection and removal with a shotgun stick. Manufacturer: as shown on drawings or approved equal.

681-2.12 SURGE ARRESTERS. Surge arresters shall comply with NEMA LA 1, IEEE C62.1, IEEE C62.2, and IEEE C62.11 and shall be provided where indicated. Arresters shall distribution class, rated as shown. Arresters shall be equipped with mounting brackets suitable for the indicated installations. Arresters shall be of the valve or metal-oxide varistor type.

681-2.13 GROUNDING AND BONDING.

1. Driven Ground Rods. Ground rods shall be copper-clad steel conforming to UL 467 3/4 inch in diameter by 8 feet in length. Sectional type rods

may be used.

2. Grounding Conductors. Grounding conductors shall be bare, except where installed in conduit with associated phase conductors. Insulated conductors shall be of the same material as phase conductors and green color-coded, except that conductors shall be rated no more than 600 volts. Bare conductors shall be ASTM B 8 soft-drawn unless otherwise indicated. Aluminum is not acceptable.

681-2.14 CONCRETE AND REINFORCEMENT. Concrete work shall have minimum 3000 psi compressive strength and conform to the requirements of Section 501 Structural Concrete. Concrete reinforcing shall be as specified in SECTION 503 REINFORCING STEEL.

681-2.15 PADLOCKS. Provide keyless type padlocks for grade accessible equipment.

681-2.16 PLASTIC TAPE. Preapplication plastic tape shall be pressure sensitive, 10 mil thick, conforming to UL 510.

681-2.17 MARKER BALLS. Marker balls shall be as manufactured by 3M Company, or approved equal, suitable for detection with a matched detector. Each conduit, for different power voltages and different communication cables, shall use a distinct marker ball. The Marker balls shall be as manufactured by 3M Company, coded distinctly for 35kV power, 15kV power, copper telephone cable, fiber optic cable and television cable

681-2.18 LIQUID DIELECTRICS. Liquid dielectrics for transformers, capacitors, reclosers, and other liquid-filled electrical equipment shall be non-polychlorinated biphenyl (PCB) mineral-oil or less-flammable liquid as specified. Nonflammable fluids shall not be used. Tetrachloroethylen (percloroethylen) and 1, 2, 4 trichlorobenzene fluids shall not be used. Liquid dielectrics in retrofitted equipment shall be certified by the manufacturer as having less than 2 parts per million (ppm) PCB content. In lieu of the manufacturer's certification, the Contractor may submit a test sample of the dielectric in accordance with ASTM D 923 and have tests performed per ASTM D 4059 at a testing facility approved by the Engineer. Equipment with test results indicating PCB level exceeding 2 ppm shall be replaced.

681-2.19 FACTORY TESTS. Factory tests shall be performed, as follows, in accordance with the applicable publications and with other requirements of these specifications. The Engineer shall be notified at least 10 days before the equipment is ready for testing. The Engineer reserves the right to witness the tests.

1. Transformers: Manufacturer's standard tests in accordance with IEEE ANSI/IEEE C57.12.00.

2. Factory Preformed Terminations: Wet withstand voltage tests in accordance with IEEE Std 48 for the next higher BIL level.

3. Electrical Power Insulators: Manufacturer's standard tests in accordance with ANSI C29.1.

681-3.01 GENERAL INSTALLATION REQUIREMENTS. The Contractor shall, with the Engineer's approval, determine the most expedient method to complete the required electrical installations and maintain temporary power where required. Equipment and devices shall be installed and energized as shown on the drawings and in accordance with the manufacturer's published instructions and these specifications.

1. Schedule: The Contractor agrees to notify Engineer at least 48-hours (two business days) prior to the start of this project. Once work commences, the Contractor and the Engineer will meet at the end of each week to review and validate the work completed to date and review the Contractor's schedule for the following week's work. The Contractor shall submit in writing the anticipated hourly work shift schedule by the Wednesday noon prior to the following workweek.

2. Coordination:

   a. Close coordination with CITY will be necessary to assure the operation of the electric distribution systems are not impacted and that the 35kv circuit across the bridge is can be operated at all times during the project. The Contractor shall contact the CITY Operations Department daily and report the Contractor's construction activities planned for the particular day. CITY will complete the energizing and switching of electric facilities. Contractor shall notify CITY in writing at least 72-hours in advance for the work which requires switching to be completed.

   b. Close coordination with TelAlaska will be necessary to assure the operation of the telecommunication systems are not impacted. The Contractor shall establish a point of contact with TelAlaska Operations Department. The Contractor shall notify TelAlaska at the start of construction and shall report to TelAlaska any construction activities impacting their system at least (48) in advance.

3. Conformance to Codes. The installation shall comply with the requirements and recommendations of NFPA 70 and IEEE C2, as applicable.

4. Verification of Dimensions. The Contractor shall become familiar with details of the work, shall verify dimensions in the field, and shall advise the Engineer of any discrepancy before performing any work.

5. Disposal of Liquid Dielectrics. PCB-contaminated dielectrics must be marked as PCB and transported to and incinerated by an approved EPA waste disposal facility. The Contractor shall furnish certification of proper

disposal. Contaminated dielectrics shall not be diluted to lower the contamination level.

6. Clean-up. A program of cleanup operations shall be carried out on a continuous basis throughout the progress of construction and the site shall be left neat and clean.

681-3.02 SURVEYING AND STAKING. Vaults, pads, and electrical duct systems shall be located and staked by the Contractor at the line and grade indicated on the Drawings. The Contractor shall schedule a physical inspection of the line and grade prior to placing vaults, pads, or ducts.

Duct bank routing shall be as shown on the Drawings and shall be constructed to within an allowable vertical tolerance of 0.1-foot and a horizontal tolerance of 0.2-foot from the indicated plan location.

681-3.03 RETIREMENT. Retirement of cables in conduit shall include the removal of the cables from conduits. Any conduits remaining will then be cut off two feet below final grade and abandoned unless otherwise noted on the drawings. All Cable and other retired materials shall become the property of the Contractor who shall be responsible for the proper disposal.

Direct buried cables shall be cut and removed a minimum of 2-feet below final grade. Incidental exposure during construction of retired direct buried cable and retired conduit shall be removed. Costs associated with the retirement work shall be included in the retirement units.

681-3.04 TRENCH AND PAD EXCAVATION AND BACKFILL. Excavation and backfill shall be as specified in Section 204. Existing underground utilities shall be identified, located, and proper care taken not to damage them. The Contractor shall establish the location of existing underground facilities by calling for a field locates in accordance with Subsection 105-1.06, Cooperation with Utilities.

681-3.05 DUCT LINES.

Duct lines shall be comprised of multiple fiberglass, HDPE, GRC, or RSC conduits of the configuration shown on the Drawings. The conduits shall be installed on bridge supports or direct bury as noted on the Drawings.

The Contractor shall, with the Engineer's approval, determine the most expedient method to complete the required electrical duct bank installation. Work across roadways shall be accomplished in accordance with Section 643, Traffic Maintenance.

1. Requirements. Numbers and sizes of ducts shall be as indicated. Duct lines shall be installed to the depths shown on the drawings and profile.

2. Treatment. Ducts shall be kept clean of concrete, dirt, or foreign substances during construction. Field cuts requiring tapers shall be made

with proper tools and match factory tapers. A coupling recommended by the duct manufacturer shall be used whenever an existing duct is connected to a duct of different material or shape. Ducts shall be stored to avoid warping and deterioration with ends sufficiently plugged to prevent entry of any water or solid substances. Ducts shall be thoroughly cleaned before being laid. Plastic ducts shall be stored on a flat surface and protected from the direct rays of the sun.

3. Concrete Reinforcement. Ducts requiring concrete encasements shall comply with NFPA 70 and as shown on the drawings. The separation between adjacent electric power and communication ducts shall be as shown on the drawings. Duct line encasements shall be monolithic construction. Where a connection is made to a previously poured encasement, the new encasement shall be well bonded or doweled to the existing encasement. The Contractor shall submit proposed bonding method for approval in accordance with the detail drawing portion of paragraph 681-1.04, Submittals. At any point, tops of concrete encasements shall be not less than the cover requirements listed in NFPA 70. Separators or spacing blocks shall be made of steel, concrete, plastic, or a combination of these materials placed not farther apart than 4 feet on center. Ducts shall be securely anchored to prevent movement during the placement of concrete and joints shall be staggered at least 6 inches vertically.

4. Non-encased Direct-Burial. Tops of non-encased direct-burial conduits shall be installed to the depths shown on the drawings and profiles. Conduits shall be installed with a minimum of 3 inches of bedding around each duct, except that between adjacent electric power and communication ducts, 12 inches of bedding is required. Bottoms of trenches shall be graded toward manholes, handholes, or vaults and shall be smooth and free of stones, soft spots, and sharp objects. Where bottoms of trenches comprise materials other than sand, a 3 inch layer of sand bedding, meeting the requirements of Subsection 681-3.14 shall be laid first and compacted to as approve by the Engineer. Joints in adjacent tiers of duct shall be vertically staggered at least 6 inches. The first 3 inch layer of backfill cover shall be sand bedding compacted as previously specified. The rest of the excavation shall be backfilled and compacted in 3 to 6 inch layers. Duct banks may be held in alignment with earth when the separation exceeds 18 inches; in all other cases use pre-manufactured duct spacers. Duct spacers shall be interlocked horizontally only. Along the length of the duct run spacers shall be staggered at least 6" vertically and shall be placed at an interval of 5' (or 4 spacers per 20' duct length). The Contractor is responsible for anchoring the installed system to ensure flotation does not occur. The Contractor shall submit an anchoring design to the Engineer for approval prior to its use. The Contractor shall design and provide anchor stakes to prevent the conduit from floating. The Contractor shall be responsible for the effectiveness and shall bear the costs incurred if "flotation" or misalignment occurs. The use of ¼ or ½ yard sandbags may be utilized by the Contractor only if the duct bank is supported by sand encasement prior to their use.

5. Conduit Installation. Conduit shall be laid in the trench shown on the Drawings unless the conditions encountered are such that changes are necessary to accomplish the work. In the event rock or other obstructions are encountered during the trenching operation preventing ducts or pads to be installed, the Contractor shall inform the Engineer on the nature and extent of the difficulty encountered for review and verification. The Engineer will determine whether the duct is to be rerouted, trenched in the rock, or advise another suitable change. Such changes shall be priced under a written change order in accordance with contract documents. Where a minimum cover as shown on the plan profiles cannot be maintained the Contractor shall obtain written approval from the Engineer to vary the depth requirement. Where design depth cannot be obtained the Contractor shall obtain Engineer approval and supply concrete encasement for protection of the installed facility.

In cases where the conduit passes above or below an underground utility , culvert or other buried inverts the Contractor shall maintain a minimum clearance of 2-feet from the conflicting obstruction (refer to the drawings for crossovers of power and telecommunications). Contractor may be required to over-excavate trench in order to provide adequate cover for the conduit installation. Contractor shall ensure smooth transitions of trench over abrupt terrain and will be required to over-excavate to provide a smooth uniform installation of the conduit. Such over-excavation is to be incorporated within the provided units; no other compensation shall be considered or authorized. Contractor is advised to contact the Engineer to determine if over-excavation is required.

Defective conduit shall not be installed and shall be removed immediately from the site of the work. Particular care shall be taken to keep concrete or other substances from the inside of the conduits during construction. The Contractor shall utilize temporary conduit end caps for the conduit-entering vaults or for buried conduit ends. The Contractor is solely responsible to ensure duct bank conduits are correctly labeled as defined in the drawings. Conduit labeling shall be done at each conduit joint and at every manhole/vault termination. Deviations for conduit terminations as defined in the drawings shall be repaired at the Contractor's own expense. Obstructions encountered while mandreling conduit shall be located, cleared and/or repaired by the Contractor at the Contractor's own expense.

The Contractor shall measure and record the pedestal to pedestal or vault to vault distance of the installed duct and record that measurement on the drawings as required by 681-3.18 AS-BUILT SURVEY. The Contractor shall maintain a complete and accurate record of conduit offsets and conduit distances. The Contractor shall supply the Engineer with a complete log of conduit distances within five (5) days after installing the conduits.

The inside of conduit fittings and the ends of ducting shall be painted with

solvent cement as prescribed by the manufacturer to make a waterproof connection. Conduit joints shall be marked with the appropriate Alfa designator for the duct design. The Contractor is solely responsible to ensure the appropriate conduit enters the vaults at the design location.

The Contractor shall install conduit in open trench as to manufacturer's recommendations and as depicted in the Drawings, with no more than 5-degree deflection per 10-feet of run. Conduits shall be joined with a waterproof connection as recommend by the manufacturer. Fiberglass conduit runs supported by the bridge require the installation of Contractor-furnished expansion couplings as shown in the Drawings.

Use factory-manufactured mechanical spacers to ensure clearances are maintained, whenever the separation is less than 18 inches. The separation between conduits shall comply with NESC.

The Contractor shall provide field bends in the HDPE conduit as set forth on the Drawings. Contractor shall submit a bending, straightening and placement plan for HDPE one month prior to placement of conduits. Submittal shall detail equipment and procedures proposed to be used and conduit manufacturer's installation literature. The Engineer will inspect HDPE conduit formed and bent by the Contractor prior to installation. Deformed bent conduit will be unacceptable and will be removed and replaced at the Contractor's own expense. The cost of field bending conduit shall be considered incidental to this contract and included in the cost of conduit. No cold bending of conduit will be accepted. Bending equipment and procedures shall be per conduit manufacturer's recommendations. Conduit joints on 4" and larger HDPE conduit and larger shall be by electrofusion. Other joining methods that do not leave an interior bead may be used upon approval by the Engineer. HDPE conduit on spools shall be mechanically straightened prior to placement using conduit manufacturers recommend equipment and procedures.

The Contractor shall install buried marking tape as indicated in the Drawings. Marking tape shall be installed 18 inches above the buried facility. The Contractor shall install tape in the center of trench face up and hold tape in place with earth as needed to prevent displacement during backfill. Installation of marking tape shall be included in the cost of trenching.

Terminating conduit ends shall be secured with temporary end caps and those terminations below grade shall be installed with an electromagnetic (underground cable marker). Conduits shall be provided with end bells and provided with a watertight seal to the structure where duct lines terminate in vaults, manholes or handholes.

Fiberglass conduit runs on the bridge require the installation of Contractor-furnished expansion couplings as shown in the Drawings.

6. Installation of Couplings. Joints in each type of duct shall be made up in accordance with the manufacturer's recommendations for the particular type of duct and coupling selected and as approved.

7. Duct Line Markers. Duct line marker balls shall be provided at the ends of long duct line stub-outs or for other ducts whose locations are indeterminate because of duct curvature or terminations at completely below-grade structures. In addition to markers, a 5 mil brightly colored plastic tape, not less than 3 inches in width and suitably inscribed at not more than 10 feet on centers with a continuous metallic backing and a corrosion-resistant 1 mil metallic foil core to permit easy location of the duct line, shall be placed approximately 12 inches below finished grade levels of such lines.

8. Rejects. The electrical duct banks shall be installed to result in the maximum degree of reliability and maintenance-free operation. Kinked ducts, inadequately supported, protected or swabbed ducts, and ducts carelessly jointed are not reliable and will be rejected. Unacceptable and rejected sections of this electrical duct system will be removed and replaced in accordance with the Specifications, at no additional charge.

9. Bending. Bending of non-metallic conduit shall be by means of infrared heating and bending equipment, such as a Carlon "Hotbox Bender" or equivalent. No cold bending of conduit will be accepted. Bending equipment and practice shall be per conduit manufacturer's recommendations. Bends will be approved by the Engineer.

   Conduit shall be field bent to follow the trench line and grade with a minimum radius of 25-feet. The minimum allowable bending radius for equipment entrances is 48-inches. Preformed sweeps and preformed elbows with bending radii less than 48-inches will not be allowed. On runs of HDPE, the material for 4- and 5-inch conduit preformed elbows of 22.5degrees or more will be fiberglass conduit.

   Short-radius manufactured 90-degree duct bends may be used only for pole or equipment risers, unless specifically indicated as acceptable. The minimum manufactured bend radius shall be 36 inches for ducts of less than 3 inch diameter, and 48 inches for ducts 3 inches or greater in diameter.

10. Duct Finishing. The Contractor shall clean and test the conduits prior to installing cables in the conduits. Conduit, which will not be immediately used, shall be mandreled, ugged with an airtight seal at each end and marked with an electromagnetic underground marker by the Contractor. Foreign materials, earth, sand, and gravel shall be removed from the conduit. As a clearance test, ducting shall be mandrel with a flexible mandrel being 0.25-inch less in diameter than the interior diameter of the conduit or not less than 0.25-inches. The Contractor shall leave in place a Contractor-provided 0.25-inch three-strand poly pull line in the conduits. This work shall take place in the presence of the Engineer. The pre-

measured jet line shall be measured and recorded, and verified by the Contractor's signature in the presence of the Engineer. The above requirements shall take place prior to the installation's acceptance by the Engineer. The Contractor shall identify and expose any area that cannot pass a mandrel and repair any Contractor caused defect at the Contractor's cost. Proofing of duct shall immediately follow conduit installation from access point to access point. Proofing of ducting shall be considered incidental and included with the duct bank pay item.

11. Pull Rope. A 3/16-inch diameter polyethylene or polypropylene pull rope, with a minimum breaking strength of 700 pounds, shall be left in each conduit.

12. Duct Finishing. The electrical duct systems shall be mandreled, brushed, and swabbed to confirm the integrity of the duct run after completion of backfilling and compaction. Bell ends shall be beveled. The steel mandrel and steel brush shall be 1-3/4 inches in diameter for the 2-inch conduit, 3-3/4 inches in diameter for the 4-inch conduit, and 4-3/4 inches in diameter for the 5-inch conduit. The length of the mandrel shall be 6" minimum. If the duct will not accept the mandrel, the duct will be removed and replaced at no additional expense to the Department. Mandreling shall be done in the presence of the Engineer. Conduit entrances and exits into the vaults shall then be sealed and plugged, ready until cable installations.

13. Plugs. A conduit plug shall be furnished by the Contractor and placed on each conduit end with the pull rope securely tied to internal portion of the plug. The conduit plugs shall be water, airtight, removable, and reusable, Manufacturer: Jackmoon USA, Inc. or equivalent. For communication ducts, Greenlee Polyline, Part No. 430/21481 shall be installed and left in place between pull points

14. Identification. Each conduit run destination shall be identified by 3/4-inch letters on 3-inch by 5-inch metal or plastic tag secured to the conduit, identifying the terminus of the conduit run, for example: "To SC 000".

681-3.06 CABLE INSTALLATION. The Contractor shall obtain from the manufacturer an installation manual or set of instructions which addresses such aspects as cable construction, insulation type, cable diameter, bending radius, cable temperature, lubricants, coefficient of frictions, conduit cleaning, storage procedures, moisture seals, testing for purging moisture, etc. The Contractor shall then prepare a checklist of significant requirements, perform pulling calculations and prepare a pulling plan which shall be submitted along with the manufacturer's instructions in accordance with SECTION 681-1.04, SUBMITTALS.

1. Cable Installation Plan and Procedure. Cable shall be installed strictly in accordance with the cable manufacturer's recommendations. Each circuit shall be identified by means of a fiber, laminated plastic, or non-ferrous metal tags, or approved equal, in each manhole, handhole, junction box, and each terminal. Each tag shall contain the following information; cable

type, conductor size, circuit number, circuit voltage, cable destination and phase identification.

a. Cable Inspection. The cable reel shall be inspected for correct storage positions, signs of physical damage, and broken end seals. If end seal is broken, moisture shall be removed from cable in accordance with the cable manufacturer's recommendations.

b. Duct Cleaning. Duct shall be cleaned with an assembly that consists of a flexible mandrel (manufacturers standard product in lengths recommended for the specific size and type of duct) that is 1/4 inch less than inside diameter of duct, 2 wire brushes, and a rag. The cleaning assembly shall be pulled through conduit a minimum of 2 times.

c. Duct Lubrication. The cable lubricant shall be compatible with the cable jacket for cable that is being installed. Application of lubricant shall be in accordance with lubricant manufacturer's recommendations.

d. Cable Installation. The Contractor shall provide a cable feeding truck and a cable pulling winch as required. The Contractor shall provide a pulling grip or pulling eye in accordance with cable manufacturer's recommendations. The pulling grip or pulling eye apparatus shall be attached to polypropylene or manila rope followed by lubricant front end packs and then by power cables. A calibration certified dynamometer shall be used to monitor pulling tension. Pulling tension shall not exceed cable manufacturer's recommendations. The Contractor shall not allow cables to cross over while cables are being fed into duct. For cable installation in cold weather, cables shall be kept at 50 degrees F temperature for at least 24 hours before installation.

e. Cable Installation Plan. The Contractor shall submit a cable installation plan for all cable pulls in accordance with the detail drawings portion of paragraph 681-1.04, Submittals. Cable installation plan shall include:

(1) Site layout drawing with cable pulls identified in numeric order of expected pulling sequence and direction of cable pull.

(2) List of cable installation equipment.

(3) Lubricant manufacturer's application instructions.

(4) Procedure for resealing cable ends to prevent moisture from entering cable.

(5) Cable pulling tension calculations of all cable pulls.

(6) Cable percentage conduit fill.

(7) Cable sidewall thrust pressure.

(8) Cable minimum bend radius and minimum diameter of pulling wheels used.

(9) Cable jam ratio.

(10) Maximum allowable pulling tension on each different type and size of conductor.

(11) Maximum allowable pulling tension on pulling device.

3. Corrosion Protection. Galvanized metal conduit and fittings used for below grade applications shall have in addition factory-applied 0.02 inch protective coating, or be field wrapped with 0.01 inch thick pipe-wrapping plastic tape applied with a 50 percent overlay.

4. Sealing Cable and Conduit. Provide watertight seal between cable and conduit with cold shrink or equivalent approved seal. Heat shrink or pre-manufactured rubber boot is not acceptable.

5. Splices and Routing. Cable splices in low-voltage cables shall be made in manholes and handholes only, except as otherwise noted. Cable joints in medium-voltage cables shall be made in manholes or approved pullboxes only. Neutral and grounding conductors shall be installed in the same duct with their associated phase conductors. Coilable plastic duct shall be run in continuous un-spliced lengths between manholes or handholes.

6. Cable Markers. Markers shall be located at approximately every 500 feet along cable runs, and at changes in direction of cable runs. In addition to markers, a 5 mil, brightly colored plastic tape not less than 3 inches in width and suitable inscribed at not more than 10 feet on centers, or other approved dig-in warning indication, shall be placed approximately 12 inches below finished grade levels of trenches.

7. Electric Manholes. Cables shall be routed around the interior walls and securely supported from walls on cables racks. Cable routing shall minimize cable crossover, provide access space for maintenance and installation of additional cables, and maintain cable separation in accordance with IEEE C2.

681-3.07 CABLE. Cable shall be handled carefully to avoid damage and shall not be dragged across the ground, fences, or sharp projections. Care shall be exercised to avoid excessive bending of the cable. The ends of the cable shall be sealed against moisture with suitable end caps. Where it is necessary to cut the cable, the ends shall be terminated or sealed immediately after the cutting

operation. Contractor's cable installation practices shall strictly adhere to the cable manufacturer installation guidelines, emphasized in cold weather installation.

Maximum bending radius shall be as recommended by the manufacture. The minimum radius specified is measured to the surface of the cable on the inside of the bend. No cable bends shall be made within 6-inches of a cable terminal base.

The cable shall be inspected carefully by the Contractor as it is played out from the reel to be certain it is free from visible defects. Damaged cable observed at any time whether prior to installation, during installation, or when discovered by test or observation subsequent to installation in plant shall be immediately called to the Engineer and the Department representative's attention. Repair or correction of such damage shall be done promptly and in accordance with the Engineer's instruction. The location of repairs shall be indicated on the as-built drawings.

Cable shall be played out from the reel mounted on a moving vehicle or trailer wherever possible. The reel shall be supported so it can turn easily without undue strain on the cable. The cable shall be carefully placed in the trench by hand. Cable placement shall be done under the Department representative's constant supervision to be certain no cable damage occurs.

Pulling cable through conduit or duct shall be performed in such a way that the cable will not be damaged from strain or dragging. The cable shall be lubricated with a suitable cable lubricant prior to pulling into conduit or duct.

The stress applied while pulling primary cables into ducts or during other pulling operations shall not exceed the least of the following:

1. Where a pulling eye is attached to the conductor, the maximum pulling strain in pounds shall not exceed 0.006 times the circular mil area for aluminum or 0.008 times the circular mil area for copper.
2. Where a basket grip is placed over the cable, the pulling strain shall not exceed the lesser of: (1) that calculated in a. above; or (2) 1000 pounds. The cable under the cable grip and 1-foot preceding it shall be severed and discarded after the pulling operation.
3. The maximum pulling tension shall not exceed the specific cable manufacturer's recommendation.
4. At bends the maximum sidewall pressure recommended by the cable manufacturer shall not be exceeded.

Sufficient slack and in no case less than 24-inches shall be left at risers, transformer pads, pedestals, and terminal points so movements of the cable after backfilling will not cause damaging strain on the cable or terminals.

As the cables are installed they shall be identified and tagged. The identification shall be of a permanent type, such as that done with an embossing type tape writer on plastic or corrosion resistant metal tags. The tag shall be securely attached to the cable. Paper or cloth tags are not acceptable.

Cable splicing will not be permitted in the final permanent distribution cable crossing the permanent bridge or in duct banks. Splicing will be permitted for temporary bridge crossing.

Cable splices shall be of the prefabricated type and shall be made in strict accordance with the splice manufacturer's instructions.

Prefabricated stress cones or terminations shall be installed in strict accordance with the manufacturer's instructions at the primary cable terminals. Indication of misfit, such as a loose or exceptionally tight fit, shall be called to the Engineer's attention. The outer conductive surface of the termination shall be bonded to the system neutral.

A portable covering or shelter shall be available for use when splices or terminations are being prepared and when prefabricated terminations are being switched. The shelter shall be used as necessary to keep rain, snow, and windblown dust off the insulating surfaces of these devices. Care shall be exercised to prevent the transfer of conducting particles from the hands to insulating surfaces since cleanliness is essential in the preparation and installation of primary cable fittings. Mating surfaces shall be wiped with a solvent, such as denatured alcohol, to remove any possible accumulation of dirt, moisture or other conducting materials. Silicone grease should be applied afterwards in accordance with the manufacturer's recommendations. The unenergized mating surfaces shall be lubricated with silicone grease before the fittings are reconnected whenever prefabricated cable devices are opened.

681-3.08 CABLE ACCEPTANCE TEST. The cable shall not be energized until the tests and phasing are confirmed and approved by the Engineer. The following is the sequence for testing the electrical cabling.

a. Continuity: The Contractor and the Engineer shall jointly perform a simple continuity test on the system after installation of the cable and prior to the high potential test. This test can be accomplished by grounding the conductor at the source and checking for continuity from the end of each tap with an ohmmeter or with a battery and ammeter.

b. High Potential: After successful continuity tests, the Contractor and the Engineer jointly shall perform high potential tests on each length of cable in the system with terminations in place but disconnected from the system. Cable shall be tested as recommended by cable manufacturer. CITY shall be present at all cable testing and shall be notified 48 hours prior to any cable tests.

681-3.09 CABLE JOINTS. Medium-voltage cable joints shall be made by qualified cable splicers only. Qualification of cable splicers shall be submitted in accordance with paragraph 681-1.04, Submittals. Shields shall be applied as required to continue the shielding system through each entire cable joint. Shields may be integrally molded parts of preformed joints. Shield shall be grounded at each joint or in accordance with manufacturer's recommended practice. Cable

joints shall provide insulation and jacket equivalent to that of the associated cable. Armored cable joints shall be enclosed in compound-filled, cast-iron or alloy, splice boxes equipped with stuffing boxes and armor clamps of a suitable type and size for the cable being installed.

681-3.10 PREFABRICATED VAULTS. The Contractor shall provide vaults as shown on the Drawings and install to the line and grade indicated. All installations shall be field verified by the Contractor. The Contractor will be responsible for transporting of the vaults to the work site, excavation to design grade of the pad, separation geotextile fabric, placement of select material, ground rods and copper ground wire, and vault installation to finish elevation. In setting a vault, the Contractor assumes responsibility for the costs of transportation, installation, sealing, repair, and maintenance of the vault until final acceptance. Vault exteriors and joints shall be waterproofed per vault manufacturer's recommendation.

The vault frame and cover shall be set to the designed finished grade of the proposed paving or existing ground level as designated by the Engineer. Vaults shall be constructed within an allowable tolerance of 0.1-foot of the plan location and elevation in any phase of the construction. The Contractor shall backfill vault installations within 48-hours. Subbase preparation shall consist of excavating below the designed grade of the telephone vaults as shown on the drawings. The Contractor shall then place separation geotextile fabric and Type-B or other Non-frost susceptible material as approved by the Engineer as required to bring the over-excavation up to the bottom grade of the vault. Provide backfill in uniform layers not more then 6 inches deep and compact to meet 203-3.04.

If the gravel foundation proves to be inadequate to support the vault, the Contractor shall remove the vault and re-compact to meet the requirements. Subgrade shall be leveled on all sides and smoothed in preparation for the vault base. In the event of standing water the representative may require 6-inch minus washed rock for the vault foundation. Trench sections within 8-feet of vault conduit entries shall be compacted to the requirements as stated above. Prefabricated vaults are installed in sections and require primer coat and Butytight vault joint sealer between sections.

Knock outs will be provided for conduit entries and terminations. Knock outs shall be sealed to ensure conduit entrances into a vault are sealed to prevent water intrusion. Provide sealing compound as recommended by vault manufacturer. Alternatively the contractor shall be prepared to core drill the vaults as necessary.

Provide ground rods at vaults as shown on Drawings. Where none are shown, the Contractor shall place two (2) 8-foot ground rods, one on each end of each vault excavation. Ground rods shall be driven from the base level down and connected with a #1/0 AWG copper vault ground wire leaving a 6-foot loop of that same wire inside the vault.

The Contractor shall verify conduit entries while proofing conduit and label conduit entries per design within the manhole. The Contractor shall install

manhole racking and cable hooks as shown on the Drawings. Contractor shall remove interior debris after the manhole installation has been completed.

681-3.11 MANHOLES, HANDHOLES, AND PULLBOXES.

1. General. Manholes shall be constructed approximately where shown. The exact location of each manhole shall be determined after careful consideration has been given to the location of other utilities, grading, and paving. The location of each manhole shall be approved by the Engineer before construction of the manhole is started. Manholes shall be the type noted on the drawings and shall be constructed in accordance with the applicable details as indicated. Top and walls shall consist of reinforced concrete. Walls shall be of monolithic concrete construction. The bottom shall be open. The Contractor may at his option utilize monolithically constructed precast-concrete manholes having the required strength and inside dimensions as required by the drawings or specifications. In paved areas, frames and covers for manhole and handhole entrances in vehicular traffic areas shall be flush with the finished surface of the paving. In unpaved areas, the top of manhole covers shall be approximately 1 inch above the finished grade. Where existing grades that are higher than finished grades are encountered, concrete assemblies designed for the purpose shall be installed to elevate temporarily the manhole cover to existing grade level. All duct lines entering manholes must be installed on compact soil or otherwise supported when entering a manhole to prevent shear stress on the duct at the point of entrance to the manhole. Duct lines entering cast-in-place concrete manholes shall be cast-in-place with the manhole. Duct lines entering precast concrete manholes through a precast knockout penetration shall be sealed with approved permenant watertight seal. A cable-pulling iron shall be installed in the wall opposite each duct line entrance.

2. Handholes. Handholes shall be located as shown. Handholes shall be of the type noted on the drawings and shall be constructed in accordance with the details shown.

3. Pullboxes. Pullbox tops shall be flush with sidewalks or curbs or placed ½ inch above surrounding grades when remote from curbed roadways or sidewalks. Covers shall be marked "Low-Voltage" and provided with 2 lifting eyes and 2 hold-down bolts. Each box shall have a suitable opening for a ground rod. Conduit, cable, ground rod entrances, and unused openings shall be sealed with mortar.

4. Ground Rods. A ground rod shall be installed at each manhole, handholes, and pullboxes. Ground rods shall be driven into the earth so that approximately 4 inches of the ground rod will extend above the manhole floor. When precast concrete manholes are used, the top of the ground rod may be below the manhole floor and a No. 1/0 AWG copper ground conductor brought into the manhole through a watertight sleeve in the manhole wall. The maximum resistance of a driven ground rod shall not exceed 25 ohms under normally dry conditions.

681-3.12 TRANSFORMERS AND SWITCH CABINETS. Switch cabinets and transformers shall be handled carefully to avoid damage to the cabinet finish and shall be positioned in accordance with the Drawings and Specifications. Equipment shall be level and plumb to their pad. Only qualified and experienced personnel shall be allowed to make connections and cable terminations.

Each equipment enclosure shall display a warning sign, for high voltage, placed so it is visible to anyone attempting entry to the enclosure.

681-3.13 PAD-MOUNTED EQUIPMENT INSTALLATION. Pad-mounted equipment, shall be installed on concrete pads in accordance with the manufacturer's published, standard installation drawings and procedures, except that they shall be modified to meet the requirements of this document. Units shall be installed so that they do not damage equipment or scratch painted or coated surfaces. After installation, surfaces shall be inspected and scratches touched up with a paint or coating provided by the manufacturer especially for this purpose. Primary taps shall be set at a nominal zero percent.

1. Concrete Pads.

   a. Construction. Concrete pads for pad-mounted electrical equipment may be either pre-fabricated or poured-in-place. Pads shall be constructed as indicated, except that exact pad dimensions and mounting details are equipment specific and are the responsibility of the Contractor. Tops of concrete pads shall be level and shall project 4 inches above finished paving or grade and sloped to drain. Edges of concrete pads shall have 0.75 inch chamfer. Conduits for primary, secondary, and grounding conductors shall be set in place prior to placement of concrete pads. Where grounding electrode conductors are installed through concrete pads, RGC conduit sleeves shall be installed through the concrete to provide physical protection. To facilitate cable installation and termination, the concrete pad shall be provided with a rectangular hole below the primary and secondary compartments, sized in accordance with the manufacturer's recommended dimensions. Upon completion of equipment installation the rectangular hole shall be filled with masonry grout.

   b. Concrete and Reinforcing. Concrete work shall have minimum 3000 psi compressive strength and conform to the requirements of Section 501, Structural Concrete. Concrete pad reinforcement shall be in accordance with Section 503 Reinforcing Steel.

   c. Sealing. When the installation is complete, the Contractor shall seal all conduit and other entries into the equipment enclosure with an approved sealing compound. Seals shall be of sufficient strength and durability to protect all energized live parts of the equipment from water intrusion, rodents, insects, or other foreign matter.

d. Orientation. The Contractor shall verify the orientation of the pads with the Engineer before installation. The pads shall conform to the final grade after completion of the entire road project.

2. Padlocks. Padlocks with self-locking and destructive screws shall be provided for pad-mounted equipment.

681-3.14 SAND BEDDING. Where existing material is unsuitable for the conduit bedding, as determined by the Engineer, the Contractor shall provide bedding sand meeting the gradation requirements of 703-2.12 SAND BLANKET and as approved by the Engineer.

681-3.15 GROUNDING. A ground electrode consisting of the indicated configuration of bare copper conductors and driven ground rods shall be installed under pad-mounted equipment as shown. Equipment frames of metal-enclosed equipment, and other noncurrent-carrying metal parts, such as cable shields, cable sheaths and armor, and metallic conduit shall be grounded. At least 2 connections shall be provided from a transformer, to the ground electrode. Metallic frames and covers of handholes and pull boxes shall be grounded by use of a braided, copper ground strap with equivalent ampacity of No. 6 AWG.

1. Grounding Electrodes. Grounding electrodes shall be installed as shown on the drawings and as follows:

   a. Driven rod electrodes- Unless otherwise indicated, ground rods shall be driven into the earth until the tops of the rods are approximately 12 inches below finished grade.

   b. Additional electrodes- When the required ground resistance is not met, additional electrodes shall be provided interconnected with grounding conductors to achieve the specified ground resistance. The additional electrodes will be up to three, 8 feet rods spaced a minimum of 10 feet apart. If the resultant resistance exceeds 25 ohms measured not less than 48 hours after rainfall, the Engineer shall be notified immediately.

2. Grounding and Bonding Connections. Connections above grade shall be made by the fusion-welding process or with bolted solderless connectors, in compliance with UL 467, and those below grade shall be made by a fusion-welding process. Where grounding conductors are connected to aluminum-composition conductors, specially treated or lined copper-to-aluminum connectors suitable for this purpose shall be used.

3. Conductors Grounding and Bonding. Grounding and bonding conductors include conductors used to bond transformer enclosures and equipment frames to the grounding electrode system. Grounding and bonding conductors shall be sized as shown, and located to provide maximum physical protection. Bends greater than 45 degrees in ground conductors are not permitted. Routing of ground conductors through concrete shall be

avoided. When concrete penetration is necessary, nonmetallic conduit shall be cast flush with the points of concrete entrance and exit so as to provide an opening for the ground conductor, and the opening shall be sealed with a suitable compound after installation.

4. Surge Arrester Grounding. Surge arresters and neutrals shall be bonded directly to the transformer enclosure and then to the grounding electrode system with a bare copper conductor, sized as shown. Lead lengths shall be kept as short as practicable with no kinks or sharp bends.

5. Manhole, Handhole, or Concrete Pullbox Grounding. Ground rods installed in manholes, handholes, or concrete pullboxes shall be connected to cable racks, cable-pulling irons, the cable shielding, metallic sheath, and armor at each cable joint or splice by means of a No. 1/0 AWG braided tinned copper wire. Connections to metallic cable sheaths shall be by means of tinned terminals soldered to ground wires and to cable sheaths. Care shall be taken in soldering not to damage metallic cable sheaths or shields. Grounding electrode conductors shall be neatly and firmly attached to manhole or handhole walls and the amount of exposed bare wire shall be held to a minimum.

681-3.16 FIELD TESTING.

1. General. Field testing shall be performed in the presence of the Engineer. The Contractor shall notify the Engineer 10 days prior to conducting tests. The Contractor shall furnish all materials, labor, and equipment necessary to conduct field tests. The Contractor shall perform all tests and inspections recommended by the manufacturer unless specifically waived by the Engineer. The Contractor shall maintain a written record of all tests which includes date, test performed, personnel involved, devices tested, serial number and name of test equipment, and test results. Field test reports shall be signed and dated by the Contractor.

2. Safety. The Contractor shall provide and use safety devices such as rubber gloves, protective barriers, and danger signs to protect and warn personnel in the test vicinity. The Contractor shall replace any devices or equipment which are damaged due to improper test procedures or handling.

3. Ground-Resistance Tests. The resistance of each grounding electrode shall be measured using the fall-of-potential method defined in IEEE Std 81. Ground resistance measurements shall be made before the electrical distribution system is energized and shall be made in normally dry conditions not less than 48 hours after the last rainfall. Resistance measurements of separate grounding electrode systems shall be made before the systems are bonded together below grade. The combined resistance of separate systems may be used to meet the required resistance, but the specified number of electrodes must still be provided.

   a. Single rod electrode- 25 ohms.

b. Multiple rod electrodes- 15 ohms.

4. Medium-Voltage Cable Test. After installation and before the operating test or connection to an existing system, the medium-voltage cable system shall be given a high potential test. Direct-current voltage shall be applied on each phase conductor of the system by connecting conductors as one terminal and connecting grounds or metallic shieldings or sheaths of the cable as the other terminal for each test. Prior to making the test, the cables shall be isolated by opening applicable protective devices and disconnecting equipment. The test shall be conducted with all splices, connectors, and terminations in place. The method, voltage, length of time, and other characteristics of the test for initial installation shall be in accordance with NEMA WC 7 or NEMA WC 8 for the particular type of cable installed, except that 28 kV and 35 kV insulation test voltages shall be in accordance with either AEIC CS5 or AEIC CS6 as applicable, and shall not exceed the recommendations of IEEE Std 404 for cable joints and IEEE Std 48 for cable terminations unless the cable and accessory manufacturers indicate higher voltages are acceptable for testing. Should any cable fail due to a weakness of conductor insulation or due to defects or injuries incidental to the installation or because of improper installation of cable, cable joints, terminations, or other connections, the Contractor shall make necessary repairs or replace cables as directed. Repaired or replaced cables shall be retested.

5. Low-Voltage Cable Test. Low-voltage cable, complete with splices, shall be tested for insulation resistance after the cables are installed, in their final configuration, ready for connection to the equipment, and prior to energization. The test voltage shall be 500 volts dc, applied for one minute between each conductor and ground and between all possible combinations conductors in the same trench, duct, or cable, with all other conductors in the same trench, duct, or conduit. The minimum value of insulation shall be:

R in megohms = (rated voltage in kV + 1) X 1,000,000 / (length of cable in feet)

Each cable failing this test shall be repaired or replaced. The repaired cable shall be retested until failures have been eliminated.

6. Liquid-Filled Transformer Tests. The following field tests shall be performed on all liquid-filled transformers. Pass-fail criteria shall be in accordance with transformer manufacturer's specifications.

a. Insulation resistance test phase-to-ground.

b. Turns ratio test.

c. Correct phase sequence.

d. Correct operation of tap changer.

7. Circuit Breaker Tests. The following field tests shall be performed on circuit breakers. Pass-fail criteria shall be in accordance with the circuit breaker manufacturer's specifications.

   a. Insulation resistance test phase-to-phase.

   b. Insulation resistance test phase-to-ground.

   c. Closed breaker contact resistance test.

   d. Manual operation of the breaker.

8. Pre-energization Services. Calibration, testing, adjustment, and placing into service of the installation shall be accomplished by the Contractor in the presence of the Engineer and a CITY representative. The following services shall be performed subsequent to testing but prior to the initial energization. The equipment shall be inspected to ensure that installation is in compliance with the recommendations of the manufacturer and as shown on the detail drawings. Terminations of conductors at major equipment shall be inspected to ensure the adequacy of connections. Bare and insulated conductors between such terminations shall be inspected to detect possible damage during installation. If factory tests were not performed on completed assemblies, tests shall be performed after the installation of completed assemblies. Components shall be inspected for damage caused during installation or shipment to ensure packaging materials have been removed. Components capable of being both manually and electrically operated shall be operated manually prior to the first electrical operation. Components capable of being calibrated, adjusted, and tested shall be calibrated, adjusted, and tested in accordance with the instructions of the equipment manufacturer. Items for which such services shall be provided, but are not limited to, are the following:

   a. Pad-mounted transformers

   b. Section Cabinets

9. Operating Tests. After the installation is completed, and at such times as the Engineer may direct, the Contractor shall conduct operating tests for approval. The equipment shall be demonstrated to operate in accordance with the requirements herein. An operating test report shall be submitted in accordance with Paragraph 681-1.04, Submittals.

681-3.17 AS-BUILT SURVEY. An as-built survey, by a land surveyor registered in the State of Alaska, will be completed by the Contractor. Electrical duct banks and pads, including the locations, alignment and installed depth shall be included. Additionally, bearing and distance between all devices and at all trench angle points will be included as part of the as built survey. The information will be referenced to established survey monuments. Delivery shall be to the Engineer prior to acceptance of the electrical duct system by the Department.

681-3.18 INSPECTION. The Engineer may at any time have access to the project site for the purpose of inspection. The manner of under-grounding of the conduit, materials, and equipment used therein, shall be subject to the inspection of by the Engineer. The Engineer will measure the conduit installed prior to backfilling the joint trenches for the conduits. Equipment, devices, and structures shall be inspected after installation has been completed and damage shall be repaired or replaced as directed. The Engineer will conduct a final inspection within ten (10) days of the Contractor's informing the Engineer, in writing, the system is complete. Incomplete items (punch list) as noted in final inspection report shall be completed by the Contractor within ten (10) days of the final inspection. The CITY and TelAlaska thru the Engineer may at any time have access to the project site for the purpose of inspection.

681-3.19 ACCEPTANCE. Final acceptance of the facility will not be given until the Contractor has successfully completed all tests and after all defects in installation, material, or operation have been corrected.

681-4.01 METHOD OF MEASUREMENT. The lump sum price, or prices, paid for underground electrical work, interconnect cable, or combinations thereof and for modifying systems or temporary systems, shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for completing all the work involved in furnishing and installing, modifying, removing the systems or combinations thereof as shown on the drawings, and as specified in these specifications and the Special Provisions, and as directed, including any necessary excavation and backfill, concrete foundations, pavement and appurtenances damaged or destroyed during construction, salvaging existing materials, and making all required tests. Sign removal and reinstallation required to install foundations, conduits, and J-boxes shall be subsidiary to other contract items. Minor conduit routing changes as directed by the Engineer shall be subsidiary to existing contract pay items.

Full compensation for all additional materials and labor not shown on the drawings or specified, which are necessary to complete the installation of the various systems shall be considered as included in the prices paid for the systems or units thereof, and no additional compensation will be allowed.

Full compensation for furnishing, installing, maintaining (including temporary power connections) and removing feeders, etc. shall be considered as included in the contract prices paid for the items of work involved in the structure which requires the underground electrical work and no additional compensation will be allowed.

The concrete required for encasement of conduits, and shown on the drawings, shall be considered subsidiary to these pay items of work and shall not be paid for separately. The Contracting Officer shall pay for additional concrete, if required, under Section 501, Structural Concrete.

Prices to include cost to mobilize equipment and crew to job site, site clean-up, and cost to de-mobilize equipment and crew from job site.

Item 681(101), Retire 15 kV, 3-Phase Underground Power Line – Lump sum, inclusive of conduit, conductor, cut-outs, j-boxes, terminations, connectors and related equipment.

Item 681 (102), Pad Mounted Oil Filled Transformers, 10kVA Single Phase – Unit price, complete with concrete pad, ground rod, all equipment, labor and materials necessary to complete the work as specified. Termination of field wiring shall be subsidiary to this pay item (temporary transformer provided by the City).

Item 681 (103), Pad Mounted Oil Filled Transformers, 150kVA Three Phase – Unit price, complete with concrete pad, ground rod, all equipment, labor and materials necessary to complete the work as specified. Termination of field wiring shall be subsidiary to this pay item.

Item 681 (104), Retire 35kV Underground Feeder – Lump sum, including excavation, backfill, marking tape, equipment, labor and materials necessary to complete the work as required, inclusive of conduit, conductor, cut-outs, j-boxes, terminations, connectors and related equipment.

Item 681 (105), New 35kV, 3-phase, Non-Fused, Pad Mounted Section Cabinet – Unit price, complete with cabinet, labor and materials, load break elbows, ground rods and terminations.

Item 681 (106), Duct Bank, DB-1 – Per linear foot, complete with excavation and backfill, conduits, spacers, cables, marking tape, equipment, labor and materials necessary to complete the work as required. Any required de-watering shall be subsidiary to this pay item. Refer to the drawings for duct bank configuration details.

Item 681 (107), Duct Bank, DB-2 – Per linear foot, complete with excavation and backfill, conduits, spacers, cables, marking tape, equipment, labor and materials necessary to complete the work as required. Any required de-watering shall be subsidiary to this pay item. Refer to the drawings for duct bank configuration details.

Item 681 (108), Duct Bank, DB-3 – Per linear foot, complete with excavation and backfill, conduits, spacers, cables, marking tape, equipment, labor and materials necessary to complete the work as required. Any required de-watering shall be subsidiary to this pay item. Refer to the drawings for duct bank configuration details.

Item 681 (109), Duct Bank, DB-4 – Per linear foot, complete with excavation and backfill, conduits, spacers, cables, marking tape, equipment, labor and materials necessary to complete the work as required. Any required de-watering shall be subsidiary to this pay item. Refer to the drawings for duct bank configuration details.

Item 681 (110), Duct Bank, DB-5 – Per linear foot, complete with excavation and

backfill, conduits, spacers, cables, marking tape, equipment, labor and materials necessary to complete the work as required. Any required de-watering shall be subsidiary to this pay item. Refer to the drawings for duct bank configuration details.

Item 681 (111), Duct Bank, DB-6 – Per linear foot, complete with excavation and backfill, conduits, spacers, cables, marking tape, equipment, labor and materials necessary to complete the work as required. Any required de-watering shall be subsidiary to this pay item. Refer to the drawings for duct bank configuration details.

Item 681 (112), Duct Bank, DB-7 – Per linear foot, complete with excavation and backfill, conduits, spacers, cables, marking tape, equipment, labor and materials necessary to complete the work as required. Any required de-watering shall be subsidiary to this pay item. Refer to the drawings for duct bank configuration details.

Item 681 (113), Duct Bank, DB-8 – Per linear foot, complete with excavation and backfill, conduits, spacers, cables, marking tape, equipment, labor and materials necessary to complete the work as required. Any required de-watering shall be subsidiary to this pay item. Refer to the drawings for duct bank configuration details.

Item 681 (114), Duct Bank, DB-9 – Per linear foot, complete with excavation and backfill, conduits, spacers, cables, marking tape, equipment, labor and materials necessary to complete the work as required. Any required de-watering shall be subsidiary to this pay item. Refer to the drawings for duct bank configuration details.

Item 681 (115), Duct Bank, DB-10 – Per linear foot, complete with excavation and backfill, conduits, spacers, cables, marking tape, equipment, labor and materials necessary to complete the work as required. Any required de-watering shall be subsidiary to this pay item. Refer to the drawings for duct bank configuration details.

Item 681 (116), Duct Bank, DB-11 – Per linear foot, complete with excavation and backfill, conduits, spacers, cables, marking tape, equipment, labor and materials necessary to complete the work as required. Any required de-watering shall be subsidiary to this pay item. Refer to the drawings for duct bank configuration details.

Item 681 (117), Duct Bank, DB-12 – Per linear foot, complete with excavation and backfill, conduits, spacers, cables, marking tape, equipment, labor and materials necessary to complete the work as required. Any required de-watering shall be subsidiary to this pay item. Refer to the drawings for duct bank configuration details.

Item 681 (118), Duct Bank, DB-13 – Per linear foot, complete with excavation and backfill, conduits, spacers, cables, marking tape, equipment, labor and materials necessary to complete the work as required. Any required de-watering

shall be subsidiary to this pay item. Refer to the drawings for duct bank configuration details.

Item 681 (1190), Duct Bank, DB-14 – Per linear foot, complete with excavation and backfill, conduits, spacers, cables, marking tape, equipment, labor and materials necessary to complete the work as required. Any required de-watering shall be subsidiary to this pay item. Refer to the drawings for duct bank configuration details.

Item 681 (120), Duct Bank, DB-15 – Per linear foot, complete with excavation and backfill, conduits, spacers, cables, marking tape, equipment, labor and materials necessary to complete the work as required. Any required de-watering shall be subsidiary to this pay item. Refer to the drawings for duct bank configuration details.

Item 681 (121), Duct Bank, DB-16 – Per linear foot, complete with excavation and backfill, conduits, spacers, cables, marking tape, equipment, labor and materials necessary to complete the work as required. Any required de-watering shall be subsidiary to this pay item. Refer to the drawings for duct bank configuration details.

Item 681 (122), Duct Bank, DB-17 – Per linear foot, complete with excavation and backfill, conduits, spacers, cables, marking tape, equipment, labor and materials necessary to complete the work as required. Any required de-watering shall be subsidiary to this pay item. Refer to the drawings for duct bank configuration details.

Item 681 (123), Duct Bank, DB-18 – Per linear foot, complete with excavation and backfill, conduits, spacers, cables, marking tape, equipment, labor and materials necessary to complete the work as required. Any required de-watering shall be subsidiary to this pay item. Refer to the drawings for duct bank configuration details.

Item 681 (124), Duct Bank, DB-19, Drainage Tee – Per unit, complete with excavation and backfill, conduits, spacers, cables, marking tape, equipment, labor and materials necessary to complete the work as required. Any required de-watering shall be subsidiary to this pay item. Refer to the drawings for duct bank configuration details.

Item 681 (125), Pull Box/Splice Box – Per unit price, inclusive of excavation, backfill inclusive of all concrete castings, covers, ground rods, as shown on the drawings for all telephone, electrical secondary distribution.

Item 681 (236), Vault-Power (9'x5') – Per unit price, inclusive of excavation, backfill inclusive of all concrete castings, covers, ground rods, as shown on the drawings for all electrical distribution. The size of the manholes shall be as shown on the drawings.

Item 681 (127), Vault-Power (10'8"x8'8") – Per unit price, inclusive of excavation, backfill inclusive of all concrete castings, covers, ground rods, as

shown on the drawings for all electrical distribution. The size of the manholes shall be as shown on the drawings.

Item 681 (128), Vault-Communication – Per unit price, inclusive of excavation, backfill and of all concrete castings, covers, ground rods, as shown on the drawings for all telecommunication distribution. The size of the manholes shall be as shown on the drawings.

Item 681 (129), Vault, Coring – Per unit price, inclusive of labor, equipment, and materials necessary to core the vault for conduit entry.

681-5.01 BASIS OF PAYMENT. Payment shall be full compensation for the labor, equipment, and materials necessary to complete this work.

Payment for electrical duct conduit system shall be the length of the construction unit conduits installed times the unit bid price per meter for each construction unit. The price paid for the electrical duct system shall include the necessary conduits, fittings, couplings, expansion joints, split anchor rings, and other components.

The unit bid price for pad and vault installation shall include excavation to plan grade, including the over excavation and backfill required, separation geotextile, and sand blanket. Excavation of unsuitable material below plan grade shall be paid under Item 203(3), Unclassified Excavation. Borrow, if required, for backfill to replace unsuitable material will be paid under the pay item of the associated Borrow Material.

The unit price for vault core drilling shall include all equipment and materials necessary to drill a hole of sufficient diameter to install a conduit.

The costs associated with shoring the trenches and the existing power facilities shall be subsidiary to associated pay items.

Payment will be made under:

Pay Item	Pay Unit
681(101) Retire 15 kV, 3-Phase Underground Power Line	Lump Sum
681(102) Pad Mounted Oil Filled Transformers, 10kVA Single Phase	Each
681(103) Pad Mounted Oil Filled Transformers, 150kVA Three Phase	Each
681(104) Retire 35 kV Underground Feeder	Lump Sum
681(105) New 35 kV, 3-phase, Non-fused, Pad Mounted Section Cabinet	Each
681(106) Duct Bank, DB-1	LF
681(107) Duct Bank, DB-2	LF
681(108) Duct Bank, DB-3	LF
681(109) Duct Bank, DB-4	LF
681(110) Duct Bank, DB-5	LF
681(111) Duct Bank, DB-6	LF
681(112) Duct Bank, DB-7	LF
681(113) Duct Bank, DB-8	LF
681(114) Duct Bank, DB-9	LF
681(115) Duct Bank, DB-10	LF
681(116) Duct Bank, DB-11	LF
681(117) Duct Bank, DB-12	LF
681(118) Duct Bank, DB-13	LF
681(119) Duct Bank, DB-14	LF
681(120) Duct Bank, DB-15	LF
681(121) Duct Bank, DB-16	LF
681(122) Duct Bank, DB-17	LF
681(123) Duct Bank, DB-18	LF
681(124) Duct Bank, DB-19	Each
681(125) Pull Box/Splice box	Each
681(126) Vault, Power (9'x5')	Each
681(127) Vault, Power (10'8"x8'8")	Each
681(128) Vault, Communication	Each
681(129) Vault, Coring	Each

SECTION 701

HYDRAULIC CEMENT

Standard Modification

701-2.03 GROUT. Add to end of last sentence: from specimens made according to ATM 507.E30(3/15/06)

Special Provisions

Add the following subsection:

701-2.04 DS GROUT. Drilled shaft (DS) grout shall consist by volume of:

One (1) part Portland Cement (Type I or II).

Three (3) parts clean concrete sand meeting the requirements of Section 703-2.01 except 100% passing the No. 4 sieve.

Sufficient potable water to obtain flowable, pumpable grout mixture.

Thoroughly mix DS grout before injecting into soil surrounding drilled shaft casing and CSL tubes.

SECTION 703

AGGREGATES

Special Provisions

703-1.01 AGGREGATES. Aggregates specified in this section shall be derived from granitic rock if they will be incorporated into rip rap, hot mix asphalt, ***delete*** or subbase grading B.

703-2.02 COARSE AGGREGATE FOR CONCRETE. Add the following: One hundred percent (100%) of the coarse aggregate used in concrete shall pass the ¾ inch sieve. **Engineer may reject source for use if any aggregate in the source fails to meet specifications.**

703-2.03 AGGREGATE FOR BASE AND SURFACE COURSE. Delete Table 703-2 and substitute the following:

TABLE 703-2
AGGREGATE FOR UNTREATED BASE
Percent Passing By Weight

Sieve Designation	Grading C-1	Grading D-1	Grading E-1
1 ½ inch	100		
1 inch	70-100	100	100
3/4 inch	60-90	70-100	70-100
3/8 inch	45-75	50-79	50-85
No. 4	30-60	35-58	35-65
No. 8	22-52	20-47	23-50
No. 30	10-33	10-26	13-31
No. 50	6-23	6-19	10-26
No. 200	0-6	0-6	8-15

(06/22/04)R117USC04

703-2.04 AGGREGATE FOR ASPHALT CONCRETE PAVEMENT. Delete Subsection 703-2.04 and substitute the following:

Coarse Aggregate (retained on the No. 4 sieve). Crushed stone or crushed gravel consisting of sound, tough, durable rock of uniform quality. Remove all natural fines passing a No. 4 sieve before crushing aggregates for Type V asphalt concrete mixtures. Free from clay balls, organic matter, and other deleterious material. Not coated with dirt or other finely divided mineral matter. Meet the following requirements:

		Type IIA, IV	Type I, IIB,III	Type V
LA Wear, % max	AASHTO T 96	45	45	45
Degradation Value, min	ATM 313	30	30	30
Sodium Sulfate Loss % max (5 cycles)	AASHTO T 104	9	9	9
Fracture, min %	WAQTC FOP for AASHTO TP61	90, 2-face	80, 1-face	100, 2-face
Flat-Elongated Pieces, max % 1:5 1:3	ATM 306	 8 20	 8 -	 5 15
Nordic Abrasion, max.%	ATM 312			12
Absorption, max. %	AASHTO T85	2.0		2.0

Fine Aggregate (passing the #4 or 4.75 mm sieve). For Type IV and V mixes, remove all natural fines passing a #4 or 4.75 sieve before crushing aggregates for this asphalt concrete mixture. Consist entirely of aggregate produced from aggregate crushing process and be non-plastic as determined by WAQTC FOP for AASHTO T 90. Meet the quality requirements of AASHTO M 29, including S1.1, Sulfate Soundness and Type V shall meet the following:

Property	Test Method	Requirement
Fine Aggregate Angularity	AASHTO T 304	45% min.

Blended Aggregate. Blend the aggregate fractions to meet the grading requirements of Table 703-3, as determined by WAQTC FOP for AASHTO T 27 / T 11. Ensure that the fraction actually retained between any two consecutive sieves larger than the No. 100 sieve is not less than 2% of the total.

TABLE 703-3
BROAD BAND GRADATIONS FOR ASPHALT CONCRETE PAVEMENT AGGREGATE

SIEVE	GRADATION			
	Type II	Type III	Type IV	Type V
1 inch				100
¾ inch	100			90-100
½ inch	75-95	100	100	65-75
3/8 inch	60-84	80-90	80-95	48-60
No. 4	33-70	44-81	55-70	30-40
No. 8	19-56	26-70	35-50	20-30
No. 16	10-44	16-59	20-40	≤ 22
No. 30	7-34	9-49	15-30	≤ 17
No. 50	5-24	6-36	10-24	≤ 14
No. 100	4-16	4-22	5-15	≤ 12
No. 200	3-8	3-8	4-8	3-8

(matls 2/05)

703-2.09 SUBBASE. First paragraph, add the following to the requirement:
Percentage Fracture of Grading B, WAQTC TM 1, 90% two face

Delete Table 703-6, and substitute the following:

Table 703-6
REQUIREMENTS FOR GRADING FOR SUBBASE
Percent Passing by Weight

	GRADING	
SIEVE	A	B
4 inch	100	-
2 inch	85-100	100
No. 4	20-55	20-55
No. 200	0-6	0-4

SECTION 707

METAL PIPE

Special Provisions

707-2.05 DUCTILE IRON PIPE FOR WATER AND SANITARY SEWER.
Delete the existing references and substitute the following:

1. Buried Water. Ductile Iron, Cement-Mortar Lined, Class 52, Mechanical Joint, Retainer Gland, Polyethylene Wrap, Continuity Straps or Bronze Wedges

Ductile Iron Pipe	ANSI/AWWA C151/A21.51, FSS WW-P-421D
Fittings	ANSI/AWWA C110/A21.10
Rubber Gaskets	ANSI/AWWA C111/A21.11
Coating, Asphaltic In & Out	ANSI/AWWA C104/A21.16
Polyethylene Encasement	ANSI/AWWA C105/A21.5
MJ Retainer Glands	UL Listed, ASTM A536-80

2. Above Grade Water. Ductile Iron, Cement-Mortar Lined, Min. Class 53, Flanged, 250 psi (PRV Facility) Pressure Rating

Threaded Flanged Pipe	ANSI/AWWA C115/A21.15
Ductile Iron Pipe	ANSI/AWWA C151/A21.51, FSS WW-P-421D
Flanges, Fittings	ANSI/AWWA C110/A21.10
Coating, Fusion Bonded Epoxy, (Inside and Outside)	ANSI/AWWA C116/A21.16

3. Buried Sewer. Ductile Iron, Cement-Mortar Lined, Class 52, Push-on Joint, (Mechanical Joint with Retainer Glands where restraint required), Polyethylene Wrap

Ductile Iron Pipe	ANSI/AWWA C151/A21.51, FSS WW-P-421D
Fittings	ANSI/AWWA C110/A21.10
Rubber Gaskets	ANSI/AWWA C111/A21.11
Coating, Asphaltic In & Out	ANSI/AWWA C104/A21.16
Polyethylene Encasement	ANSI/AWWA C105/A21.5

4. Bridge Sewer. Corrugated Steel Sleeve, Schedule 40 Steel Pipe, Butt Welded Connections

Corrugated Steel Pipe	Aluminum Coated Steel, AASHTO M 274
Thickness	0.079-inches (14-gauge)
Exterior Coating	Post Applied Polymer, 10-mils Thick
Coupling Bands	AASHTO M36 Universal Band
Insulation	Polyurethane Foam

K-Factor	0.13
Density	2 pcf
Closed Cell Content	90-95% per MIL-I-24172
Schedule 40 Steel Pipe	ASTM A53, Grade B

Standard Modification

Delete Subsection 707-2.07 and replace with the following:

707-2.07 GALVANIZED STEEL WATER CONDUIT. Meet the following:
Galvanized Pipe ASTM A 53 or ASTM A 120, galvanized per AASHTO M 111
Galvanized Fittings ASTM A 234 galvanized per AASHTO M 232.
(06/30/04)E17

SECTION 709

REINFORCING STEEL AND WIRE ROPE

Add the following to Subsection 709-2.01:

Low Alloy Steel Deformed Bars for Concrete Reinforcement ASTM A706

SECTION 712

MISCELLANEOUS

Special Provisions

712-2.06 FRAMES, GRATES, COVERS, AND LADDER RUNGS. Add the following:

Ductile iron castings	ASTM A536 for grade 60-401.

(02/22/00)R78M98

Add the following subsection:

712-2.10A BUTTERFLY VALVES. Above ground (PRV Facility) valves are specified on the plan sheets.

Buried Valves: Buried valves shall be rubber seated, tight-closing, meeting or exceeding the performance requirements of AWWA C-504 for operation pressures of 150 psi working pressure and 300 psi hydrostatic pressure.

Mechanical joint valve ends shall be per AWWA specifications C-110 and C-111 of the latest revision, and "short body" in accordance with the requirements of AWWA C-504. Accessories (bolts, glands, and gaskets) shall be supplied by the valve manufacturer.

Valves shall use full AWWA C-504 Class 150 B valve shaft diameter and full Class 150 B underground service operator torque rating throughout entire travel to provide capability for operation in emergency service.

Valve body shall be high strength cast iron ASTM A-126 Class B. For valves with the rubber seat mounted on the disc, the mating surface in the body shall be 304 or 316 stainless steel. For valves containing the rubber seat in the body, the method of seat retention shall be in accordance with the requirements of AWWA C-504-80, except that no retaining fasteners or other hardware shall be allowed in the flow stream.

Valve operators shall be of the traveling nut type, sealed, gasketed, and lubricated for underground service and capable of withstanding an overload input torque of 450 ft-lbs at full open or closed position without damage to the valve or valve operator. The number of turns to operate the valve shall be a minimum of two (2) turns per inch of valve diameter for 90-degrees of closure travel at a maximum pull of eighty (80) pounds. All valves shall open counterclockwise and be equipped with a two-inch square operating nut.

Butterfly valves twenty inches (20") and less: The valve shaft shall be one piece extending full size through valve bearings, disc, and shaft seal. In the event that the shaft is turned down to fit connections to the operator, the limits of AWWA C504-80, Sec. 3.3.2 shall be strictly observed. Carbon steel shafts, if used, shall

have 304 or 316 stainless steel journals with static seals to isolate the interior of the disc and the shaft from the water.

Butterfly valves over twenty inches (20"): The valve shaft shall be of two-piece stub shaft type, made of 18-8 Type 304 stainless steel. Valve bearings and shaft seals for valves of all sizes shall meet the requirements of AWWA C-504 Sec. 3.6 and 3.7 respectively, with the following additional requirements:

1. Sleeve bearings shall have a maximum coefficient of friction of 0.1.

2. For underground service, packing shall be pressure-energized chevron or "O" ring type, not requiring adjustment and suitable for permanent duty.

712-2.11 VALVE SERVICE BOXES. Delete the second, third, and fourth paragraphs in their entirety.

712-2.12 HYDRANTS. In the second sentence of the first paragraph, delete "Equip hydrants with 5-inch main valve openings and 6-inch standard mechanical joint hub ends for connection to the auxiliary gate valve.", and substitute the following: "Single pumper hydrants shall be furnished with a six (6) inch ASA Class 125 standard mechanical-joint end with two (2) cast on lugs for tie-backs. Double pumper hydrants shall be furnished with an eight (8) inch ASA Class 125 standard mechanical-joint end with two (2) cast on lugs for tie-backs."

Add the following: All hydrants shall be furnished with a breakaway traffic flange, which allows both barrel and stem to break clean upon impact from any angle. Traffic flange design must be such that repair and replacement can be accomplished above ground.

All hydrants shall be draining (drain plug removed).

Operating and nozzle nuts shall be pentagon shaped with one and one-half (1-1/2) inch point to flat measurements. The operating nut shall open with counter-clockwise operation.

Hose nozzle threading shall be in conformance with NFPA #194 for National (America) Standard Fire Hose Coupling Screw Threads.

All hydrants shall be furnished with chains that attach hose and pumper connection caps to hydrant bodies.

Fire hydrants shall be "Mueller Centurian" or "American Darling B-62-B" only. Submit manufacturer's literature for Engineer's review and comment.

712-2.14 PREFORMED PAVEMENT MARKING TAPE. Add the following to paragraph a. under item 1., General Requirements: The preformed ribbon shall consist of one solid piece of required width and length. In solid stripe areas, the tape length shall, where possible, be a minimum of 100-feet. (07/15/96)R79USC

Delete this Section in its entirety and replace with the following:

SECTION 720

ELASTOMERIC PADS

Special Provisions

720-2.01 Meet AASHTO M251-04, with the following revisions:

4.1 Properties of the Elastomer. Replace the first sentence with the following: Use elastomeric compound in the construction of the bearings containing only virgin natural polyisoprene (natural rubber) as the raw polymer. Do not use neoprene. Properties and requirements elsewhere in AASHTO M251 pertaining solely to polychloroprene (neoprene) do not apply.

Add the following:
Use elastomer compound classified as low temperature Grade 5 and meeting the requirements of paragraph 8.11.

Add the following paragraph: **5.5.** Fabricate pads over 3/4 inch thick with alternating laminations of elastomer and metal or fabric reinforcements. The outside laminations must be metal or fabric with a minimum elastomer cover as shown on the Plans.

ADDENDUM No. 1.
ATTACHMENT No. 15

SECTION 724

SEED

Special Provisions

724-2-02. MATERIALS. Delete Table 724-1 and substitute with the following:

TABLE 724-1
WILDFLOWER SEED MIX REQUIREMENTS

Species	% Weight	Sproutable Seed* %, Min.
Festuca rubra Arctared Red Fescue	45	85
Lupinus nootkantensis Nootka Lupine	7	90
Lolium multiflorum Annual Ryegrass	10	98
Deschampsia beringensis 'Norcoast' "Norcoast" Bearing Hairgrass	15	85
Achillea borealis Northern Yarrow	10	95
Silene armeria Catchfly	8	95
Chrysanthemum arcticum Alaska Daisy	5	81

* Sproutable Seed is the mathematical product of Germination and Purity.

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SECTION 729

GEOSYNTHETICS

Special Provisions

729-2.05 GEOGRID. At the beginning of the first sentence, replace "biaxial" with "uniaxial".

Near the end of the first sentence, delete "both" and replace with "the" and make "directions" singular.

Replace Table 729-1 with the following:

TABLE 729-1
UNIAXIAL GEOGRID PRYSICAL REQUIREMENTS

PROPERTY	REQUIREMENT	TEST METHOD
Tensile Strength, min. At 5% strain Ultimate	MD (1) 3,500 lb/ft 7,800 lb/ft	ASTM D6637
Junction Strength	90% (2)	GRI-GG2-87
Flexural Stiffness	5,100,000 mg-cm	ASTM D5732-95
Installation Damage Resistance	80% (3)	Sample per ASTM D5818 Test per ASTM D6637

(1) MD: Machine direction, which is along roll length.
(2) 90% relative to Ultimate Tensile Strength as determined by ASTM D6637.
(3) 80% relative to pre-installation Tensile Strength values. Perform Test install using GP or GW Class soil.

SECTION 730

SIGN MATERIALS

Special Provisions

730-2.04 SIGN POSTS. Add the following item:

7. Structural Tubing and W-Shape Beams.

   a. Structural tubing shall conform to either ASTM A500, grade B, or ASTM A501. The tubing shall be square and of the dimensions called for in the Plans with 0.2-inch thick walls. 0.4-inch diameter holes shall be drilled as required to permit mounting of the sign.

W-shape beams shall conform to ASTM A36.

Structural tubing and W-shape beams shall be hot dip galvanized according to 1.b. of this subsection. Damaged and abraded tubes and beams shall be repaired according to 1.c. of this Subsection.

(06/22/04)R81USC04

SECTION 740

SIGNALS AND LIGHTING MATERIALS

Special Provisions

Replace subsection 740-2.02 with the following:

740-2.02 SIGNAL AND LIGHTING POLES. Design and fabricate highway lighting and traffic signal structures with pole shaft lengths to 55 feet long to conform to the 1994 Edition of AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals* with interim revisions. For the design and fabrication of high tower poles, see subsection 740-2.04.

A registered professional engineer shall design the structures and provide stamped shop drawings and calculations. Submit the stamped drawings and calculations for each pole to the Engineer for approval. Design for stresses on the completed structure with hardware in place.

1. In the stamped calculations, indicate the edition of Standard Specifications to which the poles are being designed and provide the input data used to design each pole and mast arm, including: design wind speed, cross section shape, yield strengths of the component materials, dimensions of the pole components, and a summary of the loads used.

2. On the stamped shop drawings, provide design wind speed and the details for building the poles and mast arms, including: materials specifications, slip fit joint dimensions, pole component dimensions, welds that will be made, and the welding inspection that will be done.

Submit the mill certifications for the steel items (piles, plates, bolts, and other related items) to the Engineer for approval.

Design all poles for 130 mph winds with a 1.3 gust factor.

Design each electrolier to support a sign with an area of 16 square feet with its centroid located 14 feet above the base of the pole.
See AKDOT drawing L-03.10 Lighting Standard for pole construction and mounting requirements. (DAH/06/22/06)

Fabricate signal and lighting structures from tapered steel tubes with a round or 16-sided cross section. Orient hand holes located near the base of poles to face down-stream of traffic flow.

Furnish poles and mast arms up to 40 feet long in one piece. Poles and mast arms longer than 40 feet may be furnished in one piece or in two segments with a slip type field splice. For slip type joints, provide a minimum overlap of two feet or 1.5 times the inside diameter of the female section whichever is larger. In mast arms, locate these splices at least one foot away from the plan location of signal

heads and signs. In signal poles, locate the edge of the female section at least six-inches above the top of the signal mast arm connection.

Fabricate tubes with walls up to ½-inch thick from the prequalified base metals listed in AWS D1.1 and which feature maximum yield strengths of 70,000-psi. Fabricate elements greater than ½-inch thick from steel that conforms to ASTM A 709 and meets the Fracture Critical Impact Test requirements for zone 3. The Department will not accept structures that contain or are made with laminated steel elements.

Fabricate each tube from no more than 2 pieces of steel. When using 2 pieces, place the longitudinal welded seams directly opposite one another. Place the welded seams on adjacent sections to form continuous straight seams from the base to the top of the pole.

When tenons are needed to install traffic signals and luminaires, make them from two inch nominal schedule 40 pipe that conforms to ASTM A 53 Grade B.

Fabricate 10 feet long signal posts from 11 US Standard Gage sheet steel. Fabricate each post with a minimum inside diameter of five inches at the base plate. Use a 3½-inch long piece of four inch nominal schedule 40 pipe that conforms to ASTM A 53 Grade B as a post-top adapter.

The Department does not allow holes made for lifting purposes in the ends of tubular segments, except in the free ends of luminaire mast arms. To add lift points, weld them to the tube opposite the longitudinal seam weld on the outside of female segments and on the inside of male segments. Before shipment, remove all lift points added to the outside of the tubes, grind the area smooth with the base metal, and hot stick repair the finish according to subsection 660-3.01.8.a. You may leave the lift points added to the inside of tubes in place.

Hot-dip galvanize lighting and signal structures to meet AASHTO M 111 and these specifications. Completely submerge pole and mast arm segments in one dip in a kettle of concentrated zinc ammonium chloride flux solution heated to 130 °F, then completely submerge in one dip in a separate kettle of prime western grade zinc heated to approximately 825 °F. Galvanize bolts and fasteners to meet AASHTO M 232.

After the poles and mast arms are galvanized, remove all excess zinc from all drip lines and points and the surfaces of all tube ends that form slip type joints to provide a smooth finish.

The Department will reject poles and mast arms that are

1. Not fabricated according to these specifications or the approved shop drawings,

2. Bowed with sweeps exceeding ¾ inch throughout the length of the pole, mast arm, or segment, if you furnish a two-piece pole or mast arm,

3. Out of round. Sections are out of round when the diameters of round

members or the dimension across the flats of multi-sided members exceed two percent of the dimension specified on the shop drawings.

Fabricate pile cap adapters from grade X42 steel line pipe that conforms to API 5L and from steel plate that conforms to ASTM A 709 Grade 50. Attach the anchor plate to the pile section with a complete joint penetration (CJP) weld. Fabricate the anchor plate to match the base plate of the lighting standard.

Perform welding to conform to subsection 504-3.01 8. Welding and the following:

1. Make welds continuous.

2. Use partial joint penetration (PJP) welds in longitudinal seams. PJP welds must provide at least 60% penetration.

3. Use CJP groove welds to connect base plates to tubes with walls 5/16 inch thick and thicker. When CJP groove welds are used, the designer may use additional fillet welds when deemed necessary.

4. Use socket-type joints with two fillet welds to connect base plates to tubes with walls less than 5/16 of an inch thick.

5. On steels 5/16 of an inch thick and thicker, inspect 100 Percent of CJP welds by either radiography (RT) or ultrasound (UT).

6. Inspect a random 25 percent of PJP and fillet welds by magnetic particle (MT). If a defect is found, inspect 100% of the PJP and fillet welds made to fill the order. In steels less than 1/8 inch thick, complete the tests per AWS D1.3.

7. Only visually inspect welds made on luminaire mast arms.

Finish the edges of poles and mast arms to conform to the following requirements. Before they are hot dip galvanized, neatly round the following features to the radius specified

1. On all holes through which electrical conductors pass, provide a 1/16-inch radius on both the entrance and exit edges,

2. On all pole base plates, provide a 1/8-inch radius on all edges along which plate thickness is measured and a smooth finish on all other exposed edges,

3. On the ends of all tubes that form slip type joints, complete the following tasks on the two surfaces that contact one another. First, provide 1/16-inch radii on the inside and outside edges of the female and male segments, respectively. Then for the length of the joint plus six inches do two things: grind down all welds until they feature a radius concentric with the mating surface and remove all material protruding from the two surfaces, and

4. Grind exposed welds flush with the base metal, except fillet welds and seam welds on top of mast arms. Grinding seam welds on multi-sided poles is not required, except in slip type joints.

Provide caps to cover the free ends of poles and mast arms.

Identify critical information for poles and arms with visible permanent aluminum tags that contain the information shown in Table 740-1. The measurements shown are for illustration purposes only. Use tags large enough to include all required information using ¼ inch high text, 3/8 inch of space between successive lines of text, and at least 3/8 inch of space between the edges of the tag and the text. Secure the tags with two 1/8 inch blind rivets at the base of poles and the under side of mast arms. If you furnish a two-piece signal mast arm with slip type joint, mark both pieces with the same message.

TABLE 740-1
POLE MARKINGS

Note: *Italic type indicates additional Tag Markings if poles have 2 luminaire or 2 signal mast arms.*

	MEASUREMENTS	TAG MARKINGS
Signal Poles		
a) Signal mast arm length	45 ft./*55 ft.*	SMA 45/*SMA 55*
b) Luminaire mast arm length	22 ft./*18 ft.*	LMA 22/*LMA 18*
c) Pole height	36 ft.	PH 36
d) Intersection number (if more than one) -pole number		1 - P 4
e) Sum of signal mast arm moments about centerline of signal pole		SM 4000/*SM 3200*
f) Design wind speed	100 mph	DWS 100
Light Poles		
a) Luminaire mast arm length	15 ft./*15 ft.*	LMA 15/*LMA 15*
b) Pole height	37 ft.	PH 37
Signal Mast Arm		
a) Mast arm length	40 ft.	SMA 40
b) Intersection number (if more than one) -pole number		1 - P 4
c) Sum of signal mast arm moments about centerline of signal pole		SM 3740
d) Design wind speed	100 mph	DWS 100
Luminaire Mast Arm		
a) Mast arm length	18 ft.	LMA 18
b) Pole number (if unique arm design)		P 4

Replace subsection 740-2.04 with the following:

740-2.04 HIGH TOWER POLES. Design and fabricate high tower lighting poles to conform to the 2001 Edition of AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals* with interim revisions.

A registered professional engineer shall design the structures and provide stamped shop drawings and calculations. Submit the stamped drawings and calculations

for each pole to the Engineer for approval. Design for stresses on the completed structure with hardware in place.

1. In the stamped calculations, indicate the edition of Standard Specifications to which the poles are being designed and provide the input data used to design each pole, including: design wind speed, cross section shape, yield strengths of the component materials, dimensions of the pole components, and a summary of the loads used.

2. On the stamped shop drawings, provide the criteria to which the poles are designed and the details for building the poles, including: materials specifications, slip fit joint dimensions, dimensions of the tube segments and other components, the total weight of each segment, the welds that will be made, and the welding inspection that will be done.

The pole manufacturer shall submit a pole installation plan that details the work required to assemble each pole, the locations of timber supports during and after pole assembly. Submit this plan with the stamped plans and calculations.

Submit the mill certifications for steel items (piles, plates, bolts, and other related items) to the Engineer for approval.

Design high tower poles for a 50-year design life and the basic wind speed shown in the 2001 AASHTO Standard Specifications for Structural Supports or for 100 mph, whichever is greater. Use a gust effect factor of 1.14.

For fatigue design, use fatigue category I importance factors for lighting poles, and design poles that taper less than 0.14 inches of diameter per foot to resist the effects of vortex shedding.

Furnish poles fabricated from tapered steel tubes with a round, 16-sided, or 12-sided cross section. Use no more than four tapered-tube segments with slip type field splices to form each pole. For the slip type joints, provide a minimum overlap of 24 inches or 1.5 times the inside diameter of the female section whichever is larger.

Furnish poles that allow the luminaire ring to descend within five feet of the base plate.

Design poles to support a load that consists of the lowering device and ten luminaires equipped with light shields. Use the following values for these components.

Component	Effective Projected Area	Weight
One lowering device	8.6 ft^2	309 lbs
Ten luminaires	21.5 ft^2	617 lbs
Ten light shields	30.0 ft^2	22 lbs

Provide a reinforced rectangular hand hole that provides an opening large enough to install the winch assembly.

Provide a detachable door over the hand hole frame including hinges, nuts to fasten the door to the frame, and a neoprene gasket to provide a watertight seal around the frame. Provide for a locking mechanism for the hand hole door.

Fabricate the base plate to match the bolt circle diameter and the quantity and size of anchor bolts of the foundation detailed on the Plans. The anchor bolts conform to ASTM F 1554, Grade 55 with Supplemental Impact Test Requirements of Section S4. The distance from bottom of the leveling nut to the top of the concrete of the anchor bolts will not exceed one inch.

Install a hook to the left of the hand hole for storing the winch control cable away from the top of the foundation. Provide a one-inch wide hook that features rounded edges, a 1½ inch radius, and three inches between the low point and free end of the hook.

Fabricate tubes with walls up to ½ inch thick from the prequalified base metals listed in AWS D1.1 and which feature maximum yield strengths of 70,000-psi. Fabricate elements greater than ½ inch thick from steel that conforms to ASTM A 709 and meets the Fracture Critical Impact Test requirements for zone 3.

Fabricate each tube from no more than 2 pieces of steel. When using 2 pieces, place the longitudinal welded seams directly opposite one another. Place the welded seams on adjacent segments to form continuous straight seams from the base to the top of the pole. The Department will not accept poles and mast arms made with laminated steel elements.

The Department does not allow holes made for lifting purposes in the ends of tubular segments. To add lift points, weld them at least 12 inches away from welds on the outside of female segments and on the inside of male segments. Before shipment, remove all added lift points, grind the area smooth with the base metal, and hot stick repair the finish according to subsection 660-3.01.8.a.

Provide the mounting brackets needed to install the luminaire-ring lowering device, including the winch assembly, associated hardware, and the masthead assembly.

Around the top of each pole, provide a stabilizer system that prevents the luminaire ring from swinging freely when the top of the ring is within 24 inches of being fully docked in the masthead fitting. The stabilizer system shall consist of at least three crooked-F shaped brackets located symmetrically around each pole. The brackets shall form a tapered bottom section and a parallel top section that restricts ring movement. Bolt each bracket to two channels welded to the pole shaft. With the Eagle lowering device, locate the brackets between the wheels that line the luminaire ring. Design and fabricate the brackets from stainless steel tubing to withstand the load and wind speed used to design the poles. The installed brackets shall just fit through a circle two inches smaller in diameter than the inside diameter of the luminaire ring.

Perform welding to conform to subsection 504-3.01 8. Welding and the following:

1. Make welds continuous.

2. Use CJP groove welds on longitudinal seams within six inches of CJP circumferential welds.

3. In the ends of those segments that form a slip type joint, provide CJP longitudinal seam welds at least 12 inches longer than the length of the joint.

4. Use CJP groove welds to connect base plates to tubes with walls 5/16 inch thick and thicker. When CJP groove welds are used, the designer may use additional fillet welds when deemed necessary.

5. Use socket-type joints with two fillet welds to connect the pole top plates to tubes with walls less than 5/16 inch thick.

6. Use partial joint penetration (PJP) welds in longitudinal seams between the segments of CJP welds. PJP welds must provide at least 60% penetration.

7. Use PJP and fillet welds to attach hand-hole frames to the tube.

8. On steels 5/16 inch thick and thicker, inspect 100 Percent of CJP welds by either radiography (RT) or ultrasound (UT).

9. Inspect a random 25 percent of PJP and fillet welds by magnetic particle (MT). If a defect is found, inspect 100% of the PJP and fillet welds made to fill the order.

Weld tags on the ends of segments that form slip type joints to facilitate field assembly. Locate the tags to ensure segment alignment when the tags are aligned. Attach the tags at least 12 inches away from the slip type joint. Include the shop drawing number to which the poles are fabricated and pole length on the tag.

Finish poles to meet the following requirements. Before they are galvanized, neatly round the following features to the radius specified

1. On all holes through which electrical conductors pass, provide a 1/16-inch radius on both edges,

2. On all pole base plates, provide a 1/8-inch radius on all edges along which plate thickness is measured and a smooth finish on all other exposed edges,

3. On the ends of all tubes that form slip type joints, complete the following tasks on the two surfaces that contact one another. First, provide 1/16-inch radii on the inside and outside edges of the female and male segments, respectively. Then for the length of the joint plus six inches do two things: grind down all welds until they feature a radius concentric with the mating surface and remove all material protruding from the two surfaces, and

4. Grind exposed welds flush with the base metal, except fillet welds and seam welds on top of mast arms. Grinding seam welds on multi-sided

poles is not required, except in slip type joints.

The Department will reject poles containing segments that

1. Are not fabricated according to these specifications and the approved shop drawings,

2. Are bowed with sweeps exceeding ¾-inch throughout the length of the segment,

3. Are out of round. Segments are out of round when the diameters of round members or the dimension across the flats of multi-sided members exceed two percent of the dimension specified on the shop drawings.

4. Do not provide the minimum overlap of 24 inches or 1.5 times the inside diameter of the female section, whichever is larger, in the slip type field splices when the pole is assembled.

Hot-dip galvanize pole segments and attachments to meet AASHTO M 111 and these specifications. Completely submerge pole segments in one dip in a kettle of concentrated zinc ammonium chloride flux solution heated to 130 °F, then completely submerge in one dip in a separate kettle of prime western grade zinc heated to approximately 825 °F. Galvanize bolts and fasteners to meet AASHTO M 232.

After the poles and mast arms are galvanized, remove all excess zinc from all drip lines and points and the surfaces of all tube ends that form slip type joints to provide a smooth finish.

Replace subsection 740-2.06 with the following:

740-2.06 ELECTRICAL CONDUIT AND FITTINGS. Unless specified otherwise, use rigid metal conduit and fittings for all raceways. Furnish galvanized rigid type conduit and elbows that conform to UL-6 and are manufactured of mild steel according to ANSI C80.1. Furnish third party certified fittings designed for rigid metal conduit.

When polyethylene conduits are specified in the Plans, use a smooth wall, schedule 40, high-density polyethylene (HDPE) pipe that conforms to UL 651 B.

When fiberglass conduits are specified provide conduits as required by section 681. (DAH/06/22/06)

Furnish insulated throat grounding bushings made of malleable iron or steel with a mechanically galvanized or zinc plated finish. Grounding lugs shall either be an integral part of the bushing or consist of an attached tin-plated copper saddle. All grounding lugs shall feature a stainless steel screw, the centerline of which falls within 20 degrees of conduit centerline. The bushings furnished shall also feature a stainless steel or brass mounting screw that locks the bushing onto the conduit end.

Furnish conduit outlet bodies and their covers with a hot dip galvanized finish and stainless steel screws. For loop detectors, furnish type X bodies and, for photoelectric control installation, furnish types C and LB conduit bodies.

When Myers hubs are specified, furnish rain-tight, grounding type hubs made of malleable iron with a hot-dip or mechanically galvanized finish.

At expansion joints, provide watertight expansion fittings capable of the following movements without damaging the conduits attached to it or the conductors that pass through it. The movements include: axial expansion or contraction to ¾-inch, angular misalignments in any direction to 30 degrees, and parallel misalignment of the conduits to ¾-inch. The fittings shall also include a braided-copper bonding jumper equal to an 8 AWG conductor, bushings to prevent scraping the conductors, and a smooth inner sleeve that maintains a constant diameter regardless of conduit alignment.

Replace subsection 740-2.18 with the following:

740-2.18 ROADWAY LUMINAIRES.

1. Mast Arm Mounted Luminaires.

Furnish luminaires that:

a. Match new luminaries to existing adjacent roadway lighting. Existing Luminaries are GE MDCL40S5M12GMC32U 400W HPS. See drawings for pole and mast arm dimensions.

(DAH/06/22/06)

(04/30/05)R98USC04

Add the following subsection:

740-2.24 NAVIGATION LUMINAIRES.

1. Mast Arm Mounted Luminaires.

Furnish luminaires that:

b. Match new luminaries to existing adjacent roadway lighting. Existing Luminaries are GE MDCL40S5M12GMC32U 400W HPS. See drawings for pole and mast arm dimensions.

2. LED Bridge Navigation Lights: Provide navigation lights that mark the bridge to approaching marine traffic. Each light consists of fixture (marine lantern), internal assembly and mountings. Each colored light (red or green) shall have sufficient candela output to provide a minimum of one nautical mile range for the background lighting and atmospheric conditions in the vicinity of the bridge and will operate from 120VAC.

a. Lights: Provide and mount lights in the amount and locations as shown on the drawings.

b. Fixtures: Provide a precision molded glass, single piece, color impregnated, 8 inch fresnel lens. The lantern shall be hinged for easy access to the internal assembly and fitted with stainless steel captive toggle bolst and a watertight gasket to meet IP-55 standards. The lantern shall have stainless steel protection rods, angled to minimize shadowing of the light beam at all viewing angles. Vertical lens rods are not acceptable. The lantern housing shall be constructed with heavy duty stainless steel. The lantern base shall incorporate a bottom cable entry and four attachment bolts (3/8 diameter) on a 4-3/4 inch diameter bolt circle to match a 2 inch thick galvanized pipe coupling flange.

c. Internal assembly: Provide an array of at least twelve, high flux, red or green light emitting diodes (LED) symmetrically arranged around the lens focal point. The LED array shall be contained within a cylindrical diffuser to maximize horizontal uniformity of

the light beam. Provide a power supply located within the lantern base that will accept 240 VAC mains input and provide proper current limited DC voltage to the LED array.

The LED rated life shall exceed 100,000 hours. Mount the array on an internal shock and vibration isolator assembly. Provide a lightning surge suppressor in the circuit capable of absorbing multiple strikes without replacement.

d. Swivel Suspension Mount: Provide a galvanized steel swivel suspension with a 2" diameter hanger pipe and locking mechanism to prevent sway. The suspension assembly shall include a retrieval chain to bring the lantern to the bridge deck for servicing. The suspension support and the lantern and the hanger pipe will be a conduit for the power cable. Exposed wiring will not be allowed. The suspension shall include a 2 inch thick galvanized steel flange with four attachment bolts (3/8 diameter) on a 4-3/4 inch diameter bolt circle.

e. Approved Product: Automatic Power, Inc.'s FA-143078 Marine Signal Lantern with swivel suspension mount FA-230-L with security lock.

Automatic Power, Inc.
West Coast Office
37 Commercial BLVD., Suite 103
Novato, CA 94949
(415) 382-6296

3. Cast in Place Junction Boxes: Provide and install junction boxes, sized as shown on the plans, to be cast in place on the bridge for navigation lighting wiring. Provide watertight hot-dipped galvanized boxes rated for cast in place. Acceptable manufacturer Lew Electric Fittings Company (www.lewelectric.com) X-Series or approved equal. (DAH/06/22/06)