NEVADA DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISIONS

For Constructing a Portion of the State Highway System

On US 395, north of Reno, from McCarran to Golden Valley Structure.

County: Washoe

Route Section: US 395

Milepost: WA 27.064 to 31.107

Project: NHP-0191(104)

Contract: 3983

General description of work covered by this contract

Construct northbound and southbound auxiliary lanes, southbound travel lane, braided ramp at Panther Valley Interchange, and pavement rehabilitation.

These Special Provisions shall be used with, and as a component part of the Standard Specifications for Road and Bridge Construction, 2014 Edition

Tracy Larkin-Thomason, P.E.
NDOT Director

SPECIAL PROVISIONS

These Special Provisions supplement and modify the "Standard Specifications for Road and Bridge Construction," 2014 Edition. All of the requirements and provisions of said Standard Specifications shall apply, except where modified by the plans and these Special Provisions.

This is an English unit contract and all of the requirements and provisions given therefore shall apply. Make no reference to metric units unless metric units are the only units given or otherwise specified for both English unit and metric unit contracts.

SECTION 101 – TERMS AND DEFINITIONS

101.02 Abbreviations. The word “Saturdays” in the first sentence of the Working Day paragraph at the bottom of page 6 of the Standard Specifications is hereby deleted.

10BaseT	—	10 Mbps Ethernet Standard
100BaseT	—	100 Mbps Ethernet Standard
1000BaseT	—	1000 Mbps (1 Gbps) Ethernet Standard
10GBaseT	—	10,000 Mbps (10 Gbps) Ethernet Standard
AC	—	Alternating Current
AGC	—	Automatic Gain Control
AM	—	Amplitude Modulated
API	—	Application Programmer Interface
APC	—	AC Power Converter
AQD	—	Advance Queue Detector
ASCE	—	American Society of Civil Engineers
BNC	—	Coaxial Cable Connector
BPS	—	Bits Per Second
CAT	—	Contractor Acceptance Test
CAT6	—	Category Six (6) Twisted Pair Cabling
CCTV	—	Closed Circuit Television
CFR	—	Code (of) Federal Regulations
CODEC	—	Encode/Decode
CORE	—	Controlled Requirement Expression
COTS	—	Commercial Off The Shelf
CPU	—	Central Processing Unit
CSS	—	Central System Software
DAT	—	Design Approval Test
DSP	—	Digital Signal Processing
DB	—	Database
DC	—	Direct Current
DHCP	—	Dynamic Host Configuration Protocol
DIP	—	Dual In-line Package
DMS	—	Dynamic Message Sign
EMI	—	Electromagnetic Interference
EMT	—	Electrical Metallic Tubing
EPROM	—	Erasable Programmable Read Only Memory
FAT	—	Factory Acceptance Test
FCC	—	Federal Communication Commission
FDT	—	Factory Demonstration Test
FFDCPF	—	FAST Field Device Communications Protocols and Formats
FHES	—	Field Hardened Ethernet Switch
FPN	—	Fine Print Notes
F/UTP	—	Foil / Unshielded Twisted Pair
GBIC	—	Gigabit Interface Converter
GFCI	—	Ground Fault Circuit Interrupter
GFI	—	Ground Fault Interrupt
GUI	—	Graphical User Interface
HAR	—	Highway Advisory Radio
H.264	—	Motion Picture Experts Group 4-part 10 standard
HDPE	—	High Density Polyethylene
Hz	—	Hertz
I/O	—	Input/Output

ICCD	—	Interline Charged Coupled Device
IEEE	—	Institute (of) Electrical (and) Electronic Engineers
IETF	—	Internet Engineering Task Force RFC 2327
IP	—	Internet Protocol
ISA	—	Industry Standard Architecture
ISO	—	International Standards Organization
ITS	—	Intelligent Transportation Systems
LAN	—	Local Area Network
LC connector	—	Fiber Optic Connector
LED	—	Light Emitting Diode
MCI	—	Multimedia Control Interface
MDPE	—	Medium Density Polyethylene
MIB	—	Management Information Base
MTBF	—	Mean Time Between Failures
MPEG4	—	Motion Picture Experts Group 4-part 2 standard
MMFO	—	Multimode Fiber Optic Cable
NDF	—	Nevada Division of Forestry
NESC	—	National Energy Software Center
NFPA	—	National Fire Protection Association
NTCIP	—	National Transportation Communications for ITS Protocol
NTSC	—	National Television Standards Committee
O.E.M.	—	Original Equipment Manufacturer
OSP	—	Outside Plant
OW	—	Operator Workstation
PCI	—	Protocol Control Information or Peripheral Connection Interface
POE	—	Power over Ethernet (includes PoE++ and HiPoE)
PROM	—	Programmable Read Only Memory
PTM	—	Point-to-Multipoint
PTP	—	Point-to-Point
PTZ	—	Pan, Tilt, Zoom
PVC	—	Polyvinyl Chloride
RAM	—	Random Access Memory
R/D	—	Receiver Driver
RF	—	Radio Frequency
RFC 237	—	IETF Session Description Protocol
RFI	—	Radio Frequency Interference
ROC	—	Road Operations Center
RRFB	—	Rectangular Rapid Flashing Beacon
RSTP	—	Rapid Reconfiguration for STP
RTP	—	Real-time Transport Protocol
RWIS	—	Road Weather Information System
S/N	—	Signal to Noise
SALT	—	Stand Alone Test
SDP	—	Session Description Protocol
SDR	—	Standard Dimension Ratio
SFP	—	Small Form-factor Pluggable
SMFO	—	Single Mode Fiber Optic
SPB	—	Shortest Path Bridging
SQL	—	Structured Query Language
SST	—	Subsystem Test
STP	—	Spanning Tree Protocol
TIA	—	Traffic Industries Association
TMC	—	Traffic Management Center
TOD	—	Time of Day
UPS	—	Uninterruptable Power Supply
UTP	—	Unshielded Twisted Pair
USDOT	—	United States Department of Transportation
VAC	—	Volts of Alternating Current
VDC	—	Volts of Direct Current
VLAN	—	Virtual Local Area Networks
WAP	—	Warranty Administration Plan
WWD	—	Wrong Way Driver

101.03 Definitions. The word “Saturdays” in the first sentence of the Working Day paragraph at the bottom of page 6 of the Standard Specifications is hereby deleted.

SECTION 102 – BIDDING REQUIREMENTS AND CONDITIONS

102.03 Contents of Proposal Forms. Add the following to the end of this Subsection of the Standard Specifications:

(b) Workforce information (to comply with the Apprenticeship Utilization Act of 2019). Comply with the following requirements:

1. Prior to bid opening the prime Contractor shall upload a completed Project Workforce Checklist, provided by the Department, into the Department’s Electronic Bidding System (iCX).

2. By 5:00 pm the next business day following bid-opening, the apparent 3 lowest bidders shall upload a completed Project Workforce Checklist for all named subcontractors into the Department’s Electronic Bidding System (iCX).

3. Within 10 days of bid-opening, the apparent low bidder shall submit a Request for Waiver form, provided by the Department, for the prime Contractor and all named subcontractors. All supporting documentation for waivers, shall be submitted with the Request for Waiver form. The Request for Waiver form and supporting documentation shall be sent via email, fax or delivered to the Department’s Contract Compliance Office. If waivers are not needed, please indicate such on the Request for Waiver form, and submit as directed above.

A request for waiver may be submitted for one of the following:

a. No Registered Apprentice Programs exist for the craft/type of work required by the project.
b. A request for Apprentices was denied, or not acted upon within 5 business days of submission.
c. The project requires the performance of uniquely complex or hazardous work.

Failure to submit the workforce/apprentice utilization forms and supporting documentation described above, within the required time, may deem the bid non-responsive.

102.05 Examination of Plans, Specifications, Contract Documents, and Site of Work. Geotechnical Investigation Reports and Memos were prepared by HDR, NewFields, and the NDOT Geotechnical Section. These document titles and corresponding links are as follow:

“Final Geotechnical Design Report, US 395 North Valleys, Washoe County, Nevada” – HDR
https://www.dot.nv.gov/home/showpublisheddocument/21096/638100723151670000

“Geotechnical Design Report, Phase 1B: US395 North Valleys, Washoe County, Nevada” – NewFields
https://www.dot.nv.gov/home/showpublisheddocument/18026/637346615318730000

“I-3262 MSE Wall Design, US395 North Valleys Project, Washoe County, Nevada” – NewFields
https://www.dot.nv.gov/home/showpublisheddocument/21084/638095365196330000

“Sound Wall Design Memo, Rev. 1., US395 North Valleys Project, Washoe County, Nevada” – NewFields
https://www.dot.nv.gov/home/showpublisheddocument/21086/638095365206930000

“Geotecnical Design Report, US-395 G-1092 and I-1093 MSE Abutment Walls, Washoe County, Nevada” – NDOT
https://www.dot.nv.gov/home/showpublisheddocument/21082/638095365187400000

“Hazardous Material Surveys For Asbestos, US-395 G-1092, I-1093, and G-1748, Washoe County, Nevada” - https://www.dot.nv.gov/doing-business/about-ndot/ndot-divisions/engineering/environmental-services/environmental-documents-and-projects

102.16 DBE and SBE Certification and Bidding Requirements. The first four paragraphs of this Subsection of the Standard Specifications are hereby deleted and the following substituted therefore:

This Contract is subject to Title 49, Code of Federal Regulations, Part 26 and/or NRS 408.3872 to 408.38728, inclusive, for Disadvantaged Business Enterprise (DBE) and Small Business Enterprise (SBE) certification and bidding requirements. Portions of those regulations are set forth in these Standard Specifications, and those regulations in their entirety are incorporated herein by this reference.

It is the policy of the Department that DBEs/SBEs as defined in 49 CFR Part 26, NRS 408.3872 to 408.38728, and the Department's Disadvantaged Business Enterprise Program shall have an equal opportunity to participate in the performance of contracts. All the DBE and SBE requirements of 49 CFR Part 26 and/or NRS 408.3872 to 408.38, inclusive, apply.

The Contractor agrees to ensure that DBEs/SBEs have an equal opportunity to participate in the performance of contracts and subcontracts. In this regard the Contractor shall take all necessary and reasonable steps in accordance with 49 CFR Part 26 and/or NRS 408.3872 to 408.38, inclusive, to ensure that DBEs/SBEs have an equal opportunity to compete for and perform contracts.

The Contractor, sub recipient or subcontractor shall not discriminate on the basis of race, color, religion, sex, sexual orientation, gender identity or expression, age, disability, or national origin in the performance of the contract. The Contractor shall carry out applicable requirements of 49 CFR Part 26 and/or NRS 408.3872 to 408.38, inclusive, in the award and administration of the contract. Failure by the Contractor to carry out these requirements is a material breach of the contract which may result in the termination of this contract or such other remedy as the Department deems appropriate, which may include, but is not limited to:

(a) Withholding progress payments.
(b) Assessing sanctions.
(c) Liquidated damages.
(d) Disqualifying the Contractor from future bidding.

Add the following to the end of the seventh paragraph on page 12 of the Standard Specifications:

(e) Each DBE firm must be certified in a NAICS code applicable to the kind of work the firm would perform on the contract.

The first sentence and Subparagraph (1) of the second paragraph on page 13 of the Standard Specifications are hereby deleted and the following substituted therefore:

Determination of whether a DBE/SBE trucking company is performing a commercially useful function and the expenditures that count toward DBE/SBE goals will be as follows:

1. The DBE/SBE must be responsible for the management and supervision of the entire trucking operation for which it is responsible on a particular contract and must submit to the Department a DBE/SBE Trucking Credit Worksheet before any work can be started on a contract. There cannot be a contrived arrangement between the DBE/SBE trucking firm, the prime contractor and any lower tier subcontractors for the purpose of meeting DBE/SBE goals.

The third to last paragraph on page 13 of the Standard Specifications is hereby deleted and the following substituted therefore:

The DBE/SBE subcontractors submitted by the prime Contractor as meeting the requirements of this Subsection must have a license, if applicable, for the type and quantity of work to be performed by said DBE/SBE subcontractor, issued by the appropriate agency prior to award of the contract.

SECTION 103 – AWARD AND EXECUTION OF CONTRACT

103.02 Award of Contract. The second paragraph of this Subsection of the Standard Specifications is hereby deleted.

103.08 DBE and SBE Verification and Award Requirements. This Subsection of the Standard Specifications is in effect for this contract and the Department has established a DBE participation goal of 8.0%.

The last paragraph of this Subsection of the Standard Specifications is hereby deleted.

SECTION 105 – CONTROL OF WORK

105.03 Conformity with Plans and Specifications. (a) Testing. Demonstrate that the equipment and the systems furnished and installed under this contract function in full compliance with the requirements of the contract documents. See Subsection 623.03.21 for testing procedures. Conduct tests in the presence of the Engineer using approved test procedures. Submit test results using approved test data forms. The test results will be reviewed for conformance with the requirements of these contract documents. If the equipment or systems fail any part of a test, make necessary corrections and repeat that test.

Conduct tests in distinct stages of the system implementation as indicated in the testing procedures:

1. Factory Acceptance Test (FAT)
2. Stand-Alone Test (SALT)
3. Subsystem Test (SST)

The FAT verifies that each unit of equipment as it comes off the production line operates as specified. The CAT/DAT verifies that all equipment controllers are working in a lab environment fully configured and tested as if fully deployed in the NDOT ITS network. The SALT verifies that after installation but prior to interconnection, the equipment operates as specified in the field. SST verifies that units forming a subsystem continue to operate as specified when interconnected to the NDOT ITS network and operates error-free for 45 days. Upon successful completion and acceptance of the SST, the project will advance to the warranty and operational support period.

Coordinate with District for the name of each device to ensure consistency across all documentation. Once the device name has been agreed upon by the District, the Contractor shall send a Request for Information (RFI) to the Traffic Operations Technology Section (TOTS) (TOTechDL@dot.nv.gov) or FAST for device configuration information. Allow 2 weeks for TOTS or FAST to respond to the RFI with the IP and configuration information.

Prior to the SALT testing the contact the Traffic Operations Technology Section (TOTS) (TOTechDL@dot.nv.gov) or FAST and provide the following in an Excel spreadsheet:

1. Device Name
2. Device Type
3. Cabinet Name
4. GPS Location
5. Communications Method

Give notice of the time, date, and place of tests at least 14 days prior to the date on which a test is planned. Do not conduct tests sooner than 14 days after the associated test procedures are approved. If requested, postpone any test up to seven days to accommodate the schedules of the Engineer and their representatives. Postponements of tests are not grounds for extension of the contract nor for additional compensation. The Engineer may waive the right to witness certain tests.

The witnessing of tests, or the waiving of the right to do so by the Engineer or his representatives, shall not relieve the Contractor of the responsibility to furnish and install the work in accordance with the contract documents. Such actions by the Engineer or his representative or approval of test results by them will not be deemed as acceptance of the equipment or systems tested until successful completion of the SST.

Ensure that equipment to be tested is ready for testing prior to the performance of and Department witnessing of the tests.

Complete and submit test data forms containing the data taken as well as quantitative results for each test for approval. The test data forms will be the basis for rejection or acceptance of the required test. An authorized representative must sign the test data forms. When tests are witnessed by the Engineer, obtain the witnessing Engineer’s signature on the test data form.

The contract period will not be extended for time loss or delays related to testing.

Failure of any item to meet the requirements for any test will be counted as a defect and the equipment under test will be subject to rejection. Rejected equipment may be re-tested provided areas of non-compliance have been corrected, and evidence thereof is submitted.

For equipment that has failed and subsequently been repaired or modified, prepare and deliver a report that describes the nature of the failure and the corrective action taken. Submit this report for approval prior to shipping the modified equipment. After 3 failing tests remove and replace the faulty equipment.

1. SALT.

   (a.) The System Integrator shall work with the DEVICE VENDOR (if required by the testing form) and complete the NDOT specified SALT tests (non-network) on each unit of equipment after installation.

   (b.) The System Integrator and DEVICE VENDOR shall confirm device performance with the manufacturer software in the field.

   (c.) The System Integrator shall acquire the completed commissioning document from the DEVICE vendor.

   (d.) The System Integrator shall address all known issues prior to the start of the SALT testing.

   (e.) Conduct SALT testing on each unit of equipment as outlined on the NDOT approved testing form.

   (f.) The System Integrator shall coordinate through the Engineer and the Construction Crew to have an appropriate NDOT representative present for the onsite inspection.

   (g.) The System Integrator shall submit the DEVICE vendor commissioning documents with the SALT testing to the Engineer for review and approval.

   (h.) Supply a bucket truck and operator, or suitable equivalent equipment necessary to carry out procedures as required by the testing documents, at no direct payment.

   (i.) This test is conducted over a 72-hour period (three days), with formal testing performed once per day.

   (j.) After the 72-hour period an NDOT representative shall witness the test execution.

2. SST.

   (a.) At the beginning of the SST phase, the System Integrator shall submit, in PDF format and original signed hard copies of the certified SALT results for approval by the Engineer.

   (b.) The Engineer shall approve all SALT testing prior to the System Integrator starting the SST testing.

   (c.) Conduct SST testing in accordance with NDOT's testing documentation for all field and related equipment once the system has been interconnected to form a complete subsystem (i.e. Network connectivity).

   (d.) The SST test shall demonstrate connectivity to all field equipment utilizing NDOT's current freeway management system and ITS network.

   (e.) The SST test consists of a 45 day period of operations without major failure of equipment.

   (f.) Demonstrate that the total system (hardware, firmware, software, materials, and construction) is properly installed, is free from problems, exhibits stable and reliable performance, and meets requirements.

   (g.) Once per week, the System Integrator shall demonstrate that all system functions tested in the SST are operational and meets requirements.

   (h.) The System Integrator shall coordinate through the Engineer and the Construction Crew to have an appropriate NDOT representative present for the onsite inspection

   (i.) The System Integrator must provide proof that each device has been tested each week for the duration of the testing period witnessed by an NDOT representative.

(j.) The testing time must be scheduled a minimum of one week prior and coordinated and approved by the Engineer and the Construction Crew.

(k.) The SST testing shall last for a duration no less than 45 days.

Flashing Beacon Signs:
Flashing Beacon Controller

Signal Interconnect:
Fiber Optic Cable
Communications Subsystem Elements (Field hardened Ethernet Switch, modems)
Electrical Service

CCTV Equipment:
CCTV Camera (PTZ)
Communications Subsystem Elements (Encoders, Field Hardened Ethernet Switch)
Electrical Services

Wrong Way Driver:
Radar Detector System
CCTV Camera (Detectable)
Rectangular Rapid Flashing Beacon
Rectangular Rapid Flashing Beacon Controller (Type 2)

Use device communication software provided by the Department or the CSS to test the device communication protocols and interfaces in support of the SST. Modify the device communication software if required so that it can be used to conduct the SST.

Except for the DMS devices, use the field device communication protocols provided by the Department. For DMS devices use NTCIP as approved for application within the State of Nevada. Vendors approved for the QPL shall have demonstrated prior compliance with this NTCIP. Obtain the definition of this protocol from the Engineer prior to starting the development of DMS test procedures.

If required, give notification prior to starting test software modifications. When notified the Engineer will verify the veracity of previously published communication protocol and format documentation (and submit modifications, if any). The Department will not be responsible for costs arising from protocol changes that occur prior to notification.

Perform testing using System Integrator furnished computer equipment. Provide additional test equipment as necessary to meet all testing requirements. SALT testing may be conducted from the communication building. As part of this testing, periodically poll all devices that support status polling per the Engineer approved field device communication protocols.

The SALT will not be considered successful until equipment being tested is operational without failure for 72 consecutive hours.

The SST will not be considered successful until equipment being tested is operational without major failure for 45 consecutive days.

SST TESTING PHASE. Exercise the all ITS system equipment daily. For example, control the cameras, switch video, upload detector data, operate ramp meters, and display test messages/symbols on the DMS signs. Obtain access to the TMC/ROC during normal working hours to conduct these tests.

The SST shall be performed for subsystems (e.g. CCTV cameras, DMS, Ramp meters, etc) concurrently. Permission to start the test will only be granted after standalone testing (SALT) has been successfully completed. Request in writing the time and date when the test is to start.

Conduct the SST using the CSS. Load this software on a System Integrator furnished computer or a Department provided workstation. Demonstrate that the total system (hardware, firmware, materials, and construction) is properly installed, is free from identified problems, exhibits stable and reliable performance, and complies with the contract documents.

As part of the SST, the Department will be utilizing the system such as posting messages on DMSs, collecting and utilizing detector information, operating the CCTVs for monitoring purposes, and operating ramp meters. Coordinate SST testing activities with the Department's operations staff.

Ensure that equipment is maintained in operable condition during the SST. Troubleshoot, diagnose, identify, isolate, and resolve hardware and firmware problems and inconsistencies. Formulate possible solutions and implement corrections needed for Contractor installed equipment. Identify problems in equipment furnished by the Department and/or others and assist the Department in correcting problems with such equipment.

Have a System Integrator on-site to operate the system exercising functions, as required. Prior to the System Integrator being allowed onto the project a resume for the System Integrator with direct system integration experience for Intelligent Transportation Systems must be provided and accepted by the Engineer. Make available on-site, key technical personnel familiar with the design and construction of each major system component within 48 hours of notification of a problem.

Correct system documentation errors, omissions, and changes discovered and resulting from the SST and previous testing. System acceptance will not be considered complete until corrected documentation is submitted and As-built drawings have been received.

In the event of a major failure of a single piece of equipment during the SST, replace or repair the equipment and restart the 45 day test only for that piece of equipment. If the failure of the single piece of equipment prevents the proper operation of other equipment (e.g. failure of the CCTV terminal server prevents CCTV control for several cameras), the 45 day testing for the other devices affected by the failure will have to be restarted as well. The restarting of testing of the other devices must occur regardless if these devices having previously been tested and passed before equipment failure occurred.

The following conditions constitute a minor system failure and will result in suspension of the 45 day test:

3. Interference with project operations due to power failure.
4. Failure to complete the objective of any test scenario due to lack of adequate documentation for equipment supplied by the Contractor. Re-test using revised documentation.

After satisfactory remedial action, the 45-day test shall be resumed and extended one day for each restart.

Along with other conditions described in individual testing documents, the following constitutes a major system failure. Any one of the following conditions will result in reinitialization of the SST from day zero:

5. Failure of hardware or performance items to meet the operational requirements of the specifications for 72 consecutive hours.
6. Failure of 5% of field devices or communication equipment within a 14 day period.
7. Intermittent hardware, software, communication, or operation control malfunctions.

105.04 Coordination of Plans, Specifications, Supplemental Specifications, and Special Provisions. This Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

All supplementary documents are essential parts of the contract and a requirement occurring in one is binding as though occurring in all. They are complimentary and provide and describe the complete contract. If there is a discrepancy, the governing ranking is:

Dimensions	Information
1. Plan	1. Special Provisions
2. Calculated	2. Plans
3. Scaled	3. Standard Specifications
	4. Standard Plans
	5. Information received at mandatory prebid meetings

Take no advantage of any apparent contract error or omission. Promptly give notification if any omissions or errors are discovered. Such corrections and interpretations will then be made as may be deemed necessary for fulfilling the intent of the plans and specifications.

105.05 Partnering. This Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

For the benefit of both the Contractor and the Department, the formation of a "Partnering" relationship will be established in order to effectively complete the contract. The purpose of this relationship is to maintain cooperative communication and to mutually resolve conflicts at the lowest responsible management level.

The Department strives to work cooperatively with all Contractors and partnering is our way of doing business on all contracts. The Department encourages the formation of a partnering team consisting of significant contributors from the Department, Contractor, major Sub-contractors, and invited stakeholders.

Additional information and resources for Partnering requirements described herein can be found on the Department's website at https://www.nevadadot.com/doing-business/about-ndot/ndot-divisions/operations/construction/partnering-program.

For partnering requirements, projects are classified as Level 1 or Level 2 based on the contract bid amount. Level 1 projects have a total bid amount under $10 million while Level 2 projects have a total bid of $10 million or higher. All projects are required to follow partnering principles and implement basic partnering elements such as team member expectations, project goals, a risk assessment, and an issue resolution ladder. Level 1 projects may accomplish this in a partnering kickoff meeting led by the Engineer and Contractor Project Manager. Level 2 projects shall be led by a professional facilitator. All projects will have access to the "Partnering Roadmap" to use as a checklist and tracking tool for partnering expectations.

If a contract is under $10 million yet meets criteria in the "Facilitation Matrix" in Figure 105.1 at the end of this Subsection, the project might warrant professionally facilitated partnering. In some cases, the contract may specify required facilitation due to its complex nature or high public impact.

The establishment of the partnering relationship will not change or modify the terms and conditions of the contract.

Though the Engineer typically extends an invitation for the initial partnering session, either the Department or Contractor may request a facilitated session. After the Engineer receives the request, the Contractor and the Engineer shall cooperatively select a partnering facilitator from the Department's "Partnering Program Facilitator List."

Additional interim partnering workshops may be required throughout the life of the contract. It is suggested that, at minimum, kickoff and closeout sessions be held for all projects. Interim sessions should be held following a winter suspension or if the project exceeds one year in length. The frequency will be determined by the length and scope of the project. The Engineer and Contractor should work closely to schedule these sessions.

In implementing partnering, the Contractor and the Engineer shall manage the contract by:

1. Using early and regular communication with involved parties.
2. Establishing and maintaining a relationship of shared trust, equity, and commitment.
3. Identifying, quantifying, and supporting attainment of mutual goals.
4. Developing strategies for using risk management concepts.
5. Implementing timely communication and decision making.
6. Resolving potential problems at the lowest possible level to avoid negative impacts.
7. Holding periodic partnering meetings and workshops as appropriate to maintain partnering relationships and benefits throughout the life of the contract.
8. Establishing periodic joint evaluations of the partnering process and attainment of mutual goals.

At the kickoff session, the partnering team shall create a team charter that includes mutual goals (core project goals which may also include project specific goals and mutually supported individual goals), a partnering maintenance and closeout plan, dispute resolution plan with a dispute resolution ladder, and team commitment statement and signatures.

Professionally facilitated partnering teams shall participate in monthly partnering evaluation surveys to measure progress on mutual goals and short-term key issues as they arise. The surveys are intended to keep the team members and the project on task with the goals and resolution of issues. Issues identified in the surveys shall be addressed timely and appropriately. The closeout partnering session should be held shortly before or

after substantial completion and the team shall document the accomplishment of team goals and challenges as well as document lessons learned.

The costs of providing the Partnering Facilitator, Partnering Trainer, and Workshop Sites will be borne by the Department. The Contractor shall pay all initial costs incurred. The Department will reimburse the Contractor all of the costs as evidenced from the Facilitator, Trainer, and Workshop Site provider. Markup or profit added to invoices will not be allowed. All other costs associated with Partnering shall be borne separately by the party incurring the cost.

Figure 105.1 Facilitation Matrix.

Project Risk Calculation	**<<<Less**		**Risk Score**		**More>>>**	
Factors	**1**	**2**	**3**	**4**	**5**	**Risk Score (1-5)**
Project Duration	Less than 60 calendar days.		60-150 calendar days.		Greater than 150 calendar days.	
Number of 3rd parties (utilities, local municipalities, other key stakeholders	3 or less third parties.		4-6 third parties.		More than 6 third parties.	
Size of Project	Small		Medium		Large	
Number of Project Risks	Relatively few risks with minor cost and/or time impacts.		Typical project with moderate number of risks.		Many risks with significant cost and/or time impacts.	
Schedule Risks	Little to no anticipated constraints. Low liquidated damages and/or potential incentive.		Limited anticipated constraints. Average liquidated damages and/or potential incentive.		Many anticipated schedule constraints. High liquidated damages and/or potential incentive.	
Partnering Team Relationships	Team has worked together before and has a solid partnering foundation.		Team has some experience working together, not necessarily good or bad.		Team has not worked together or has a poor prior partnering relationship.	
					Total Risk Score:	
					Total Risk Score less than 15:	
					Total Risk Score 15 or more:	

105.09 Construction Stakes, Lines, and Grades. This Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Construction stakes establishing lines, slopes, and profile grade in road work, and centerline and benchmarks for bridge work, culvert work, protective and accessory structures and appurtenances will be set as deemed necessary, and all necessary information relating to lines, slopes, and grades will be furnished. These stakes and marks shall constitute the field control by and in under which the Contractor shall establish other necessary controls and perform the work.

Be responsible for the preservation of all stakes, marks, etc., provided by the Department.

Replace any part of the stakeout that is destroyed or lost by construction operations, or by any other reason, when needed to complete the work, at own expense.

The Department will be responsible for the accuracy of this work.

After initial stakeout of horizontal and vertical controls, give 72 hours written notice for any additional required controls. Saturdays, Sundays, and holidays will not be counted as part of the 72 hours.

105.16 Final Inspection and Acceptance. The fourth paragraph of this Subsection of the Standard Specifications is hereby deleted.

105.18 Disputes Review Team. This Subsection of the Standard Specifications is hereby deleted.

SECTION 106 – CONTROL OF MATERIAL

106.01 Source of Supply and Quality Requirements. Rock, soil, or other mineral material obtained or produced from sources other than those described in Subsection 106.02 must be evaluated for Naturally Occurring Asbestos (NOA) and erionite and comply with the requirements contained in the Department's "NDOT NOA & Erionite Commercial Import Material Clearance Guidance, July 2019". Submit required information for review and approval a minimum of 30 days prior to start of related work. Additional contract time will not be given for information requiring changes and re-submittal. The approval of source materials shall not relieve responsibility under the contract for successful completion of work.

A copy of "NDOT NOA & Erionite Commercial Import Material Clearance Guidance, July 2019" may be obtained from the Department's website at https://www.nevadadot.com/home/showdocument?id=16763.

Refer to "Invitation to Bid" documentation for applicable QPL. Alternative products may become available for use through updated QPLs subsequent to contract award date. Suitable products listed in updated QPLs may be used at no additional payment.

106.02 Local Materials. Anytime during the bidding process, access may be obtained, at own expense, to local material sources designated for contractual use on this project for the purpose of pre-bid material testing. Testing will be limited to rock, soil, or other mineral material, including borrow, selected borrow, or other selected material. No time extensions during the advertisement period will be issued to prospective bidders for the purpose of pre-bid material testing.

Contact the District Engineer to coordinate material site access, and to establish boundaries and avoidance areas in accordance with these Special Provisions. Submit, in writing, the following:

1. Location and dates of requested access;

2. Full details of exploration operations, including purpose of testing, proposed sampling procedures, material type and estimated quantity to be obtained, and post reclamation measures;

3. Acknowledgement and acceptance all work will be performed in accordance with applicable State and Federal requirements; and

4. Acknowledgement and acceptance of responsibility for all damages and costs associated with operations.

Do not excavate materials in a manner where the resulting scars will present an unsightly appearance.

Should material sites be located on public lands under the jurisdiction of the Bureau of Land Management, new Part 23 of Title 43 as noted in Subsection 106.03 shall pertain.

106.04 Samples and Tests. The second paragraph on page 34 of the Standard Specifications is hereby deleted and the following substituted therefore:

Testing personnel are required to be qualified in the Nevada Alliance for Quality Transportation Construction (NAQTC) Aggregate Module and Sampling and Density Module or Western Alliance for Quality Transportation Construction (WAQTC) Aggregate Module and Embankment and Base Module.

The first sentence of the second indented paragraph of (e) on page 35 of the Standard Specifications is hereby deleted and the following substituted therefore:

For gradation acceptance, samples will be taken from behind the lay down machine according to Test Method No. Nev. T200, except for aggregates for bituminous open-graded which will be sampled from the paving machine.

The first sentence of the last indented paragraph of (g) on page 35 of the Standard Specifications is hereby deleted and the following substituted therefore:

For gradation acceptance, samples will be taken from behind the lay down machine according to Test Method No. Nev. T200, except for aggregates for bituminous open-graded which will be sampled from the paving machine.

In the last sentence of the second indented paragraph of (h) on page 35 of the Standard Specifications, the reference to “AASHTO T40” is hereby deleted and “AASHTO R66” substituted therefore.

In indented paragraph (i) on page 36 of the Standard Specifications, the reference to “procedure No. 10” is hereby deleted.

106.05 Certificates of Compliance. Add the following to the end of the first paragraph of this Subsection of the Standard Specifications:

Progress payments will not be made on installed or stockpiled material without approved certificates of compliance.

The third sentence of the fifth paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

All tests shall be performed by an AASHTO re:source accredited facility.

106.12 Buy America. The fourth paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

The Build America, Buy America Act (BABA) of the Infrastructure Investment and Job Act (IIJA) (Pub. L. No. 117-58 §§ 70901-52) expands the requirements of the Buy America Act to include permanently incorporated construction materials on Federal-aid projects.

A “construction material” as defined under BABA shall include any article, material, or supply - other than an item of primarily iron or steel; a manufactured product; cement and cementitious materials; aggregates such as sand, stone, or gravel; or aggregate binding agents or additives - that is or consists primarily of the following:

1. Non-ferrous metals;
2. Plastic and polymer-based products, including but not limited to polyvinylchloride, composite building materials, and polymers used in fiber optic cables;
3. Glass (including optic glass);
4. Lumber; or
5. Drywall

Items that consist of two or more of the listed materials that have been combined together through a manufacturing process, and items that include at least one of the listed materials combined with a material that is not listed through a manufacturing process, should be considered as manufactured products rather than construction materials.

All construction materials must be manufactured in the United States. This means that all manufacturing processes for the construction material occurred in the United States.

Provide a Certificate of Materials Origin, using NDOT form 020-095, certifying materials comply with Buy America and BABA requirements as specified above. Submit the certification prior to installation of the material or product. Unless a Certificate of Materials Origin has been provided, the materials will be considered of foreign origin.

SECTION 107 – LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC

107.01 Laws to be observed. Subparagraphs (1), (2), (3), and (5) of this Subsection of the Standard Specifications are hereby deleted and the following substituted therefore:

(1) Compliance with Regulations: The Contractor shall comply with regulations relative to nondiscrimination, Federal regulation Title 49, Code of Federal Regulations, Part 21, Title 23, Code of Federal Regulations, Part 200, and Nevada Revised Statute 613.350, (hereinafter referred to as the Regulations), which are herein incorporated by reference and made part of this contract.

(2) Nondiscrimination: The Contractor, with regard to the work performed by it during the contract, shall not discriminate on the basis of race, color, religion, sex, sexual orientation, gender identity or expression, age, disability or national origin in the selection and retention of Subcontractors, including procurements of materials and leases of equipment. The Contractor shall not participate either directly or indirectly in discrimination prohibited by the Regulations.

(3) Solicitations for Subcontractors, Including Procurement of Materials and Equipment: In all solicitations either by competitive bidding or negotiation made by the Contractor for work to be performed under a subcontract, including procurements of materials or leases of equipment, each potential Subcontractor or supplier shall be notified by the Contractor of the Contractor's obligations under this contract and the Regulations relative to nondiscrimination on the basis of race, color, religion, sex, sexual orientation, gender identity or expression, age, disability or national origin.

(5) Sanctions for Non-Compliance: In the event of the Contractor's noncompliance with the nondiscrimination provisions of this contract, NDOT shall impose contract sanctions as it, the FHWA or the State may determine to be appropriate, including but not limited to:

a. withholding of payments to the Contractor under the contract until the Contractor complies, and/or
b. cancellation, termination or suspension of the contract, in whole or in part.

107.06 Sanitary, Health, and Safety Provisions. The third paragraph of this Subsection of the Standard Specifications is hereby deleted.

107.07 Public Convenience and Safety. The first sentence of the fourth paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Retain a person certified by the American Traffic Safety Services Association (ATSSA) or Department approved equivalent as a Traffic Control Supervisor as specified in Subsection 624.03.06.

107.08 Relations with Railroads. The second, third, and fourth sentences of the second paragraph on page 42 of the Standard Specifications are hereby deleted and the following substituted therefore:

Coordinate with the Railroad for the use of qualified services required for the project. Obtain and pay for the services required to meet compliance with the Railroad rules and regulations. The Department will reimburse the Contractor the costs as evidenced by copies of invoices from the qualified service provider, except costs incurred by the Contractor which are applicable to any private crossing agreements not provided in the contract. Invoices shall contain the contract number and description for which the services are provided. To the actual cost will be added the sum of 5% for profit and overhead with no further compensation therefore.

The Union Pacific Railroad representative to be contacted for this contract is as follows:

Rooke Jackson
Public Projects Manager
Benesch (for UPRR)
(817) 415-2990 (office)
(682) 274-3898 (mobile)
rjackson@benesch.com

The ninth paragraph on page 43 of the Standard Specifications is hereby deleted and the following substituted therefore:

In advance of any blasting, notify the Railroad and qualified service provider in order that proper flagging protection may be provided.

The first and second sentences of subparagraph "(c) Protection of Railroad Facilities" (indented paragraphs a through d shall remain) on the bottom of page 43 of the Standard Specifications are hereby deleted and the following substituted therefore:

Railroad will identify service providers qualified to protect its facilities, property, and movements of its trains or engines. Obtain such service providers in accordance with Subsection 107.08:

107.09 Liability Insurance. (b) Railroad Protective Insurance. The approximate ratio of the estimated cost of the work over or under or within 50 feet of Railroad's tracks to the total estimated contract cost is .119.

107.12 Protection and Restoration of Property and Landscape. The second to last paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Be responsible for the preservation, maintenance, and mitigation efforts to minimize erosion and water pollution throughout the duration of the project. See Section 211 and Section 637.

107.17 Contractor's Responsibility for Utility Property and Service. Contact the following representatives 2 weeks prior to beginning construction:

AT&T
Cliff Cooper
PO BOX 10010
Reno, Nevada 89520
(775) 233-0434
cc2132@att.com

NV Energy (Electric)
Jake Newman
PO Box 10100
Reno, Nevada 89520
Office (775) 834-7721
Cell (775) 636-5063
jake.newman@nvenergy.com

NV Energy (Gas)
Matt Brecke
PO Box 10100
Reno, Nevada 89520
(775) 834-7071
matt.brecke@nvenergy.com

Paiute Pipeline Company
Amanda Jones
P.O. BOX 1190
Carson City, Nevada 89702-1190
(775) 887-2808
amanda.jones@swgas.com

AT&T Legacy (Long Haul)
Jake Carnes, Shasta Consulting
700 South Main Street, Suite 3
Yreka, California 96097
Office (530) 841-0621 Ext. 104
Cell (530) 643-6756
jakecarnes@shastagroup.net

Charter Communications
Bart Givens
4815 Longey Lane
Reno, Nevada 9502
Office (775) 823-7744
Cell (775) 560-9452
bart.givens@charter.com

Zayo Communications
Robert Alford
(209) 275-0339
robert.alford@zayo.com

Michael Stake
(925) 813-8096
michael.stake@zayo.com

CITY OF RENO PUBLIC WORKS
JON SIMPSON
1 EAST FIRST ST. 8TH FLOOR
P.O. BOX 1900
RENO, NV 89509
O (775)689-2961
C (775) 742-4748
simsonj@reno.gov

TRUCKEE MEADOWS WATER AUTHORITY
STEVE VOLK
1355 CAPITAL BLVD.
RENO, NV 89502
O (775) 834-8024
C (775) 848-3083
svolk@tmwa.com

MCI/VERIZON
JIM BURKE
4875 LONGLEY LANE
RENO, NV
O (775) 622-6563
Jim.burke@verizon.com

WASHOE COUNTY
BEAU DUC
1001 E. 9TH STREET
RENO, NV 89521
O (775) 328-2042
C (775) 240-2654
bduc@washoecounty.us

Plumas-Sierra Telecommunications
Jeff Blagg
PO Box 1057
Portola CA 96122
530-520-8056
jblagg@pst.coop

Maintain a minimum of 2 ft. horizontal clearance with Paiute gas lines at all crossings. Contact Paiute Pipeline Construction Supervisor, Jaime Haas a minimum of 48 hours prior to any excavation in proximity to Paiute facilities. [(775) 881-8149 jaime.haas@swgas.com]

Department and certain Local Public Agency owned underground utilities shall be assumed to not be included in “UNDERGROUND SERVICE ALERT” network and coordination for the location or physical marking of such utilities are the sole responsibility of the Contractor. The Contractor shall contact the Department and any such local utilities 10 working days prior to ground disturbance to request location and physical marking of any such known utilities or facilities.

Preservation or perpetuation of such markings shall be the sole responsibility of the Contractor. Any cost associated with subsequent requests to restore or replace markings destroyed by the Contractor through carelessness or by willful action shall be borne by the Contractor and deducted from payment due for work performed.

SECTION 108 - PROSECUTION AND PROGRESS

108.01 Subletting of Contract. Prior to the Preconstruction Conference, submit a copy of the “NDOT Bidder Subcontractor and Supplier Information – Enterprise Subcontractors and Suppliers” report with an additional narrative that details your plans for utilization of each Enterprise Subcontractor for the prosecution of work. Include sufficient detail to ascertain when each Enterprise Subcontractor is anticipated to work on the project. Submit updated plans by the 15th of each month indicating any changes in planned utilization.

The second, fourth, and fifth paragraphs of this Subsection of the Standard Specifications are hereby deleted.

The second and third sentences of the third paragraph of this Subsection of the Standard Specifications are hereby deleted and the following substituted therefore:

Without exception and before the performance of any work by a subcontractor or service provider, submit a Subcontractor/Service Provider Request (SSPR) form to the Engineer for approval by the Department. Upon receipt of the SSPR approval, the subcontractor or service provider may begin work on the project. After SSPR approval, and within 2 business days of the subcontractor or service provider starting work on the project, enter the subcontractor or service provider in the Business to Government Now (B2GNow) system, and, for all subcontractors, upload a fully executed subcontract between the Contractor and the subcontractor. This applies for all tiers of subcontractors and service providers.

The sixth paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

All subcontractors, service providers and assignees of the prime Contractor shall be required to follow all Federal, State and local regulations and laws in the same manner as the prime Contractor.

The third paragraph and subparagraphs (a) through (g) in the middle of page 54 of the Standard Specifications are hereby deleted.

The second paragraph of “NON-DISCRIMINATION IN EMPLOYMENT AND CONTRACT LABOR PROVISIONS” on page 54 of the Standard Specifications is hereby deleted and the following substituted therefore:

“Also included, and made part of this subcontract agreement, through the execution of the Subcontractor/Service Provider Request (SSPR) form, are the applicable Labor Provisions, and required contract inclusions for all State and Federal construction contracts.”

When performed by subcontract, the following items of work, designated herein as "Specialty Items," are hereby exempted from the provisions that 50% of the value of the work be performed by the Contractor with his own organization, but are not exempted from the remaining provisions concerning subcontracting.

Specialty Items:

Description	Item Number
Reset Guardrail End Tratment	202 0460
All Section 503 Items	503 0130 thru 503 0560
Structural Steel	506 0110
Pedestrian Rail, Type V (Modified)	506 0810
Pedestrian Rail, Type X	506 0820
Drilled Shaft Foundation (60-inch)	509 0170
All Section 616 Items	616 0300 thru 616 1470
All Section 618 Items	618 0250 thru 618 0540
All Section 619 Items	619 0200 thru 619 0260

All Section 623 Items ..... 623 0201 thru 623 4100
All Section 627 Items ..... 627 0022 thru 627 0260
All Section 632 Items ..... 632 0830 thru 632 1070
All Section 634 Items ..... 634 1030 thru 634 1060
Impact Attenuator 641 0100

108.02 Notice to Proceed. Commence work not later than the date set forth in the "Notice to Proceed" and prosecute diligently so as to be completed within 450 working days after commencement of work or the date set forth in the "Notice to Proceed," whichever occurs first.

After the “Notice of Award” and prior to the “Notice to Proceed”, begin the procurement and approval process associated with all long lead items and materials associated with, but not limited to, MSE walls, bridge falsework, and drilled shafts.

The time limits specified for the completion of work contemplated herein is, in the opinion of the Director, insufficient to permit completion of the work by the Contractor working a normal number of hours per day or week on a single shift basis. It is expected that additional shifts will be required throughout the life of this contract to the extent deemed necessary to ensure that the work will be completed within the time limit specified. Any additional costs occasioned by compliance with these provisions will be considered to be included in the price paid for the various contract items of work and no additional compensation will be allowed therefore.

Liquidated damages will be assessed according to Subsection 108.09 for failure to complete the work as specified herein.

108.03 Prosecution and Progress. This Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

(a) General. After being awarded the contract, prepare and submit for acceptance the progress schedules as specified herein showing the order in which the work is proposed to be carried out.

Do not construe the acceptance of any progress schedule submitted to assign responsibility of performance or contingencies to the Department or relieve responsibility to adjust forces, equipment, and work schedules as may be necessary to insure completion of the work within prescribed contract time. Regardless of the number of working days or completion date indicated on the schedules, acceptance of a schedule shall not be construed as approval to adjust the contract time and liquidated damages will be assessed according to Subsection 108.09.

Any contingency (difference in time between the project’s early completion and required contract completion date) in a progress schedule belongs to the project, not any one party to the contract.

Neither the Contractor nor the Engineer shall own the “slack” or “float,” which is the amount of time between the early start date and the late start date, or the early finish date and the late finish date, of any activity or group of activities in the schedule.

The progress schedule may be used as a basis for establishing major construction operations and as a check on the progress of work. Provide sufficient materials, equipment, and labor to guarantee the completion of the project according to the plans and specifications. Should the prosecution of the work for any reason be discontinued, give notification at least 24 hours in advance of resuming operations.

Submit electronic copies of the schedule, in addition to hard copies of plots and reports. Acceptable formats for the preliminary schedule include bar chart, Gantt chart, or time-scaled logic diagram. Provide electronic copies of the baseline, monthly updates, and supplemental schedule files in an approved, compatible format which can be accessed by the Department’s current version of “Oracle” software scheduling program. The submittal of satisfactory progress schedules including preliminary, baseline, monthly updates, and supplemental schedules shall be considered as a necessary portion of the work; therefore, partial payments as set forth under Subsection 109.06 may not be forthcoming until this requirement is complied with.

The supplemental schedules and monthly updates shall not alter the logic previously established in the preliminary schedule or baseline schedule unless requested and approved in writing.

Through the use of calendars, incorporate non-work periods such as holidays, weekends, or other non-work days as identified in the contract.

Activity descriptions shall be concise and contain a verb, noun, and a location, but representative of the work being performed.

Schedules shall reflect Department activities and third party activities.

Do not use leads or lags when the creation of an activity performs the same function (e.g. concrete cure time). Lag duration shall not exceed 10 days without prior approval and shall not have a negative value. Explain the use of interrelation constraints such as leads and lags on activities in the narrative.

Do not use mandatory start or finish constraints, start on, expected finish, and zero total float constraints in the baseline, monthly update, or supplemental schedules without approval.

Code activities for the responsible party, phasing, and area or location.

Do not use schedule submittals to notify the Department of caused delays or to request additional contract time.

Failure or delay in the submittal or approval of a baseline, monthly update, or supplemental schedule will not result in any time extension.

(b) Preliminary Schedule. Submit an electronic copy of the preliminary schedule within 14 days of the "Notice of Award," and no later than 7 days before the Preconstruction Conference. As a minimum, show the first 30 working days on this schedule, including such activities as mix designs, procurement, shop drawings, aggregate source acceptance, material sampling, mix design preparation, fabrication, submittals, reviews, mobilization, demobilization, and activities or phases of work.

Allow 10 days for review and acceptance or rejection of the preliminary schedule. Participate in a review and evaluation of the preliminary schedule with the Engineer, as requested. Provide requested revisions to the preliminary schedule within 10 days.

(c) Baseline Schedule. Within 15 days after acceptance of the preliminary schedule, submit an electronic baseline schedule. Designate at the time of the baseline schedule submittal, in writing, an authorized representative who will be responsible for the preparation, revision, and updating of the baseline schedule. Allow 15 days for review and acceptance or rejection of the baseline schedule. Participate in a review and evaluation of the baseline schedule with the Engineer, as requested. Provide requested revisions to the baseline schedule within 10 days.

Provide a graphic network diagram showing the elements of the project in detail and an entire project summary. Show the order and interdependence of activities and the sequence in which the work is to be accomplished. Include the description, activity number, estimated duration in working days, and all activity relationship lines for each activity in the graphic network diagram. Provide sufficient detail to allow day-to-day monitoring of proposed operations. Activity durations shall not exceed 20 working days in length. Unless otherwise approved, exceptions may include procurement activities and work activities which may be considered routine once they are commenced. Provide a plot of the schedule in an acceptable size, scale, and format. Show the order and interdependence of activities and the sequence of work. Prominently distinguish critical activities on all reports by the use of color or other acceptable means. Each activity in the schedule, with the exception of the first and last, shall have a predecessor or successor activity, respectively.

Provide an analysis of the network diagram which includes the following information as a minimum for each activity:

1. Preceding and succeeding event numbers.
2. Activity description and number.
3. Estimated duration of activities.
4. Early start date (by calendar date).
5. Early finish date (by calendar date).
6. Late start date (by calendar date).
7. Late finish date (by calendar date).
8. Slack or float.
9. Activity constraints.

In the event an early completion schedule is submitted, either party may submit a Value Engineering Proposal to modify Subsection 108.02 to reflect the early completion. If the Value Engineering Proposal is not accepted, the parties agree that the "slack" or "float" shown by the early completion schedule remains with the project and to

waive rights to any damages for failing to complete the project in the time shown on the early completion schedule. A baseline schedule submitted that exceeds the time frames shown in Subsection 108.02 may be accepted at the discretion of the Engineer, however, any actual work that exceeds these time frames without an executed contract modification increasing time will be subject to the provisions of Subsection 108.09.

(d) Monthly Updates. Submit monthly updates on projects over 120 working days duration. Submit monthly updates on dates as agreed with the Engineer. Provide tabulation reports for activity numbers, total float, early start, and for precedence schedules, and a logic report of proceeding and succeeding activities with all restraints indicated. Provide a report showing the activities, or portions of activities, completed during the reporting period. State the percentage of the work actually completed and scheduled, the remaining duration, and the progress along the critical path in terms of days ahead or behind the allowable dates as of the report date. Indicate any changes made to the baseline schedule.

Provide a schedule narrative for each monthly update and include the following:

1. A summary of the progress for the current period, including schedule gains or losses and the reason why.
2. A list of all activities that have been added, deleted, or otherwise changed in the schedule with explanations for the modifications and description of the impacts each has on the schedule.
3. Any revisions that may have been performed to the schedule, providing the purpose of the revision and description of the impact to the critical path and completion dates.
4. The status of the critical path, explaining reasons for changes in critical path, impacts to the critical path that occurred during the period represented, or identifying potential future impacts.

(e) Supplemental Schedule. Submit a supplemental schedule if the project is determined to be behind schedule as requested by the Engineer within 15 days. Include a revised network diagram and analysis showing the proposed revisions to the baseline schedule. The conditions under which revisions of the baseline schedule will be required include the following:

1. When delay in completion of any work item or sequence of work items results in an estimated extension of project completion by either 20 working days or 5% of the remaining duration of time to complete the project, whichever is less.
2. When delays in submittals or deliveries make replanning or rescheduling of the work necessary.
3. When the schedule does not represent actual prosecution and progress of the work.
4. When any change to the sequence of activities, the completion date for major portions of the work, or changes occur which affect the critical path.
5. When contract modification necessitates schedule revision.

(f) Time Impact Analysis. Submit a “Notice of Potential Time Impact” when potential impacts are identified which may result in an adjustment of a milestone date or an extension of contract time as specified in Subsection 108.08. Submit such notice within 24 hours of identification of an impact unless otherwise approved.

Provide a description of the impact and include the status of the project on the progress schedule immediately before the impact and the effect of the FRAGNET as specified below with the “Notice of Potential Time Impact.”

Time extensions will only be considered when delays that affect milestone dates or the contract completion date are beyond the Contractor’s control.

Perform a time impact analysis of the effects of the potential impact and include the following:

1. Establish the status of the project on the progress schedule immediately before the impact.
2. Predict the effect of the impact on the current baseline schedule by inserting a FRAGNET of the issue and tying the FRAGNET to the impacted activity.
3. Track the effects of the impact on the schedule during its occurrence.
4. Establish the status of the project after the impact is complete and provide details identifying any mitigating actions or circumstances used to keep the project ongoing during the impact period.

Submit one electronic copy of the complete time impact analysis and a copy of the proposed supplemental schedule incorporating the time impact analysis no later than 15 days after the completion of the impact. If the project schedule is revised after the submittal of a time impact analysis, but prior to its approval, indicate in writing the need for any modification to the time impact analysis.

The time impact analysis will be reviewed. If this review detects revisions or changes to the schedule that had not been performed and identified in a narrative, the time impact analysis may be rejected. If the Engineer is in agreement with the time impact analysis, a change order may be issued to grant adjustment to milestones or extension of contract time.

108.04 Limitation of Operations. Contact the Department's Water Quality Specialist within the Stormwater Division (775) 888-7771 prior to submitting the Notice of Intent (NOI) to obtain coverage under the general Permit for Stormwater Associated with Construction Activity.

Provide a copy of the Notice of Intent (NOI) for the General Permit for Storm Water Associated with Construction Activity, as specified in Section 637, prior to beginning work.

Regardless of traffic control operations do not stop traffic on US 395 at any time unless otherwise approved or directed.

Do not adversely impact public traffic on US 395 during lane shifts or closures. If a lane shift or closure adversely impacts public traffic, as determined by the Engineer, work may be immediately suspended. If work is suspended, submit a revised plan which addresses the problem. Working days will continue to be assessed during the suspension and review of the plan.

During any lane reductions or shifts on US 395, the speed limit shall be reduced to 55 mph. Give notification in writing 14 days prior to planned speed reductions.

Traffic drums will be mandatory on all lane tapers or lane shifts unless otherwise approved or directed.

Do not adversely impact public traffic during ingress and egress of construction equipment. If ingress or egress operations adversely impact traffic, as determined by the Engineer, work may be immediately suspended. If work is suspended, submit a revised plan which addresses the problem. Working days will continue to be assessed during the suspension and review of the plan.

Open all lanes to public traffic during non-working hours unless otherwise approved or directed.

Maintain a minimum of two lanes open to public traffic Northbound on US 395 between the hours of 8:00 p.m. and 11:00 a.m., nightly, unless otherwise approved or directed.

Maintain a minimum of one lane open to public traffic Northbound on US 395 between the hours of 10:00 p.m. and 5:00 a.m., nightly, unless otherwise approved or directed.

Maintain a minimum of two lanes open to public traffic Southbound on US 395 at all times unless otherwise approved or directed.

Maintain a minimum of one lane open to public traffic Southbound on US 395 between the hours of 7:00 p.m. and 5:00 a.m., nightly, unless otherwise approved or directed.

Northbound US 395 from STA "XN" 619+00 ± to STA "XN1" 811+00± may be reduced down to two lanes open to public traffic at all times continuously for a maximum duration of 210 consecutive days. Once reduced down to two lanes, work diligently to complete all portions of work to safely open and maintain three lanes open to public traffic at all times within 210 days

Temporary stoppage of traffic on US 395 for the erection of overhead signs, is permitted between the hours of 1:00 a.m. and 4:00 a.m., nightly. Submit plans and durations for any stoppages 10 days prior to performing them for approval. Temporary traffic stoppages shall have a maximum time allowed of 20 minutes, upon which traffic shall be released and allowed to clear for a duration determined by the engineer. Contact the Nevada Highway Patrol in accordance with section 624.03.07 to coordinate the temporary stoppage and release of public traffic..

Ramp closures will be allowed between 9:00 p.m. and 5:00 a.m. nightly, unless otherwise approved or directed.

Consecutive on or off ramps cannot be closed simultaneously at any time unless otherwise approved or directed.

Do not close more than one ramp at an interchange unless otherwise approved or directed.

The closure of the northbound access of North Virginia Street from “V4” 10+00 to US 395 will be allowed to perform substructure construction for the widening portions of I-1093, and the construction of the new Structure I-3262 one time for a maximum 200 consecutive days. Once northbound access of North Virginia Street from “V4” 10+00 to US 395 is closed, work diligently to complete all portions of work through dense grade to safely open a minimum of one lane NB access to public traffic from North Virginia to US 395 by end of day 200.

Liquidated damages will be assessed according to Subsection 108.09 for failure to complete the work as specified herein.

Do not allow public traffic directly beneath the placement of any falsework or placement of any concrete.

Do not allow public traffic on cold milled surface at any time.

Maintain one lane of emergency access for all law enforcement from the Washoe County Sherriff’s Office Regional facility on Parr Boulevard to Southbound US 395 at all times, unless otherwise approved or directed.

Maintain a minimum vertical falsework clearance of 16 feet unless otherwise approved.

Prior to beginning construction, obtain all the necessary permits from the City of Reno and Washoe County by coordinating with the contacts supplied in Section 107.17 of these special provisions for traffic control implementation and the resulting impacts including public traffic detours onto their roadways.

At least 60 working days before the submittal of the Concrete Quality Control Plan (CQCP), as required in Subsection 501.02.01, the Department will present a concrete quality coordination meeting. The purpose of this meeting will be to discuss the expectations for production, testing and inspection during the placement of the construction of PCCP and bridge deck. Designate the appropriate personnel to attend this meeting.

Protect existing vegetation in place as shown on the landscape plans.

Work operations may be suspended during special events as directed. A special event is an occurrence that is anticipated to generate above average traffic volumes which exceed the capacity of lanes available. However, written request to perform specific operations that do not impact public traffic may be submitted 10 days prior to the special event. The written request shall include, but are not limited to, specific work activities to be performed, the number of workers and their proposed working hours, any equipment that will be operated, any material deliveries or removals from designated work areas, and the duration of work activities. The following is a partial list of special events, notification will be provided of other events:

Burning Man
Hot August Nights
Street Vibrations
Reno Air Races

Submit a noise abatement plan, as specified in Section 637, prior to beginning work.

Ten days prior to related work, submit an acknowledgment of asbestos assessment form to the Washoe County Health District and the Engineer. The form acknowledges the contractor has reviewed the hazardous material surveys for asbestos at bridges G-1092, I-1093, and G-1748 in section 102.05.

The last paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

During removal and reconstruction of curb ramps, maintain alternate pedestrian access through the work zone at all times, and sequence work on curb ramps at intersections so pedestrian traffic is provided continuous access through the intersection according to Section 624.

Backfill drop-offs at excavations for the curb ramps with aggregate base if the concrete is not replaced within the next day.

Do not work on more curb ramps at one time than can be completed and reopened to the public within 4 days following the initial removals. Failure to comply with this time constraint will be cause for suspension of work according to Subsection 108.06.

All vegetation/structure removal shall be conducted to avoid impacts to listed migratory birds (50 CFR 10.13), which are protected in Nevada by NAC 503.050, that may be actively utilizing vegetation/structures for nesting. When possible, vegetation/structure removal should not occur during avian breeding season (generally March 1 through July 31). Raptors and owls may begin nesting as early as January. If vegetation/structure removal shall occur during avian breeding season, nesting surveys shall be conducted by a biologist with experience in bird identification, general nesting behavior, nest and egg identification, and knowledge of habitat requirements for migratory birds. The survey shall be conducted a maximum of 7 days prior to land disturbance. Submit a copy of the biologist's survey report and the biologist's curriculum vitae.

If nesting sites are found within the project limits, the Department will determine a suitable buffer area around the nest site. The buffer area around the nest site will be flagged as an avoidance area. Disturbance shall not occur within the flagged avoidance area while the nest is occupied.

Bird nests containing eggs and/or young shall not be disturbed until after the young have left the nest, including swallows nesting on structures, and bats using structures for roosting. The Contractor may take preventative measures prior to avian breeding season to ensure that birds do not create nests on structures.

Be responsible for project delays ensuing from a failure to take into account bird nesting season and/or safeguard structures from bird nest construction. Approval shall be obtained prior to commencement of any contract-related activity resulting in the disturbance or removal of unoccupied nests. Do not commence vegetation/structure removal until written approval is obtained.

Be responsible for all costs incurred related to compliance with the MBTA, bird nesting surveys, establishment and maintenance of nest avoidance areas, bird nesting preventive measures, or removal of unoccupied nests on structures.

108.09 Failure to Complete the Work on Time. Liquidated Damage of $13,000.00 per working day will be assessed for failure to complete the work in the number of working days specified in Subsection 108.02.

Liquidated damages of $28,000.00 per day or portion thereof will be assessed for failure to complete all portions of work to safely open and maintain three lanes open to public traffic on Northbound US 395 within the number of days as specified in Subsection 108.04.

Liquidated damages of $25,000.00 per day or portion thereof will be assessed for failure to comply with the continuous closure restriction of the northbound access of North Virginia Street ramp as specified in Subsection 108.04.

Liquidated damages of $3,500.00 per 15 minutes will be assessed for failure to comply with the hourly restrictions for lane closures on US 395 as specified in Subsection 108.04.

Liquidated damages of $1,000.00 per 15 minutes will be assessed for failure to comply with the hourly restrictions for ramp closures as specified in Subsection 108.04.

Liquidated damages of $4,500.00 per day will be assessed for failure to clean track out areas as specified in Subsection 107.07.

Liquidated damages of $2,000.00 per day will be assessed for failure to have all traffic signal loop detectors installed and fully operational within 5 days of the paving operation at each loop detector location as specified in Subsection 623.02.30.

Liquidated damages of $1,000.00 per day per lane mile will be assessed for failure to place pavement striping as specified in Subsection 632.03.04.

SECTION 109 - MEASUREMENT AND PAYMENT

109.01 Measurement of Quantities. The eighth paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

When water meters are required, the accuracy of the meters will be checked by comparing the actual mass of approximately 4,000 L (1,000 gal), or 4 m^3 (125 ft^3), as metered with the calculated mass using as a reference density 1.00 kg/L (8.345 lb/gal) or 1,000 kg/m^3 (62.4 lb/ft^3). Unless otherwise specified, provide water meters accurate to within 1.5% of the indicated amount. The frequency of checking water meters will be determined.

109.02 Scope of Payment. The cost of the asphalt product for the double asterisk note in the demerit table on page 68 of the Standard Specifications is as follows:

Cost of the emulsified asphalt (diluted) will be $660.00 per ton.

Section 637 pay items are subject to the following requirements:

It is agreed by the parties to the contract that (a) in case the temporary pollution control implementation does not conform to the requirements set forth in Section 637, damage will be sustained by the Department, and that (b) it is extremely difficult to ascertain the actual damage which the Department will sustain; therefore, it is agreed the Contractor shall pay to the Department as liquidated damages or the Department, at its option, may deduct from any money due or to become due the Contractor from the Department an amount set forth in the following schedule:

Liquidated damages are assessed at $350 per demerit per day plus additional damages for 21 or more demerits as indicated. Liquidated damages are cumulative per violation.

Number of Demerits From Section 637	Additional Liquidated Damage
21-30	5% of contracted amount of temporary pollution control items
31-40	10% of contracted amount of temporary pollution control items
* 41 or more	Potential action by the Director, value and deduct to be determined

* Pursuant to NRS 408.441 through 408.451, the Director may issue an order for compliance, commence a civil action, request the Attorney General commence a criminal action, or seek injunctive relief.

Nothing herein prevents the Nevada Division of Environmental Protection, Environmental Protection Agency, or other state, federal, or local agencies from assessing penalties and fines against the Contractor due to the Contractor's failure to comply with applicable laws, regulations, and ordinances, or any combination thereof.

109.04 Asphalt Escalation. This Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

The use of the price adjustment provisions as developed and implemented herein are intended to minimize the cost effects of price uncertainty to the Contractor and the Department for "Asphalt Cement" used in the construction of the contract. The price adjustment provisions are not intended to serve as a guarantee for full compensation for "Asphalt Cement" price fluctuations but are intended to provide for a sharing, by the Department, in a portion of the Contractor's risk which could result from potentially volatile price fluctuations that might occur throughout the duration of the contract.

The price adjustment provisions do not serve to relieve the Contractor of risks associated with fluctuation in prices beyond the amount adjusted by the provisions. The price adjustment provisions are only applicable to "Asphalt Cement;" they are not applicable to cutback asphalt or emulsified asphalt. The term "Asphalt Cement" as used herein is applicable to PG grades as specified in Subsection 703.03.02.

The progress payment will be adjusted upward or downward, as calculated by the "Total Bi-Weekly Adjustment." These adjustments will be determined by the Department and will be based on selling prices for asphalt cement in the Poten & Partners Asphalt Weekly Monitor report. The sources used by the Department to determine the asphalt cement price at any given time will be the selling prices for California/Utah/Idaho/Nevada for non-modified paving grades and the California paving grades. The average of the high and low selling price for each of the following areas will be used: Utah - Salt Lake City area; Idaho - Boise area, Eastern markets, Northern markets [includes E.WA]; Nevada - Las Vegas area, Reno area; California - San Francisco area, Los Angeles area, Bakersfield area. Each of these nine average area prices is then used to calculate the weekly average price; the weekly average price is used to calculate the "Base Price" and the "Current Price." The adjustment will be made by comparing a "Base Price" to the " Current Price." The method for making this adjustment is described in the following paragraphs:

(a) The "Base Price" is the weekly average price using the prices posted on the Monday of the bid opening. The "Base Price" will be determined by the Department on a weekly basis. The "Base Price" in effect for the week a contract bid opening occurs will be the "Base Price" for the contract.

The "Base Price" for "Asphalt Cement" will be available on an informational basis to interested parties but said prices will not be available prior to the first regular business day of the week of the bid opening. The price may be obtained on the Department's website at:

https://www.nevadadot.com/home/showdocument?id=2025.

(b) The “Current Price” is the weekly average price using the prices posted on the Monday prior to the end of the progress payment period. During the time "Asphalt Cement" is used on the contract, the Department will maintain the “Current Price” on a weekly basis.

(c) The adjustment for said "Asphalt Cement" will be subject to increase or decrease in accordance with the following provision for "Asphalt Cement" price fluctuations exceeding 10%. The adjustment will be determined in accordance with the following formulas for “Asphalt Cement” used during the progress payment period:

For the Adjustment to be applied to both Dense Grade Plantmix and Open Graded Plantmix:

Total Bi-Weekly Adjustment per Item = Pa*Q

For the Unit Price Adjustment:

Pa = (Cp-A)* Ix

For an increase or decrease in the Weekly Materials Adjustment Index exceeding 10% of the Base Price:

A = Bp + (0.10*Bp)

If current price is higher than base price, formula should include +
If current price is lower than base price, formula should include -

Where:

A	=	The Adjusted Base Price
Bp	=	The Base Price for the week in which the bid opening for the contract occurred
Cp	=	The Current Price for the week of the progress payment period
Pa	=	Unit Price Adjustment
Ix	=	Index Factor which is defined as 5% (0.05) for Dense Grade Plantmix and 6.5% (0.065) for Open Graded Plantmix
Q	=	Quantity in tons of Dense Grade Plantmix or Open Graded Plantmix

(d) The adjustment in compensation shall also be subject to the following:

1. The compensation adjustments provided herein, will be shown separately on the progress payment. The Contractor shall be liable to the State for decreased compensation adjustments and the Department shall deduct the amount thereof from any monies due or that may become due the Contractor.

2. The Department reserves the right to terminate the contract whenever the “Current Price” exceeds the “Base Price” by 75%. The contract may be terminated in part or in whole by the Department.

109.05 Fuel Escalation. The Fuel Escalation Clause is not in effect for this contract, therefore this Subsection of the Standard Specifications is hereby deleted.

109.06 Partial Payment. The first paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Progress payments will be made biweekly as the work satisfactorily progresses. The progress payments will be based upon material in place, or on the job site and invoiced, and labor expended thereon. The contract price will be adjusted upward or downward according to approved changes throughout the life of the contract. The Department shall withhold retention in the amount of 2.5% of each biweekly progress payment until the entire contract is completed satisfactorily and Final Inspection and Acceptance in accordance with Subsection 105.16 of the Specifications is granted. Retention shall be reduced to $50,000 when the aforementioned conditions have been met. The Department may reduce the retention from $50,000 to a minimum of $10,000 if sufficient reasons exist for reduced retention and written approval has been obtained from every surety furnishing bonds for the work. Any remaining retention shall be withheld until the conditions of Subsection 109.07 Acceptance and Final Payment of the Specifications have been satisfied.

The fifth full paragraph, including subparagraphs (a) and (b), on page 76 of the Standard Specifications is hereby deleted.

The third and fourth sentences of the second to last indented paragraph from the bottom of page 76 of the Standard Specifications are hereby deleted.

The word “original” in two places in the last indented paragraph at the bottom of page 76 of the Standard Specifications is hereby deleted.

The word “original” in five places in subparagraph (c) Mobilization on the middle of page 77 of the Standard Specifications is hereby deleted.

Partial payment will be made on the pay items noted below, provided that materials and equipment are satisfactorily supplied and remain for use on this project only:

CCTV Camera (Fixed)
CCTV Camera (PTZ)
Field Hardened Ethernet Switch

Any materials or equipment requiring testing will receive partial payments of the unit cost according to the following schedule:

1. When successful pre-installation testing of the fiber optic cable is complete and/or upon installation of ITS devices listed above, 70% of the contract unit bid price will be eligible for payment.

2. When successful completion of the SALT and SST is accepted 100% of contract unit bid price will be eligible for payment.

No stockpile payments will be made on the above ITS items of work. All retention is still applicable as detailed in Subsection 109.06.

109.08 Payments to Subcontractors. The second paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Report payments made to each subcontractor and each DBE/SBE supplier via B2GNow reporting software by the 15th day of each month following payment. Access to the software is provided at no cost. Ensure that subcontractors report their payments to lower-tier subcontractors via B2GNow. Ensure that Enterprise Subcontractors verify payments made to them via B2GNow. If subcontractors do not confirm payments via the B2GNow system, proof of payment may be required. Reporting via B2GNow is considered a necessary portion of the work and partial payments as set forth under Subsection 109.06 may not be forthcoming until this requirement is complied with.

109.09 Emulsified Asphalt Escalation. The use of this price adjustment provision, as developed and implemented herein, is intended to minimize the cost effects of price uncertainty to the Contractor and the Department for “Emulsified Asphalt” used in accordance with Sections 404, 406, 407, 408, and 418, for the construction of the contract. The price adjustment provisions are not intended to serve as a guarantee for full compensation for “Emulsified Asphalt” price fluctuations, but are intended to be a sharing, by the Department, in a portion of the Contractor’s risk which could result from potentially volatile price fluctuations that might occur throughout the duration of the contract. This escalation does not cover items when considered incidental to the contract.

The price adjustment provisions do not serve to relieve the Contractor of risks associated with fluctuation in prices beyond the amount adjusted by the provisions. This adjustment will be full compensation for any and all price fluctuations, including but not limited to taxes, transportation, and delays.

The price adjustment provisions are only applicable to “Emulsified Asphalt.” The terms “Emulsified Asphalt” and "emulsion" as used herein are applicable to grades of emulsified and cutback asphalts required for Section 404, 406, 407, 408, and 418. The quantity of asphalt used in escalation calculations for emulsified asphalt is based upon the minimum residue (MR) percentage with the specified dilution factors for the particular type of emulsion bid and supplied by the Contractor in accordance with Subsection 703.03.04.

The progress payment will be adjusted upward or downward, as calculated by the "Total Bi-Weekly Adjustment." These adjustments will be determined by the Department and will be based on selling prices for asphalt cement in the Poten & Partners Asphalt Weekly Monitor report. The sources used by the Department to determine the asphalt cement price at any given time will be the selling prices for Utah/Idaho/Nevada for non-modified paving grades and the California paving grades. The average of the high and low selling price for each of the following areas will be used: Utah - Salt Lake City area; Idaho - Boise area, Eastern markets, Northern markets [includes E. WA]; Nevada - Las Vegas area, Reno area; California - San Francisco area, Los Angeles area, Bakersfield area. Each of these nine average area prices is then used to calculate the weekly average price; the weekly average price is used to calculate the "Base Price" and the “Current Price.” The adjustment will be made by comparing a "Base Price" to the "Current Price." The method for making this adjustment is described in the following paragraphs:

(e) The “Base Price” is the weekly average price using the prices posted on the Monday of the bid opening. The “Base Price” will be determined by the Department on a weekly basis. The “Base Price” in effect for the week a contract bid opening occurs will be the “Base Price” for the contract.

The “Base Price” for “Emulsified Asphalt” will be available on an informational basis to interested parties but said prices will not be available prior to the first regular business day of the week of the bid opening. The price may be obtained on the Department’s website at:

https://www.dot.nv.gov/doing-business/about-ndot/ndot-divisions/operations/construction/contract-escalation-clauses.

(f) The “Current Price” is the weekly average price using the prices posted on the Monday prior to the end of the progress payment period. During the time "Emulsified Asphalt" is used on the contract, the Department will maintain the “Current Price” on a weekly basis.

(c) The adjustment for said "Emulsified Asphalt" will be subject to increase or decrease in accordance with the following provision for "Emulsified Asphalt" price fluctuations exceeding 10%. The adjustment will be determined in accordance with the following formula for “Emulsified Asphalt” used during the progress payment:

For the Adjustment to be applied:

Total Bi-Weekly Adjustment per Item = Pa*RQ

For the Unit Price Adjustment:

Pa = Cp-A

For an increase or decrease in the Weekly Materials Adjustment Index exceeding 10% of the Base Price:

A = Bp + (0.10*Bp)

If current price is higher than base price, formula should include +
If current price is lower than base price, formula should include –

For the Residue Quantity, in tons of actual asphalt contained in product:

RQ = MR*(Emulsified Asphalt Supplied)

Where:

A = The Adjusted Base Price

Bp = The Base Price for the week in which the bid opening for the contract occurred

Cp = The Current Price for the week of the progress payment period

Pa = Unit Price Adjustment

RQ = Residue Quantity of emulsified asphalt supplied by Contractor

MR = Minimum asphalt residue percentage identified as minimum "Residue, %" for specified emulsion type listed in Table I, for items associated with Sections 404, 406, 407, 408 and 418. This percentage is the quantity of actual asphalt contained within the various emulsions.

TABLE I

Grade of Emulsified Asphalt	Residue %
EMULSIFIED ASPHALT, TYPE CMS-2S	60
EMULSIFIED ASPHALT, TYPE CMS-2S (DILUTED)	30
EMULSIFIED RECYCLING AGENT	60
CUTBACK ASPHALT, TYPE MC-250	67
EMULSIFIED ASPHALT, TYPE SS-1	57
EMULSIFIED ASPHALT, TYPE SS-1 (DILUTED)	40
EMULSIFIED ASPHALT, TYPE SS-1H (DILUTED)	40
EMULSIFIED ASPHALT, TYPE CSS-1 (DILUTED)	40
EMULSIFIED ASPHALT, TYPE CSS-1H	57
EMULSIFIED ASPHALT, TYPE CSS-1H (DILUTED)	40
EMULSIFIED ASPHALT, TYPE CSS-1H (MODIFIED)	57
EMULSIFIED ASPHALT, TYPE CQS-1NV (DILUTED)	40
EMULSIFIED ASPHALT, TYPE CQS-TRNV (DILUTED)	40
FOG SEAL	39
EMULSIFIED ASPHALT, TYPE CRS-2NV	65
EMULSIFIED ASPHALT, TYPE LMCRS-2H	65
EMULSIFIED ASPHALT, TYPE PMPS-H	65
EMULSIFIED ASPHALT, TYPE PMRE-H	65
EMULSIFIED ASPHALT, TYPE PMCQS-1NV	64
MICRO-SURFACING EMULSION, TYPE MSE	64
MICRO-SURFACING EMULSION, TYPE MSE-H	64

(d) The adjustment in compensation will also be subject to the following:

1. The compensation adjustments provided herein, will be shown separately on the progress payment. The Contractor shall be liable to the State for decreased compensation adjustments and the Department may deduct the amount thereof from any monies due or that may become due the Contractor.

2. The Department reserves the right to cancel the contract whenever the “Current Price” exceeds the “Base Price” by 75%. The contract may be canceled in part or in whole by the Department.

SECTION 110 - WAGES AND CONDITIONS OF EMPLOYMENT

110.01 Description. The sixth and seventh paragraphs of this Subsection of the Standard Specifications are hereby deleted and the following substituted therefore:

The minimum wage rates apply to workers working upon the “site of the work.” The term “site of the work” is defined per NRS 338.040, NAC 338.009, and 29 CFR § 5.2(l).

The last paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Submit payrolls electronically into the Department’s contracted payroll tracking system “LCPtracker” on a weekly basis. This requirement will apply to the prime Contractor and every lower tier Subcontractor, service provider and vendor required to provide certified payroll reports by NRS 338.010 to 338.090 inclusive and the applicable parts of 29 CFR. Annual access fees, options for interface software, and training to utilize the system are available on LCPtracker websites.

Pay the annual LCPtracker system access fees established by LCPtracker based on the contract bid amount.

Obtain access to the LCPtracker system no later than the date employees start work on the project. Ensure subcontractors have access to the LCPtracker system for the reporting of payrolls no later than the date the subcontractor's employees start work on the project.

List, for each employee, a designation of race, ethnicity, color, or national origin, and male/female identifier on each weekly payroll.

For standardization purposes the Department has established the following identifications:

White/Caucasian: Persons having origins in Europe, North Africa or the Middle East.

Black/African American (except Hispanic): Persons having origins in any of the Black racial groups of Africa.

Native American - American Indian or Alaskan Native: Persons having origins in any of the original peoples of North America and who maintain their culture through a tribe or community.

Hawaiian or other Pacific Islander: Persons having origins in the original peoples of Hawaii or other Pacific Islands.

Asian: Persons having origins in any of the peoples of the Far East, Southeast Asia, or India.

Hispanic Americans: Persons of Mexican, Puerto Rican, Cuban, Central or South America, or other Spanish culture or origin, regardless of race.

Two or More Races: Persons who identify with two or more designations listed above, or other persons protected from employment discrimination by EEO law, based on race, ethnicity, color or national origin, not otherwise defined.

Not Specified: Only for persons who choose not to list their race, ethnicity, color or national origin.

110.03 Training Program. This Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

In accordance with 23 U.S.C. 140(a) and as a part of the Contractor's equal employment opportunity affirmative action program, training shall be provided as specified herein.

Provide on-the-job training aimed at developing full journeymen in the type of trade or job classification involved.

The number of hours of training will be as indicated in the Proposal.

In the event that a portion of the contract work is subcontracted, determine how many, if any, of the trainees are to be trained by the subcontractor, however, the Contractor retains the primary responsibility for meeting the training requirements specified. Insure that these training specifications are made applicable to such subcontract. Where feasible, 25% of apprentices or trainees in each occupation shall be in their first year of apprenticeship or training.

The number of trainees shall be distributed among the work classifications on the basis of the Contractor's needs and the availability of journeymen in the various classifications within a reasonable area of recruitment. Prior to commencing construction, submit for approval, the number of trainees in each selected classification and training program to be used. Furthermore, specify the starting time for training in each of the classifications. Credit will be given for each trainee employed on the contract work who is currently enrolled or becomes enrolled in an approved program and reimbursement will be made for such trainees as provided hereinafter.

Training and upgrading of minorities and women toward journeymen status is a primary objective of these training requirements. Make every effort to enroll minority trainees and women (e.g., by conducting systematic and direct recruitment through public and private sources likely to yield minority and women trainees) to the extent that such persons are available within a reasonable area of recruitment. Be responsible for demonstrating the steps taken in pursuance thereof, prior to a determination as to whether the Contractor is in compliance with these training requirements. This training commitment is not intended, and shall not be used, to discriminate against any applicant for training, whether a member of a minority group or not.

Do not employ any person as a trainee in any classification in which they have successfully completed a training course leading to journeyman status or in which they have been employed as a journeyman. Satisfy this requirement by including appropriate questions in the employee application or by other suitable means. Regardless of the method used, the Contractor's records shall document the findings in each case.

The minimum length and type of training for each classification shall be as established in the training program selected by the Contractor and approved by the Department and the Federal Highway Administration. The Department and the Federal Highway Administration will approve a program if it is reasonably calculated to meet the equal employment opportunity obligations of the Contractor and to qualify the average trainee for journeyman status in the classification concerned by the end of the training period. Furthermore, apprenticeship programs registered with the U.S. Department of Labor, Bureau of Apprenticeship and Training, or with a State apprenticeship agency recognized by the Bureau and training programs approved but not necessarily sponsored by the U.S. Department of Labor, Manpower Administration, Bureau of Apprenticeship and Training will also be considered acceptable provided it is being administered in a manner consistent with the equal employment obligations of Federal-aid highway construction contracts. Approval or acceptance of a training program shall be obtained from the State prior to commencing work on the classification covered by the program. It is the intention of these provisions that training is to be provided in the construction crafts rather than clerk-typists or secretarial-type positions. Training is permissible in lower level management positions such as office engineers, estimators, timekeepers, etc., where the training is oriented toward construction applications. Training in the laborer classification may be permitted provided that significant and meaningful training is provided and approved. 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.

Except as otherwise noted below, the Contractor will be reimbursed 80 cents per hour of training given an employee on this contract in accordance with an approved training program. As approved by the Engineer, reimbursement will be made for training persons in excess of the number specified herein. This reimbursement will be made even though the Contractor receives additional training program funds from other sources, provided such other does not specifically prohibit the Contractor from receiving other reimbursement. Reimbursement for offsite training indicated above may only be made where the Contractor does one or more of the following and the trainees are concurrently employed on a Federal-aid project; contributes to the cost of the training, provides the instruction to the trainee, or pays the trainee's wages during the offsite training period.

No payment will be made to the Contractor if either the failure to provide the required training or the failure to hire the trainee as a journeyman is caused by the Contractor and evidences a lack of good faith on the part of the Contractor in meeting these training requirements. It is normally expected that a trainee will begin their 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 in their work classification or until they have completed their training program. It is not required that all trainees be on board for the entire length of the contract. A Contractor will have fulfilled his responsibilities under these training requirements if acceptable training has been provided for the number of training hours specified. The number trained shall be determined on the basis of the total number enrolled on the contract for a significant period.

Trainees shall be paid at least 60% of the appropriate minimum journeyman's rate specified in the contract for the first half of the training period, 75% for the third quarter of the training period, and 90% for the last quarter of the training period, unless apprentices or trainees in an approved existing program are enrolled as trainees on this project. In that case, the appropriate rates approved by the Departments of Labor or Transportation in connection with the existing program shall apply to all trainees being trained for the same classification who are covered by these specifications.

Furnish each trainee a copy of the program they shall follow in providing the training. Provide each trainee with a certification showing the type and length of training satisfactorily completed.

Maintain records and furnish periodic reports documenting performance of these training requirements.

SECTION 200 - CONSTRUCTION STAKEOUT

This Section of the Standard Specifications is hereby deleted and the following substituted therefore:

DESCRIPTION

200.01.01 General. This work to be performed by the Contractor consists of the construction surveying, calculating, and staking necessary for the construction of various elements of the project.

Unless specified otherwise, all survey procedures shall be in conformance with the Department's Construction Survey Manual.

200.01.02 Contractor Stakeout. Perform the following construction stakeout in accordance with the plans, these Special Provisions, the Department's Construction Survey Manual, and as directed:

1. Perform complete stakeout of bridge structures, including the approach slabs and slope paving, and all stakeout necessary to construct bridge structures to completion.

2. On major structures constructed with structural steel girders, obtain tenth point elevations in accordance with the plan camber diagram on the erected unloaded girders and provide elevation information to the Engineer prior to installing the deck forms, including any stay-in-place forms.

3. Perform the stakeout for permanent pavement striping as specified in Subsection 632.03.01.

4. Provide any additional benchmarks, reference points, or other controls that may be required.

Replace construction stakeout work as needed during construction and as directed to control the work.

Be responsible for the accuracy of the construction stakeout work performed. Correct errors in stakeout and related work performed, at own expense.

When tying into existing roadway features, verify elevation and alignment at match points. Give notification of all elevation and alignment discrepancies prior to proceeding with the work.

Submit all survey records upon completion of the project. Survey records shall become the property of the Department.

CONSTRUCTION

200.03.01 Equipment. Furnish all personnel, survey equipment, safety equipment, materials, and traffic control necessary to perform the required construction surveying and staking outlined in Subsection 200.01.02. All surveying equipment, including Electronic Distance Meters (EDM), total stations, theodolites, levels, rods, tapes, tripods, tribrachs, and Global Positioning System (GPS) receivers and equipment shall be checked and calibrated by the manufacturer and documented in the survey records prior to the start of work and every six months thereafter. Provide a certificate of calibration to the Engineer.

200.03.02 Grade for Machine Laydown. 3D Engineered Construction Surveying (3DECS) may be used to supplement construction staking to reduce the amount of staking needed for construction.

Use 3D model information provided by or generated from information supplied by the Department, or as generated in conjunction with construction equipment controlled by GPS and/or robotic total station (RTS) instruments, to guide the equipment during construction operations of specific items such as subgrade, subbase, base course, and other roadway structure materials, ditches, and other planned excavations and embankment of the project.

If electing to use 3DECS, the following applies:

1. Designate a 3DECS Supervisor assigned to this work. This person is responsible for all processes of this work including the coordination of the verification with the Department. This person shall be qualified to perform and/or supervise personnel during the setup, operation, and adjustment of all necessary equipment for this process to achieve the accuracy and standards for the material placement it will be controlling.

2. The 3DECS Supervisor shall have at least 2 years of experience directly related to 3DECS surveying in a supervisory or responsible capacity. Submit for review and approval the name and qualifications of this person 7 days in advance of the date set for the preconstruction conference.

3. The 3DECS Supervisor shall be an employee of the Contractor or subcontractor, under the direct supervision of the superintendent, and dedicated solely to the contract.

4. The 3DECS Supervisor shall perform or supervise the performance of accuracy verifications a minimum of 3 times per shift (setup and beginning of production, approximate middle of production shift, and end of production with tear down check-in). If discrepancies are discovered, additional accuracy verifications shall be required until accuracy is confirmed. Do not allow material placements more than 500 feet along centerline beyond verified sections/areas. Any material placed beyond verified sections or areas will be subject to corrections and/or removal at no cost to the Department. Verifications shall be performed with the survey equipment as used in the production work and stored in the electronic file format matching the collected and used data for the production or placements.

5. All surveying shall be based on the horizontal and vertical control established by the Department.

6. Provide construction stakes for the control points of the project centerline or Engineer approved offset line and angle points, all of which shall be established from primary control monuments and their assigned coordinates as shown on the plans.

7. Staking for the project centerline or offset shall be established from the project centerline control points as shown on the plans to provide a method of machine control equipment checks, inspection, and field verification.

8. The maximum staking interval for the project centerline shall be 500 feet on tangents and 100 feet on curves, or as specified. All project centerline control points as shown on the plans shall be staked.

9. On the first day of a production run, an initial test section of at least 500 linear feet along centerline and to a minimum width and depth specified by the contract plans' typical sections, or as directed, of product placed will be required to verify the survey control used in production of any material placed meets the positional tolerances according to the Department's Construction Survey Manual. No further production work in this process will be allowed until this verification is completed and approved by the Department. This test section shall be required each time there is a change outside of the original modeled test section to the base control, equipment, or components.

Provide the model in a format compatible with and of the appropriate size to allow for data processing by the Department's survey equipment.

At no cost to the Department, the Contractor shall revert to traditional surveying and discontinue any further use of 3DECS should the Engineer determine the existence of contractor quality or accuracy issues related to 3DECS in accordance with the Department's survey standards.

METHOD OF MEASUREMENT

200.04.01 Measurement. Construction stakeout will not be measured for payment.

BASIS OF PAYMENT

200.05.01 Payment. There shall be no direct payment for construction stakeout and all work involved shall be considered included in the various contract bid items of work requiring construction stakeout.

SECTION 202 – REMOVAL OF STRUCTURES AND OBSTRUCTIONS

202.01.01 General. This work consists of reset guardrail end treatment and reset fence.

202.03.02 Removal. The seventh paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Remove bituminous surface or other overlay material where specified on plans from existing bridge decks by approved methods and equipment which will not damage the existing concrete decks.

Remove pavement marking film by approved means in such a manner that there is no residue that may interfere with the ability of the surface treatment to adhere to the existing pavement. Remove crosswalks and stop bars no sooner than 24 hours prior to the application of the surface treatment. Exercise care to prevent damage to the existing pavement surface.

202.03.03 Removal of Bituminous Surface by Cold Milling. The third paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Use a machine capable of accurately establishing profile grades, within plus or minus 0.25 inches, by referencing from the existing pavement or concrete bridge decks or from an independent grade control and having a positive means for controlling cross slope elevations. When referencing from the existing pavement or concrete surface on bridge decks, use a moving reference at least 20 feet in length, unless otherwise approved. The moving reference may be a floating beam, ski, or other suitable type such that the resulting milled surface is sufficiently even.

202.03.08 Salvage. Salvage the fence to be reset as shown on the plans.

202.03.10 Reset Fence. Reset salvaged fence at the location shown on the plans. Furnish and install new posts and foundations. Reinstall fence panel and hardware. Furnish any new materials necessary to rebuild the fence of the same kind as those in the original fence. The resulting reset fence shall be equal to or better than before removed.

202.04.01 Measurement. Reset guardrail end treatment will be measured by the each.

Reset fence will be measured by the linear foot.

202.05.01 Payment. Payment shall be made under:

Pay Item	Pay Unit
Reset Guardrail End Treatment	Each
Reset Fence	Linear Foot

SECTION 203 – EXCAVATION AND EMBANKMENT

203.02.02 Roadway Excavation. Add the following after the first paragraph of this Subsection of the Standard Specifications:

If the Contractor should choose to use excavated material, produce and separate roadway excavation intended for borrow embankment into individual stockpiles containing no less than 2000 yd3 and no more than 10,000 yd3. Each designated stockpile will be sampled a minimum of 10 days prior to placement. Do not use stockpiled material until given approval. Any stockpiles deemed unsuitable shall be disposed of off-site according to 107.14. Perform informational source requirement sampling and testing by a material testing firm or own testing personnel per Section 106.04, using the applicable Nevada Test Methods which appear under “Source Requirement Test” in Sections 704. Perform and submit, prior to acceptance testing, a minimum of one informational source requirement test for every stockpile.

203.03.07 Surplus Material. This Subsection of the Standard Specifications is hereby deleted.

203.03.11 Borrow. The third paragraph of this Subsection of the Standard Specifications if hereby deleted.

203.03.13 Embankment Material. The third paragraph and the first sentence of the fourth paragraph of this Subsection of the Standard Specifications is hereby deleted.

SECTION 207 – BACKFILL

207.02.02 Slurry Cement Backfill. Add the following to the end of the third paragraph of this Subsection of the Standard Specifications:

For mixes batched using a volumetric mixing truck, the trial batch shall be performed by a truck of the same make and model as the truck used for production. Include the make and model of the truck with the trial batch data.

The last paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

The use of air entrainment, air generators, or foaming agents may be needed to meet the performance specifications.

Testing will be performed using the procedures specified herein, except that specimens will not be rodded during preparation. The 28-day compressive strength will be determined using specimens prepared using Test Method No. Nev. T428 and tested in accordance with ASTM D4832. The air content will be determined by Test Method No. Nev. T431 or T432. Subsidence will be tested according to ASTM C940, except that a standard 6-inch by 12-inch cylinder may be used for measurement purposes. Subsidence is defined as the Final Bleeding percentage determined by ASTM C940. Mixtures that require placement by use of a concrete or grout pump will be allowed a maximum subsidence of 2%. Slump tests may be performed on a random basis using Test Method No. Nev. T438 for the purpose of controlling consistency at the job site.

207.03.04 Slurry Cement Backfill Placement. Add the following after the third paragraph of this Subsection of the Standard Specifications:

Upon approval, slurry cement backfill may be batched and placed using a volumetric mixing truck. Volumetric mixing trucks used to produce slurry cement backfill shall have a computer batching system capable of producing the approved mix design and providing printed tickets showing the mix design designation and weight of each mix component. Volumetric mixing trucks shall have a rating plate affixed by the manufacturer declaring that it complies with ASTM C685 and Volumetric Mixer Manufacturers Bureau standards.

Perform the calibration of volumetric mixing trucks in accordance with California Test 109, Part 5, no more than six months before the date of placement, using the same aggregates and cement used for producing the approved mix design. Submit a record of the calibration for each truck and demonstrate that the calibration factors have been appropriately entered into the computer batching system.

Perform a yield check on each truck prior to that truck's first placement on the contract. Provide a yield box of 1/4 cubic yard capacity. The ticket produced when filling this box shall show a delivered volume within 5% of the actual capacity of the box. Do not proceed with placement until the yield check has been approved.

SECTION 211 – EROSION CONTROL

211.01.01 General. Store seed, soil inoculants, and other materials according to the manufacturer's recommendations.

The sixth paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Apply erosion control work within 14 days of finish grading unless this date falls outside of September 15 to March 15. Apply Temporary Erosion Control to all exposed surfaces and the Department's Best Management Practice Manual within 14 days of finish grading to all areas not treated between September 15 and March 15.

211.03.02 Topsoil. Topsoil consists of preparing areas for placement, transporting topsoil from approved sources, preparing areas for placement, blending with riprap or placing separately on riprap, and placing at designated areas.

Imported Topsoil shall meet the requirements per Subsection 726.03.01.

Submit plan for approval prior to blending riprap and topsoil. Include working plans showing method of transporting topsoil, blending and placement or placing separately, mechanical equipment details and other information to complete the blending and placement of topsoil with riprap. After approval, do not deviate from the submitted plan.

Method 1: Furnish and blend topsoil with riprap, then place topsoil riprap blend to achieve embedded soil in riprap per contract documents. Place topsoil riprap blend to achieve embedment in soil. Lightly water the blend after placement.

Method 2: Place riprap then apply topsoil blend. Lightly water the blend after placement and prepare for seeding per section 211.

Method must allow full chemical reaction of rock coloring on adjacent areas with rock coloring per section 212.

Prepare onsite mockup sample area of method for approval. Mockup must by a minimum 10-foot by 10-foot area and may include an area of the project or be separate.

Do not place blend when the ground or topsoil is frozen, excessively wet, or not in an acceptable condition to facilitate uniform spreading.

211.03.03. Compaction. This Subsection of the Standard Specifications is hereby deleted.

211.03.04. Soil Amendments and Inoculants. The following materials shall be applied by tillage or hydraulically at the following rates, as a portion of the entire hydraulic slurry mix (specified in Subsection 211.03.05):

Product	**Application Rate**
Inoculant	50 pounds/acre
Soil Building Amendment	5 gallons/acre
Liquid Humic Acid	5 gallons/acre

Mix inoculants with seed prior to drill seeding per manufacture recommendations.

211.03.05. **Seeding.** This Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Seeding shall be accomplished using the drill seeding, hydro-seeding, and broadcast seeding methods, as shown on plans. On slopes 3:1 (horizontal to vertical) or flatter, seeding shall be accomplished by drill seeding. Seeding on slopes greater than 3:1 with existing vegetation shall be accomplished by broadcast seeding. Seeding in riprap areas may be broadcast or hydro-seeded.

Perform seeding between September 15 and March 15.

Treat all seeding areas for any invasive weeds including Cheatgrass (Bromus tectorum) or Red Brome (Bromus rubens) or Russian Thistle (Salsola kali sp.) and noxious weeds, per section 637 of the Standard Specifications, prior to the seeding (drill, broadcast, hydroseed) application. If herbicidal treatment is used, wait a minimum of 3 weeks before seeding, dependent on type of herbicide used, and as directed.

Provide licensed personnel with experience dealing with eradication and treatment of weeds found at the project site. Submit a plan for treatment of weeds prior to mobilization which identifies all weeds withing the project limits, treatment measures and timing.

All revegetation work shall be performed by a licensed and qualified landscape contractor in the State of Nevada (C-10). The subcontractor shall be listed in the Contractor's bid by name, address and license number and the license shall be active at the time of Contract award and shall remain in effect throughout the term of this Contract.

Submit equipment to be used, tanks size and tank area coverage for approval. Apply to staked areas.

Delineate and stake areas for treatment.

Apply the slurry with a hydro-seeder which utilizes water as the carrying agent (hydraulic) and maintains a continuous agitator action that will keep the slurry mixes in uniform distribution until pumped from the tank. Maintain pump pressure to maintain a continuous, non-fluctuating stream of solution. Use enough water to ensure even distribution.

Do not seed within 24 hours of a precipitation event unless authorized.

Do not apply seed within 10 feet of the roadway pavement edge or 3 feet from the multiuse trail edge. Extend seeding to back of walls and barrier rail where occurs. Avoid over-spray onto the traveled way, lined drainage channels, and existing vegetation.

Do not seed when there are sustained winds of 13 mph or more, or conditions that may cause material to disperse or apply inaccurately. Do not seed when the ground is frozen. Uniformly apply seed at the rate and mix specified.

Give a minimum of 48 hours notification in advance of seeding operations for approval of the seeding areas. After approval, seeding of the approved areas may begin.

Following application of soil amendments and inoculants, prepare all compacted soils to be seeded by loosening up to a depth of six inches, except on riprap areas. Operate equipment such that furrows are produced perpendicular to the natural flow of water.

Areas disturbed by construction activities shall be seeded as directed.

Materials for seeding shall be batched on site under the observation of the Department or designated representative.

It is anticipated that 20% of the seeded areas shall require an additional seeding. Areas requiring re-seeding will be determined. Re-seed within one year of the initial seeding using approved method.

Drill Seeding: Seed shall be planted approximately ¼ inch deep, with a maximum depth of ½ inch. The distance between the furrows produced using the drill process shall not be more than eight inches. If the furrow openers on the drill exceed eight inches, the area shall be drilled twice. Seeding shall be done with grass seeding equipment with double disc openers, depth bands, packer wheels or drag chains, rate control attachments, seed boxes with agitators and separate boxes that accommodate intermediate and fluffy seeds. Seed of different sizes shall be sowed from at least two separate boxes adjusted or set to provide the planting rate as specified.

Apply mulch and tackifier in accordance with Subsection 211.03.06.

Broadcast seeding: When allowed, perform broadcast seeding with an approved mechanical type of distribution rotary spreader. Distribute the seed or seed mixture uniformly over the areas shown on the plans using mechanical distribution on top of the soil. Cover seed and firm soil by using a ring roller, harrowing or cultipacker to ensure proper seed contact with the soil. Roll or pack sloped areas along the contour of the slopes. Calibrate mechanical spreader using approved method before use.

211.03.06. Mulch. This Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Within 24 hours after each area is seeded, apply mulch.

The slurry shall contain a color additive which will assist the applicator in the uniform application of the mixture.

Hydromulch: Hydromulching consists of applying mulch and tackifier in one slurry application.

Areas disturbed by construction activities shall be hydromulched as directed. Avoid mulch over-spray onto the traveled way, lined drainage channels, and existing vegetation. Application shall not result in rilling or runoff.

Materials for hydro-mulching shall be batched on site under the observation of the Department or designated representative.

Do not hydromulch when there are sustained winds of 13 mph or more, or conditions that may cause material to disperse or apply inaccurately. Do not hydromulch when the ground is frozen.

Apply the slurry of hydromulch and tackifier with a hydro-seeder which utilizes water as the carrying agent (hydraulic) and maintains a continuous agitator action that will keep the slurry mixes in uniform distribution until pumped from the tank. Mix the materials according to manufacturer specifications. Maintain pump pressure with a continuous, non-fluctuating stream of solution.

Slurry mixture shall not remain in the tank longer than 1 hour. The slurry shall contain a color additive which will assist the applicator in the uniform application of the mixture.

Slurry mix shall conform to the following:

Product	Application Rate
Hydromulch	2500 lb/acre
Tackifier	150 lb/acre

The slurry shall contain a color additive which will assist the applicator in the uniform application of the mixture.

Do not disturb surface areas after mulching and tacking is complete. Repair damaged areas as directed.

211.03.07. Hydro-seeding. Apply the slurry with a hydro-seeder which utilizes water as the carrying agent (hydraulic) and maintains a continuous agitator action that will keep the slurry mixes in uniform distribution until pumped from the tank. Maintain pump pressure to maintain a continuous, non-fluctuating stream of solution. Use

enough water to ensure even distribution.

Do not proceed with other hydro-seeding work until the areas that received the first application have been approved.

Application shall not result in rilling or run-off.

Repair hydro-seeded areas that are disturbed or damaged by re-application of hydro-seeding.

Hydraulic application of seed shall occur in the following one-step process:

1. Mix seed, soil inoculants, soil building amendment, and liquid humic acid, in hydro-seeder. The resultant slurry mix shall not remain in the tank longer than ½ hour. Do not apply if temperatures in the tank exceed 90°F.

   Slurry mix shall conform to the following:

Product	Application Rate
Seed Mix	As specified in Subsection 726.03.11
Soil Amendments and Inoculants	As specified in Subsection 211.03.04
Mulch	As specified in Subsection 211.03.06
Tackifier	As specified in Subsection 211.03.06

211.03.11. Performance Criteria. Final Stabilization shall follow Section 3.6.3 of the 2015 Nevada Construction Stormwater General permit.

SECTION 212 – LANDSCAPE AND AESTHETICS

212.01.01 General. This work consists of aesthetic patterning, painting, plant establishment work, decorative boulder, decorative rock, rock coloring, and decorative structure.

212.01.02 Submittals. For landscape materials, submit certification or other data substantiating that materials comply with the specified requirements.

For Decorative Structures and Decorative Figures, submit the following:

1. Engineered shop drawings
2. Structural drawings and calculations stamped and signed by a Professional Engineer registered in the State of Nevada.

212.02.08 Pre-emergent. The first paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Pre-emergent herbicide shall be a non-selective pre-emergent herbicide, appropriate for the season and for use near existing vegetation. Apply pre-emergent herbicide before and after installation of rock mulch, boulders, rip rap, and rip rap bedding.

Apply at the direction of the Engineer.

212.02.10 Painting. Paint material for concrete shall be from the following or an approved equal:

Vista Paint Corporation
Coverall 2800 AF Exterior Flat
2020 East Orangethorpe Avenue
Fullerton, CA. 92831
www.vistapaint.com
Odis Freeman
ofrreman@vistapaint.com
Phone: (714) 680-3800
Cell: (702) 292-8316
Fax: (714) 459-4677

Canyon Tone Stain
GAF
1 Campus Drive
Parsippany, NJ 07054
(877) 423-7663
fax (866) 248-6299
customercarecommercial@gaf.com
www.gaf.com
Local contact is John De Vito,
(925) 393-4211, e: jdevito@gaf.com

Bridge and Highway Concrete Heavy Stain
Sherwin-Williams Company
Derrick Castle
809 Gunpowder Drive
Lexington, KY 40509
(913) 481-0612
derrick.castle@sherwin.com
protective.sherwin-williams.com

Colors shall be as shown on the plans.

Deliver materials in the original sealed containers clearly marked with the manufacturer's name, brand, and type of material, batch number, and date of manufacture.

Paint for galvanized surfaces shall be the following:

Natina, Steel Solution
1555 North V I P Boulevard
Casa Grande, AZ 85122
Phone: (866) 804-0378
Ryan Morey
Phone: (858)-243-4965

No direct payment for galvanized surfaces.

Store product in accordance with manufacturer's recommendation.

See section 614 of these Special Provisions for metal work and powder painting requirements

212.02.11 Decorative Rock. Decorative rock shall be inert, crushed rock clean and free of debris.

A representative sample shall be delivered to the job site in a protected area and set up as a mock sample during construction. Provide individual rock mixture samples. Minimum area is 5 foot x 5 foot. This mock sample shall contain final approved submittals of rock samples and rock delivered to the job site shall be approved using the mock sample before proceeding with installation. Sample may be required to be modified as needed to achieve the design intent for approval.

Decorative rock as follows:

(a) Decorative Rock Type C. Rock shall be deep brown and tan color semi angular rock, similar to trade name Cinderlite Mocha or Oxborrow Lava Mocha, ¾".

212.02.13 Decorative Boulders. Decorative boulders shall be light to medium tan with brown and gray highlights, as shown on the plans, deviations require pre-approval. Prior to job site delivery, approval of representative rock from each color group, size and form is required at the source. Once color is approved, use representative boulders for duration of the project.

The type will be differentiated by size as measured by the longest dimension in feet. Decorative boulders shall be pit run and conform to the following dimensional requirements:

Type	Size
Decorative Boulder (Type A)	4' Length x 4' Width x 3' Height
Decorative Boulder (Type C)	5' Length x 5' Width x 4' Height
Decorative Boulder (Type E)	6' Length x 6' Width x 5' Height

The boulders shall be a meta-quartzite, "rhyolite", "granite" or other approved equal type material, matching the shape of boulders installed on contract 3819, Parr Bridge.

Size variation of ± 1 foot on 2 dimensions will be allowed provided the sum of the 3 dimensions on each boulder equals or exceeds the sum of the 3 specified dimensions.

Provide boulders free from defects, including scrapes, scars and holes from handling or excavating, viewable from more than 20 feet away. Boulders bulk Specific Gravity not less than 2.50 (min.). Boulders to be of sound structure. Rock density -155pcf.

212.02.14 Rock Coloring. Rock coloring shall be applied to all rock mulch, class 300 riprap bedding and class 150 rip rap within the project limits. Additionally, rock coloring shall be applied to all hydraulic channels and ditches as indicated on the plans.

The colorant shall be an environmentally safe, clear, soluble, and non-pigment based surface coloring solution that results in a weathered aged color and patina, closely matching rock coloring applied on contract 3819. No pigment-based additives shall be added to achieve the desired color. Submit certified test results from an approved testing agency which indicates chemical structure, pH value, corrosive value, environmental quality, and cleanup for approval 45 days prior to applying test sections.

Colorant shall contain organic acids to etch slightly into the rock surface to create longer lasting results. The product shall react with the target surface for a period of 5 to 14 days to produce brown colors with a matte finish that blend into surrounding areas and are resistant to fading in the sun.

Final approval of product samples will be made by the Department. Do not proceed with coloring until given written approval.

After sample approval and prior to start of coloring, submit the manufacturer's comprehensive product description, including specifications and application instructions. Submit product warranty information.

Rock coloring shall be one of the following products:

Soil-Tech, Permeon
2090 Kleppe Lane, Unit C
Sparks, Nevada 89431
Phone: (775) 324-5547

Natina, Rock Color Solution
1555 North V I P Boulevard
Casa Grande, AZ 85122
Phone: (866) 804-0378
Ryan Morey
Phone: (858) 243-4965

212.02.15 Decorative Structure. Construct decorative structure as shown on the plans and as described.

Weathering steel structure with internal framing and translucent polycarbonate panels on a painted concrete pedestal with aesthetic patterning, powder coated metal and weathering steel.

Decorative structure base shall be painted cast-in-place concrete. Aesthetic patterning formliner pattern and paint color shall match bridge rail. Bid item is inclusive of all items necessary to construct decorative structure, complete in place including but not limited to reinforcing, concrete, formliners, paint, fasteners, foundation, metal, polycarbonate panels, and framing.

Schedule a kick off meeting with the Engineer prior to preparation of shop drawings to discuss design intent.

Furnish decorative metal for decorative structure as shown on the plans and as described.

Decorative metal and fasteners shall conform to the requirements as shown on the plans.

Submit scalable detailed shop drawings (11 inch by 17 inch page size) identifying all materials, connections, welding notations, dimensions, and method notes of fabrication for review. CAD files are available to assist with shop drawings and fabrication. Shop drawings shall be prepared by a Nevada

Registered Professional Engineer and submitted for review and approval in accordance with Subsection 105.02. Do not start final fabrication and full-scale production until shop drawings have been reviewed and approved. Include lighting in shop drawings.

Prior to beginning work, furnish examples of finished to be achieved for the weathering steel plates and polycarbonate panels. Prepare 4 inch by 4 inch minimum samples for review and approval. Keep samples on site for duration of project.

After completion of finish work, all items shall be reviewed for approval prior to delivery to the job site. During visit, continue the weathering process as needed until the desired effect is achieved to the satisfaction of the Engineer.

Metal work shall be fabricated by one of the following or a department approved alternative meeting the requirements below:

Tutto Ferro
616 East 4th St.
Reno, NV 89512
Contact: Paolo Cividino (775) 322-7001x100

Reno Iron Works
333 E Parr Blvd
Reno, NV
Contact (775) 329-1111

Minimum qualifications of metal fabricator:

Qualified provider with at least 7 years' experience in working with similar artistic finished products.

Submit a portfolio containing a minimum of five completed work products of similar complexity and materials. Include photos, a brief description of work, and references.

Provide materials with smooth, flat surfaces unless otherwise indicated. Provide materials without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

Provide polycarbonate panels for decorative structures as shown on the plans and as described.

Panels shall have a nominal thickness of 1/2 inch and have a vellum finish in colors described in the plans and shall be one of the following:

3-Form, Koda XT
2300 South 2300 West
Salt Lake City, UT 84119
www.3-form.com
Phone: 1-800-726-0126

Lumicor, Inc., Lumishield EX
1400 Monster Rd.
SW Renton, WA 98057
www.lumicor.com
Phone: 1-425-255-4000

Polycarbonate panels shall comply with the following mechanical properties:

Tensile Strength	9,000 psi
Tensile Elongation Maximum	110%
Flexural Strength	93 MPa
Flexural Modulus	354,000 psi

Polycarbonate panels shall comply with the following thermal properties:

Thermal Conductivity	1.35 BTU-in
Maximum Continuous Service Temperature	194 °C

212.03.09 Plant Establishment Work. This Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

This work consists of replacement plants, fertilizing, pruning, edging, mulching, weeding, and trash removal in all project areas. Additionally, this work consists of temporary irrigation of containerized/nursery plants and reapplying seed as directed. Plants shall be maintained in a vigorous and healthy condition in accordance with generally accepted horticultural practices and general maintenance specified herein.

Planted areas may include plants established to subsist on natural rainfall, plants watered with a temporary irrigation system, or both as shown on the Plans or in the Special Provisions. Planted areas may be planted, seeded, or both as shown on the Plans or in the Special Provisions.

The plant establishment period will begin when all landscaping, planting, weeding, and seeding operations have been completed and approved, all other work has been completed, and the project is in a neat, clean and weed free condition.

The Engineer may establish separate dates for the start of the plant establishment periods based on completion of portions of the landscape installation.

The plant establishment period shall run consecutive from the beginning date established by the Engineer for a period of 12 months.

It is anticipated that up to 20% of the seeded areas will require an additional application. Areas requiring reapplication are to be determined by the Engineer. The anticipated 20% re-application is included in the seeding quantity. 20% seeding does not include any contractor disturbed areas. The additional application may be required after the initial application or during plant establishment. Prepare soil and reapply seed to all areas which are bare and/or poorly established as directed.

Submit a schedule of plant establishment activities, manpower, and equipment for approval before starting establishment activities. Provide monthly, a summary of plant establishment activities completed, including man hours expended and materials used. Provide the water source including any permits, approvals, and agreements with purveyor as necessary.

All plants shall be watered individually through the end of the plant establishment work using clean potable water from temporary irrigation system. 90 days prior to planting, submit proposed plan for temporary watering including all equipment and locations. Individually water all containerized plants with bubblers or drip emitters, avoiding runoff and erosion onto adjacent areas. Any piping and drip tubing shall be buried 2 inches below the surface. Temporary water shall include on-site refillable gravity fed tank(s) sized appropriately. Water tanks shall be tan and shall all match. Broadcast watering by truck is not permitted. All temporary irrigation equipment including but not limited to tanks, emitters, pipe and valves shall be removed at the end of the plant establishment period or as directed by the Engineer.

Schedule monthly walkthroughs with the Engineer. Present to the Engineer all work that has been performed and documented on the monthly summary. The Engineer will determine the completeness of work and may provide a list of items that need to be completed prior to monthly payment.

Failure in any month to perform required plant establishment work will result in not being credited for that month. No extension of contract time will be granted beyond the final completion date by reason of failing to perform plant establishment work on days when such work is necessary.

All plants identified on the Plans or in the Special Provisions, or as directed, shall be watered regularly, as needed, through the end of the plant establishment period using clean potable water from a portable or temporary source. Individually water all plants avoiding over-spray and erosion onto adjacent mulched areas.

Keep all plants identified on the Plans or in the Special Provisions, or as directed, watered as provided in Subsection 212.03.07. Make irrigation adjustments as directed.

Prune or head back trees and shrubs when directed. Use pruning standards accepted by the International Society of Arboriculture or the National Arborist Association.

Remove and replace in kind all planted, non-seeded plants that show signs of failure to grow normally or which are injured or damaged as to render them unsuitable for the purpose intended, and as directed. Work will be inspected in the first or second week during the plant establishment period, and all plants to be replaced will be marked or otherwise indicated. Complete replacement of such plants within two weeks of notification. Use plants pre-approved for replacements.

Maintain the entire project area free of weeds. Do not allow any weeds to flower or set seed within the project area. Maintain the entire area within the project limits free of noxious weeds according to Section 637. Implement the noxious weed abatement plan which conforms to the Nevada Revised Statute (NRS 555). Remove all weeds and trash from the site. Remove weeds according to best practices based on weed type. This may require hand pulling, mowing, or application of herbicides approved for use or a combination of methods depending on the site and weeds present. Submit a report including weed type and proposed removal method for approval prior to removal. The only vegetation to remain shall be seeded or planted material and existing vegetation identified to remain. Provide personnel professionally trained and experienced in the identification and treatment of weeds in the project region

Maintain water basins, rake rivulets and gullies, check trees for vertical alignment, adjust or replace stakes, guys, bracing, and ties as necessary.

Spray or dust with appropriate insecticides, miticides, and fungicides as necessary to maintain plants in healthy and vigorous growing condition. Have pest, disease, and weed control chemicals applied according to their manufacturer's recommendations by licensed applicators and as required by authorities having jurisdiction over such activity.

Remove and dispose of surplus earth, papers, trash, and debris in the project limits according to Subsection 107.14. Care for the planted areas as to present a neat and clean condition at all times.

Remove the staking and guys for plants and trees as directed at the end of the plant establishment period.

212.03.10 Painting. Provide evidence that the paint product selected has been used successfully on similar projects. Evidence shall include, as a minimum, post-construction photos with dates of painting and of photography, project names, and contact information for the Owner of the project.

Thirty days prior to beginning paint application, apply paint on 36 inch by 36 inch sample concrete test panel for each proposed color. Apply a test section of each color of proposed paint utilizing the methods proposed for the project for approval. Variance in shades of the colors or variance of shades on the same test panel may be required to make a selection. Prior to the test paint application, conduct surface preparation as specified below, and under circumstances similar to those expected during actual painting work. Allow the test panel to fully dry. Apply test paint in accordance with the manufacturer's recommendations using a manufacturer certified applicator. Demonstrate the paint penetrates the pore spaces of the concrete and adheres tightly to the concrete surface. When the paint surface is nicked or damaged, the paint shall not peel or flake away from the concrete surface beyond the limits of the damaged area. Do not begin application of the paints on this project until the paint colors have been approved and application methods demonstrate successful results.

Do not paint concrete surfaces until they have cured a minimum of 28 days. Schedule the paint application with earthwork and backfilling operations of any given wall to ensure that the walls are treated to the minimum distance below finished grade.

Provide a water soluble example over the concrete to demonstrate the pattern. Adjustments may be required to the layout of the pattern in order to achieve the desired graphic quality.

Dispose of test panels after completion of project or as directed.

Give notification not less than 72 hours prior to the commencement of application of paint.

Remove laitance, curing compounds, form release agents and other substances detrimental to the finish coating performance prior to painting using the following steps:

1. Hot water pressure blast. Provide equipment capable of producing between 2000 and 3000 psi when applied at a rate of 3 to 4 gpm. Vary the blasting pressure until laitance removal is observed. Do not operate pressure so high that etching of the concrete surface occurs. Maintain water temperature between 185 ºF and 200 ºF. Make any adjustments necessary to the satisfaction of the Engineer.

Use a fan nozzle that produces a 0º to 15º spray pattern.

The hot water pressure blasting removal pattern shall provide a clean concrete surface. Hold the nozzle perpendicular and 12 to 24 inches away from the concrete surface. Overlap each spray pass to obtain maximum removal of laitance. Spray patterns may be up and down or side to side. If the laitance is difficult to remove, both up and down and side to side spray pattern may be necessary for complete surface preparation.

2. Chemical wash with trisodium phosphate, copper sulfate, or any detergents specially formulated for removal of form release agents, curing compounds and all laitance involved with the construction procedure. Apply with vigorous scrubbing or an approved mechanical method.

3. Hot water pressure blast to remove cleaning agents and remaining laitance.

The above steps are based on early form removal and the necessity for the application of curing compounds. In areas where curing compound has not been applied, hot water pressure blasting accompanied with field testing may be all that is required for complete surface preparation.

Perform field test as described below.

Field testing shall consist of applying water on a dried section of prepared concrete surface. If any water beading and/or differential absorption into the concrete surface are noted, then perform the above steps 2 and 3.

All surface preparation shall be performed to the satisfaction of the Engineer.

Apply paint at the surface temperatures recommended by the manufacturer.

Do not apply paint when winds are 5 mph or greater or when there are dusty conditions. Do not apply paint during fog, mist, when the relative humidity exceeds 85%, at temperatures less than 5 °F above the dew point, or when precipitation is imminent.

Provide drop clothes or other forms of protection for surrounding surfaces of overspray and splashing. Protect traffic and pedestrians from overspray.

212.03.11 Decorative Rock. Verify that the areas to receive decorative rock are ready for such work prior to proceeding. Prior to placement compact the subgrade receiving material to a minimum of 90% relative density. Prior to the placement of decorative rock, treat areas to be covered with decorative rock in accordance with Subsection 212.02.08.

Place decorative rock to the following depths over the areas indicated on the plans:

1. Decorative Rock (Type C) shall be placed at a depth of 4 inches.

Final contour of all decorative rock types shall be raked evenly and uniform.

After placement of the decorative rock, apply a pre-emergent herbicide in accordance with Subsection 212.02.08.

212.03.12 Painting Galvanized Surfaces. On all pedestrian rails apply coats as necessary to achieve color a dark brown matte finish on all visible surfaces. No direct payment for painting of galvanized surfaces.

Apply paint to a minimum 12-inch sample section of galvanized metal with the same material and method that will be used for coloring final surfaces. Prior to painting sample, conduct surface preparation as specified below, and under circumstances similar to those expected during actual painting work. Apply test coloring in accordance with the manufacturer’s recommendations using same materials, equipment, and method used for final surface. Sample shall cure for 14 days before inspection. Provide a minimum of 3 different sample applications varying from light to dark for selection, closely matching the color of weathering steel.

Give notification 7 days prior to coloring the samples.

No additional coloring shall proceed without written approval.

Surface to be treated shall be free of oils, dirt, and other contaminants. All surfaces shall be completely dry prior to application of coloring.

All surface preparation shall be performed to the satisfaction of the Engineer.

Apply coloring at the surface temperatures recommended by the manufacturer.

Do not apply paint when winds are 5 mph or greater or when there are dusty conditions. Do not apply paint during fog, mist, when the relative humidity exceeds 85%, at temperatures less than 5 °F above the dew point, or when precipitation is imminent.

Provide drop cloths or other forms of protection for surrounding surfaces of overspray and splashing. Protect traffic and pedestrians from overspray.

212.03.13 Decorative Boulders. The work of decorative boulders includes transporting boulders from their original location to the final designated areas as shown on the plans or as directed. Place boulders as specified herein and as directed. Boulder placement dimensions shown on the plans shall be used as a guideline and final boulder placement shall result in variable random appearing groupings not all exactly alike.

Stake boulder locations per plans for approval prior to construction. Modifications to stakeout may be required prior to construction.

Excavate a depression to bury each boulder as shown on the plans. Re-grade the area surrounding the boulders and contour to match surrounding area.

212.03.14 Rock Coloring. For rock surfaces, apply coloring to a 4 foot x 4 foot sample with the same material and method that will be used for coloring final surfaces. Prior to painting sample, conduct surface preparation as specified below, and under conditions similar to those expected during actual painting work. Apply test paint in accordance with the manufacturer's recommendations using same materials, equipment, and method used for final surface. Sample shall cure for 14 days before inspection.

Give notification 7 days prior to coloring the samples.

No additional coloring shall proceed without written approval.

Surface to be treated shall be free of oils, dirt, and other contaminants. All surfaces shall be completely dry prior to application of coloring.

All surface preparation shall be performed to the satisfaction of the Engineer.

Apply coloring at the surface temperatures recommended by the manufacturer.

Do not apply rock coloring when winds are 5 mph or greater or when there are dusty conditions. Do not apply rock coloring during fog, mist, when the relative humidity exceeds 85%, at temperatures less than 5 °F above the dew point, or when precipitation is imminent.

Provide drop cloths or other forms of protection for surrounding surfaces of overspray and splashing. Protect traffic and pedestrians from overspray.

212.03.15 Decorative Structure. Assemble items in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

Form decorative metal to required shapes and sizes, true to line and level with true curves and accurate angles and surfaces. Finish exposed surfaces to smooth, sharp, well-defined lines with a sharp edge formed at the meeting of surfaces (arris).

Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing the Work.

Form simple and compound curves in bars, pipe, tubing, and extruded shapes by bending members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces.

Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

Mill joints to a tight, hairline fit. Cope or miter corner joints. Fabricate connections that will be exposed to weather in a manner to exclude water.

Provide necessary rebates, lugs, and brackets to assemble units and to attach to other work. Cut, reinforce, drill, and tap as needed to receive finish hardware, screws, and similar items unless otherwise indicated.

Comply with AWS D1.1/D1.1M for recommended practices in shop welding. Clean exposed welded joints of flux, and dress exposed and contact surfaces.

Field Welding. Comply with applicable AWS specification for procedures of manual shielded metal arc welding and requirements for welding and for finishing welded connections. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations or field conditions.

Clean metal in preparation for shop painting in accordance with the Society of Protective Coatings (SSPC) standard SP 6, Commercial Sand Blasting.

Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC standard PA 1, Shop, Field and Maintenance Painting of Steel, for touching up shop-painted surfaces.

212.03.16 Aesthetic Patterning. (a) General. Use prefabricated form liners to provide aesthetic patterning to formed concrete surfaces as shown on the plans.

Prior to fabrication, submit shop drawings for form work incorporating form liners for approval. The shop drawings shall show the location of construction joints, use of special form liner materials, and type and location of form ties. Include a material list of form liner types, showing location, including panel size, layout of each panel, form liner joints, seams, and method of attachment. Included in shop drawing and material list shall be materials used to construct reveals, elevation/relief transitions, edges, and required special graphic features.

(b) Materials. The form liner manufacturer shall have a minimum of 5 years experience in manufacturing form liners of equal complexity to this project. Submit proposed form liner material for approval. Provide a 36 inch x 36 inch sample of each proposed pattern/texture, including the reverse positive of each, indicating use, location, and attachment method. Include materials that will be used to produce reveals, chamfers, and transitions in relief elevations and textures. Provide evidence that materials have been used successfully on similar projects using construction photos, dates, and names. Submit a minimum of 3 photos demonstrating such patterning.

The form liners shall be able to withstand concrete pour pressure without deflection and distortion and be removable without causing concrete surface deterioration or weakness in the substrate.

Use release agents compatible with form liner surface finish and color system to be applied.

(c) Installation. Upon approval of form liner materials and shop drawings, construct full size mockup panels using approved form lining materials. Construct panels to provide a sampling of form liner material types and textures, construction joints, form liner seams, reveals, colors and portions of special art features. The form liner used shall produce the same pattern that is intended for use on the finished structure and shall be incorporated into final work. The mockup test panels shall be un-reinforced, vertically cast, concrete constructed to determine the surface texture resulting by use of form liners. Panels to be oriented with the aesthetic patterns facing south. Remove unsatisfactory panels and replace with satisfactory panels. Dispose of test panels after completion of finished concrete wall or as directed. Do not begin construction until proposed materials and construction methods indicate satisfactory results.

Securely attach liner to forms per manufacturer’s recommendation. Coordinate wall ties with approved shop drawings.

Apply form release agent per manufacturer's recommendation.

Make free of build-up prior to each pour. Visually inspect each liner for blemishes and/or tears and repair per manufacturer's recommendation.

Form liner seam joints shall be finished and carefully blended into the final concrete surface. Finished texture and pattern shall be continuous without visual disruption.

212.04.01 Measurement. Aesthetic patterning, painting, and rock coloring will be measured by the square yard.

Detail painting will be measured by the square foot.

Plant establishment work will be measured by the month.

Decorative boulder (type) and decorative structure will be measured by the each.

212.05.01 Payment. Payment will be made under:

Pay Item	Pay Unit
Aesthetic Patterning	Square Yard
Painting	Square Yard
Plant Establishment Work	Month
Decorative Boulder (type)	Each
Decorative Rock (type)	Square Yard
Rock Coloring	Square Yard
Decorative Structure	Each

SECTION 302 – AGGREGATE BASE COURSES

302.02.01 General. In lieu of Type 1 or Type 2 Aggregate Base meeting the requirements specified in Section 704, the material may contain a mixture of mineral aggregate, recycled concrete, and recycled asphalt pavement. Blend the materials to be consistent and homogeneous.

The percentage of recycled asphalt pavement in the material will be determined by screening the portion retained on the No. 4 sieve from a representative stockpile sample and counting the individual particles as either recycled asphalt pavement or native material. The percentage of recycled asphalt pavement, by mass of the total material, will then be calculated.

Material containing 0 to 15% recycled asphalt pavement shall conform to the requirements for Type 1 or Type 2 Aggregate Base.

Material containing more than 15% but less than 85% recycled asphalt pavement shall conform to the requirements for Type 1 or Type 2 Aggregate Base and will only be allowed in the bottom half of the specified base layer thickness.

Material containing 85 to 100% recycled asphalt pavement will only be allowed in the bottom half of the specified base layer thickness and the material shall conform to the following requirements:

Sieve Size	Percent Passing by Mass
1 inch	100
No. 4	30-65

Project Control Tests	Test Method	Requirements
Sieve Analysis	Nev. T206	Above
Sampling Aggregate	Nev. T200	—

302.03.06 Compaction. Place aggregate base consisting of 85 to 100% recycled asphalt pavement in layers not exceeding 4 inches in compacted thickness. Compact such material according to Control Strip (Method C) as specified in Subsection 402.03.06 or as directed.

SECTION 401 - PLANTMIX BITUMINOUS PAVEMENTS - GENERAL

401.02.02 Composition of Mixtures. Asphalt Cement, Grade PG 64-28NV or Grade PG 64-28NVTR shall be the only grade permitted for use in plantmix bituminous dense-graded and open-graded aggregate mixtures.

The fourth sentence of paragraph (b) on page 145 of the Standard Specifications is hereby deleted and the following substituted therefore:

Identify the asphalt cement supplier and shipping point, as well as the tack coat supplier and type in the job-mix formula.

401.03.01 Bituminous Mixing Plant. Add the following after the third sentence of the first full paragraph on page 149 of the Standard Specifications:

Once the calibration results are submitted and prior to approval, the Department will verify the results. Demonstrate that each metering device is calibrated by operating at the indicated rate of speed.

In the third full indented paragraph on page 149 of the Standard Specifications, the words "received and" are hereby deleted.

The last sentence of paragraph “h. Mixer” on the top of page 152 of the Standard Specifications is hereby deleted.

The second sentence of the first paragraph of “c. Mass Calibration of Aggregate” on page 152 of the Standard Specifications is hereby deleted and the following substituted therefore:

If the rate of feed for each individual aggregate feeder bin cannot be visually verified on the plant controls, supply a graph of each individual bin showing the speed of the belt to the tons per hour of the material.

In the last sentence of paragraph “d. Bitumen Metering Device and Calibration” on page 152 of the Standard Specifications, add "or gallons" between the words "masses" and "shown."

The last sentence of paragraph “f. Mixer” on the bottom of page 152 of the Standard Specifications is hereby deleted.

401.03.03 Pavers. The first indented paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

When picking up grade information from an underlying base, the external longitudinal reference device shall be a floating beam at least 30 feet long or a non-contact averaging ski with a minimum of 3 sensors.

Use a Material Transfer Vehicle (MTV) for all mainline paving operations. Use an MTV that is self-propelled and can operate independently of the paver. The MTV shall have an internal chamber for remixing, including multi-pitch augers, a covered conveyor system to prevent heat loss, and a capacity of 15 to 25 tons. In conjunction with the MTV, use a paver hopper insert that prevents the paver wings from being closed and increases hopper capacity.

401.03.04 Rollers. The last sentence of Subparagraph (b) of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Fully skirt the roller with rigid material to within 4 inches of pavement surface.

401.03.05 Weather Limitations. In addition to the temperature limitations specified in this Subsection of the Standard Specifications, do not place plantmix bituminous open-graded surface after November 1 in a given construction season.

401.03.11 Rolling. Do not accelerate the cooling of the pavement by any means, including but not limited to application of water or lime-water, unless otherwise approved.

401.03.14 Surfacing Miscellaneous Areas. Add the following after the second paragraph of this Subsection of the Standard Specifications:

An approved Type 3 dense-graded job-mix formula may be substituted. Increase the bitumen ratio by not less than 0.5% by dry weight of aggregate over the Type 3 dense-graded job-mix formula in the bituminous mixture placed in gutters, gutter flares, dikes (excluding plantmix shoulder dikes), down drains, spillways, aprons at the end of drainage structures and other designated areas outside the traveled way.

401.03.16 Shoulder Dikes. An approved Type 3 dense-graded job-mix formula may be substituted. Increase the bitumen ratio by not less than 0.5% by dry weight of aggregate over the Type 3 dense-graded job-mix formula in the bituminous mixture placed in shoulder dikes. The requirement for minimum temperature of the mixture at the paver does not apply.

SECTION 402 – PLANTMIX BITUMINOUS SURFACE

402.01.01 General. This work consists of placing plantmix paved ditches.

402.02.02 Recycled Asphalt Pavement. Add the following to the end of the sixth paragraph of this Subsection of the Standard Specifications:

Do not submit RAP samples for bituminous mix designs until a minimum of three informational tests of the RAP material have been performed. In lieu of AASHTO T164, AASHTO T308 (Method A) may be used to obtain bitumen ratio on no more than 85% of the informational samples after the mix design has been approved.

The seventh paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Testing personnel are required to be qualified in the Nevada Alliance of Quality Transportation Construction (NAQTC) Asphalt Extended Module, which includes AASHTO T164, AASHTO T30, and AASHTO T308 (Method A).

402.03.03 Equipment. The second paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Furnish a vehicle-mounted inertial profiling system meeting the applicable requirements of AASHTO M328, R56, and R57.

A minimum of 7 working days prior to beginning collection of profile data, submit a copy of the operator's manual for the profiler that is to be used and documentation that the inertial profiler and operator are certified according to the requirements of AASHTO R56 or other equivalent Department-accepted certification program. The profiler operator shall be certified to operate the actual profiler that is to be used.

Calibrate the following components of the inertial profiling system according to the manufacturer's recommendations at the intervals specified in the operator's manual for the inertial profiler that is furnished or at any time deemed necessary:

1. Accelerometer Calibration (if specified by the manufacturer) or Accelerometer Verification.
2. Longitudinal Distance Calibration or DMI Calibration Test.
3. Vertical Height Calibration (if specified by the manufacturer) or Vertical Height Verification.
4. Any other test as recommended by the manufacturer of the inertial profiler.

If calibration procedures are not indicated by the manufacturer, submit a proposed procedure for calibration and/or verification of calibration for approval.

The calibration shall be observed by and approved at the discretion of the Engineer.

Use an inertial profiling system capable of measuring the left and right wheel paths of a travel lane and determining the smoothness of the pavement surface using the International Roughness Index (IRI) format.

The inertial profiling system shall have a printer capable of providing the calculated IRI for each wheel path and Mean Roughness Index (MRI) in inches per mile for each 0.1 mile section. The printer shall also be capable of printing station numbers, distances, and comments entered by the operator via keypad while measuring the profiles.

The laser height referencing transducer may consist of a single point or spot laser, or a line laser with a minimum 4 inch wide footprint when measuring the plantmix bituminous surface.

402.03.05 Surface Tolerances. This Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Type A pavement smoothness is required.

Produce completed surfacing which is smooth and free from ruts, humps, depressions or irregularities. Eliminate ridges, indentations, or other objectionable marks left in the surface by rolling or other means. Discontinue the use of equipment that leaves ridges, indentations, or other objectionable marks in the bituminous surface, or

does not consistently produce a surface meeting straightedge and inertial profiler requirements.

After final rolling, the smoothness of the final dense-graded surface course shall meet the straightedge and inertial profiler requirements. Furnish the specified inertial profiler and perform the profile measurement.

(a) Straightedge Measurement. The Engineer will perform this measurement. When a straightedge 12 feet long is laid on the finished surface both perpendicular and parallel with the centerline of the highway, the surface shall not vary by more than 0.25 inch from the lower edge of the straightedge.

Correct defective areas by approved methods.

(b) Inertial Profiler Measurement. Measure the pavement with the inertial profiling system according to Test Method No. Nev. T448. Give notification at least 2 working days prior to beginning the measurement process.

Operate the inertial profiler within the operational range as recommended by the manufacturer.

Perform the profile measurement in the direction of traffic.

Measure the profiles of the left and right wheel paths within each traffic lane at 3 feet from and parallel to the respective left or right traffic lane line. The spacing between sensor paths shall be between 66 and 72 inches.

Mark areas of localized roughness in excess of the specified limit after the initial run of the inertial profiler.

Do not measure pavement for MRI within 50 feet of the leading edge nor within 50 feet of the trailing edge of a manhole, cattle guard, or any other break in the continuous pavement. Do not measure pavement for MRI within 50 feet of the leading edge nor within 50 feet of the trailing edge of a concrete bridge deck (including approach slabs) unless the bridge deck is to receive a plantmix overlay.

Pavement within 50 feet of the leading edge or within 50 feet of the trailing edge of a bridge deck or approach slab shall meet the profile requirements set forth in Subsection 502.03.16.

Calculate a Mean Roughness Index (MRI) for each 0.100 mile of traffic lane measured.

Submit the measured profile data in an approved unfiltered electronic format within 24 hours of the completion of the measurement. The submitted format shall be compatible with Profile Viewing and Analysis (ProVAL) software. In addition to the electronic format file, provide a printout of the report of calibration for the profiler and a printed summary report within 24 hours of the completion of a measurement run. The required elements of the printed report shall be as shown in Test Method No. Nev. T448.

Profile data will be evaluated to determine acceptance.

Profile data will be evaluated for MRI and any areas of localized roughness with an International Roughness Index (IRI) in excess of specification requirements for the designated pavement smoothness type. An area of localized roughness is defined as any 25 foot section of roadway that contributes disproportionately to the overall roughness index value. Areas of localized roughness shall be identified using a report of short continuous IRI with a base length of 25 feet. This yields the IRI of every possible 25-ft segment. Any segment for which the continuous report exceeds a threshold IRI value is considered a defective segment requiring correction.

The maximum allowable MRI for each 0.100 mile section for the specified pavement smoothness type shall be as follows:

MEAN ROUGHNESS INDEX

Pavement Smoothness Type	inch/mile
Type A	50.000
Type B	60.000
Type C	80.000
Type D	100.000

The maximum allowable IRI for each area of localized roughness for the specified pavement smoothness type shall be as follows:

INTERNATIONAL ROUGHNESS INDEX
LOCALIZED ROUGHNESS

Pavement Smoothness Type	inch/mile
Type A	150.000
Type B	160.000
Type C	180.000
Type D	200.000

Pavement on horizontal curves having a centerline radius of less than 2,000 feet, and within the super elevation transition of such curves, will be evaluated as pavement smoothness Type C.

The Department will perform verification testing using an inertial profiler meeting the requirements of Subsection 402.03.03.

The Contractor's overall MRI values shall be within 5% of the Department's overall MRI values. Re-measure sections that exceed the 5% difference criteria. If results still exceed 5% difference, the Contractor can accept the Department's results or have referee testing performed by an independent party who shall be required to conform to all of the requirements specified herein. If all the referee testing results are within 5% of the Contractor's test results, the Department will reimburse the Contractor for the cost of the referee testing.

Locate and correct areas exceeding the pavement smoothness requirements.

Submit the intended method of correction for approval. Do not perform corrective action until the submitted data has been evaluated and the intended method of correction has been approved.

If abrasive grinding is approved and used as a method of correction, ensure that the grinding process does not significantly reduce the pavement thickness. The Department reserves the right to obtain core samples to determine remaining pavement thickness upon completion of grinding operations. Perform additional grinding as necessary to extend the ground area laterally to the nearest lane line or edge of pavement and longitudinally to lines normal to the pavement centerline.

Re-measure repaired, replaced, or corrected areas for conformance with pavement smoothness requirements.

Upon completion of corrective work, submit the profile data and related printed summary within 24 hours of completion of corrective work. The data shall indicate corrected areas meet pavement smoothness requirements.

Apply seal coat to ground areas after the surface tolerance specifications have been met. Apply the seal coat according to Section 407. If a final wearing course is to be applied within two weeks of completion of grinding, the seal coat may be omitted.

The grinding machine for correcting pavement exceeding the profile requirements shall be power driven, self-propelled and specifically designed to remove, profile, smooth, and texture hot mix asphalt or Portland cement concrete. Use a grinding machine with an overall wheel base of not less than 12 feet, equipped with a rotating powered mandrel drum equipped with diamond blades with a cutting head not less than 3 feet wide. Equip the grinding machine with an effective means for controlling dust and other particulate matter.

Do not cause permanent strain or damage to the underlying surface of the pavement with the grinding machine. Do not use grinding and texturing equipment that causes ravels, aggregate fractures, spalls, or disturbance of joints.

Perform grinding in a longitudinal direction. Satisfactorily grind to produce a uniform textured surface over the surface areas designated for grinding.

The surface of the ground pavement shall have parallel corduroy-type texture consisting of grooves between 0.09 and 0.13 inch wide. The peaks of the ridges shall be approximately 0.0625 inch higher than the bottom of the grooves with 52 to 57 grooves per foot.

Pick up and dispose of grinding materials, including water used for the grinding operation, outside the right of way according to Subsection 107.14.

402.03.06 Compaction. Perform compaction according to "Method B."

Density test requirements in this Subsection of the Standard Specifications will be reported to the one-tenth of one percent accuracy.

The last sentence of the fourth paragraph on Page 163 of the Standard Specifications is hereby deleted and the following substituted therefore:

The mean density of the 5 nuclear tests shall not be below 92.0% nor above 96.0% (with no single test below 90.0% nor above 97.0%) of the target density obtained in the Department's Field Laboratory using Test Method No. Nev. T325.

The last sentence of the second to last paragraph on Page 163 of the Standard Specifications is hereby deleted and the following substituted therefore:

A new control strip will be required when 20 test sections have been constructed without establishment of a new control strip.

402.04.01 Measurement. Plantmix paved ditches will be measured by the square yard for placing. The quantities of bituminous mixture used to pave plantmix paved ditches will be measured by the ton of completed mixture of aggregate, asphalt, and mineral filler as specified in Subsection 401.04.01.

402.05.01 Payment. Payment will be made under:

Pay Item	**Pay Unit**
Plantmix Paved Ditches	Square Yard

The compensation payable for the additional quantity of asphalt cement and mineral filler added at the direction of the Engineer according to Subsection 401.02.02 will be made at the following set unit prices:

Asphalt Cement, PG 64-28NV and PG 64-28NVTR	$810 per ton
Mineral Filler, Marination Method	$150 per ton

SECTION 403 – PLANTMIX BITUMINOUS OPEN-GRADED SURFACE

403.03.04 Surface Tolerances. This Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Type A pavement smoothness is required.

Produce completed surfacing which meets the straightedge and inertial profiler requirements of Subsection 402.03.05 with the following additions and exceptions to the inertial profiler measurement.

Furnish an inertial profiling system meeting the requirements of Subsection 402.03.03 and measure the pavement as specified in Subsection 402.03.05.

Include 25 feet of the existing pavement on each end of the project in the profile determination. Make construction joints with the existing pavement meet the requirements of this Subsection.

Liquidated damages of $2,500.00 will be assessed for each defect (MRI, IRI, and straightedge) within each one-tenth mile section exceeding the pavement smoothness type and straightedge requirements. The cumulative amount of liquidated damages for each travel lane within each one-tenth mile section shall not exceed $20,000.00.

Abrasive grinding for correcting pavement smoothness will not be permitted on any open-graded paving or wearing course surface.

Removing and replacing the open-graded paving or wearing course surface may be required in lieu of assessing the maximum cumulative amount of $20,000.00 in liquidated damages for exceeding the pavement smoothness type and straightedge requirements.

SECTION 405 – TACK COAT

405.03.01 Equipment. Subparagraph "(c)" of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

(c) Positive automatic in-cab controls including tachometer, pressure gages, and digital volume measuring device.

405.03.04 Application of Bituminous Materials. Manually check the spray rate by measuring the volume of emulsion in the tank before spraying and rechecking the volume in the tank after spraying. The project superintendent shall check the depths on the calibration stick with the Engineer prior to placement. Uniformly apply asphalt within 0.02 gal/yd^2 of the required rate. Failure to comply with the requirements for distribution equipment or providing weigh back tickets to accurately determine the application of emulsified or cutback asphalt will be deemed as failing material. Twenty-one demerits will be assessed and subject to the provisions of Subsection 109.02.

SECTION 406 – PRIME COAT

406.03.04 Application of Bituminous Material. The table at the top of page 176 of the Standard Specifications is hereby deleted and the following substituted therefore:

SPRAYING AND MIXING TEMPERATURES OF EMULSIFIED ASPHALTS

Grade of Emulsified Asphalt	Distributor Spraying Temperature °C (°F)		*Pugmill Mixing Temperature of Emulsions and Aggregates °C (°F)	
	Minimum	Maximum	Minimum	Maximum
CRS-2nv	57 (135)	85 (185)	(Not used for Mixing)	
CQS-1nv	21 (70)	71 (160)	(Not used for Mixing)	
SS-1, CSS-1	21 (70)	71 (160)	10 (50)	71 (160)
SS-1h, CSS-1h	21 (70)	71 (160)	10 (50)	71 (160)
CMS-2s, CQS-1h	21 (70)	71 (160)	10 (50)	71 (160)
QSE, QSRE	21 (70)	71 (160)	(Not used for Mixing)	
LMCRS-2h	57 (135)	85 (185)	(Not used for Mixing)	
PMPS-h, PMRE-h	57 (135)	85 (185)	(Not used for Mixing)	
PMPS-FS	43 (110)	85 (185)	(Not used for Mixing)	
MSE, MSE-h, PMCQS-1nv	(Not used for Spraying)		21 (70)	71 (160)

*The maximum spraying temperature may be used if the aggregate is not heated.

406.04.01 Measurement. The first paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Prime coat will be measured by the square yard.

406.05.01 Payment. Payment will be made under:

Pay Item	Pay Unit
Prime Coat	Square Yard

SECTION 409 - PORTLAND CEMENT CONCRETE PAVEMENT

409.01.01 General. This work consists of joint sealer, grind concrete pavement, and repair concrete slab. Repair concrete slab at locations shown on the plans.

409.02.01 General. In the first sentence of the fourth paragraph of this Subsection of the Standard Specifications, the words “and as a project control requirement” are hereby deleted.

The last paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

For mix design approval, testing shall demonstrate that a minimum flexural strength of 600 psi will be achieved at 28 days. An average of 3 beams, when cured and tested according to Test Method No. Nev. T442, shall meet or exceed 600 psi with no individual beam having a strength less than the specified strength.

409.03.01 Equipment. Delete the second paragraph on page 186 of the Standard Specifications and replace with the following:

Use early-entry saws with attached vacuum system for dust collection. Saws shall be up-cutting, have replaceable skid plates, be no more than 550 pounds in weight, and be designed for cutting fresh concrete without the use of water. Provide sawing equipment adequate in number of units and power to complete the saw cutting to the required dimensions and at the required rate. Replace saw blades and skid plates regularly in accordance with the manufacturer’s recommendations. Provide at least one standby saw in good working order. Maintain an ample supply of saw blades at the site of the work at all times during sawing operations.

Add the following to subparagraph (d) on page 187 of the Standard Specifications:

When consolidating concrete containing epoxy-coated reinforcing steel or dowel bars, provide vibrators with a resilient covering to prevent damage to the epoxy coating.

409.03.02 Preparation of Grade. This Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Place a white pigmented wax based curing compound on the prepared surface. Apply curing compound in a single application at a rate of 2 gal/150 ft2 ± 25 ft2 no more than 10 days before placing concrete. Allow adequate time for the curing compound to cure as per the manufacturer's recommendations before placing concrete. Repair or reapply curing compound that has been contaminated or otherwise affected and which will not perform the function as intended. Apply a fine spray of water to the curing compound immediately before concrete placement begins.

409.03.09 Joints. Subparagraph (a) General. Add the following to the end of this Subparagraph of the Standard Specifications:

Submit a Joint Layout Plan for approval a minimum of 20 working days prior to the start of concrete paving operations for all jointing circumstances not shown in the plans. Jointing circumstances not shown in the plans may include but are not limited to entrance and exit ramps and ramp terminals, gore areas, auxiliary lanes and lane tapers, drainage inlets, irregularly shaped panels, structure approaches, and tie-ins to existing PCCP. Determine and show where reinforced panels will be required.

Do not begin concrete paving operations without written approval of the accepted Joint Layout Plan.

Subparagraph (c) Weakened Plane Joints of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

(c) Weakened Plane Joints. Transverse weakened plane joints shall be perpendicular to centerline. Space transverse weakened plane joints according to the plans, except where PCCP is being placed in contact with existing PCCP. Where PCCP is being placed in contact with existing PCCP, transverse joints in the new PCCP shall meet transverse joints in the existing PCCP at the contact joint.

Cut longitudinal weakened plane joints on all lane lines and shoulder lines. Where the combined width of the Portland cement concrete pavement shoulder and adjacent lane is 16 feet or less, omit the longitudinal joint between the shoulder and the lane.

Perform initial 1/8-inch saw cut with a power driven early entry saw designed for sawing fresh concrete without the use of water. Cut joints when saw cutting equipment can be placed on the surface without raveling, tearing, spalling, or causing any other damage to the newly placed concrete pavement. Determine the exact time to saw joints.

After the joint is sawed, clean the saw cut and adjacent concrete surface with a dry vacuum. Immediately revise any procedure used to saw joints which results in uncontrolled random cracking.

Repair portions of curing seal which are disturbed by sawing operations by spraying the areas with additional curing seal.

Keep a standby power saw on the project at all times when concrete paving operations are under way.

409.03.12 Riding Tolerances. This Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Produce completed surfacing which meets the straightedge and inertial profiler requirements of Subsection 402.03.05 with the following additions and exceptions to the inertial profiler measurement.

Furnish an inertial profiling system meeting the requirements of Subsection 402.03.03 and measure the pavement as specified in Subsection 402.03.05.

Include 25 feet of the existing pavement on each end of the project in the profile determination. Make construction joints with the existing pavement meet the requirements of this Subsection.

The laser height referencing transducer shall utilize a line laser with a minimum 4-inch wide footprint when measuring the concrete pavement surface.

The maximum allowable Mean Roughness Index (MRI) for each 0.1 mile section shall be 60.000 inches/mile.

The maximum allowable International Roughness Index (IRI) for each area of localized roughness shall be 175.000 inches/mile.

Correct areas exceeding profile requirements by grinding. Use grinding machines that are power driven, self-propelled and specifically designed to remove, profile, smooth, and texture concrete pavement. The grinding operation shall conform to Subsection 402.03.05.

Re-groove ground areas as directed to meet the tining requirements of Subsection 409.03.11 (d).

Pick up water and materials produced from grinding and grooving operations and dispose of according to Subsection 107.14.

409.03.14 Protection of Pavement. The second paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Unless directed, do not permit traffic or equipment on the pavement before a period of 10 days after the concrete has been placed, nor before the concrete has developed a modulus of rupture of at least 500 psi, as determined by Test Method No. Nev. T442.

The second paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Request in writing to place the tracks of the paving equipment on the pavement after a period of 3 days after the concrete was placed, and the concrete has developed a modulus of rupture of at least 450 psi. Do not locate any part of the track closer than 12 in. from the edge of pavement. Do not exert more than 20 psi pressure on the pavement by the paver track. In case of visible cracking or other damage to the pavement, immediately discontinue operation of the paving equipment on the pavement. Repair damage to the pavement resulting from such operations. Replace concrete which has been damaged and in the opinion of the Engineer cannot be repaired satisfactorily.

409.03.15 Repair Concrete Slab. Remove existing concrete slabs as specified in Subsection 202.03.02. Should repair and/or re-compaction of the base be necessary, proceed at the direction of the Engineer. Use an All Weather Asphalt Cold Patch material listed in the QPL. Repaired base must have enough strength to resist deformation from construction personnel and equipment prior to the concrete placement. Provide a sufficient standby quantity of base repair material at the job site, as determined by the Engineer. Place dowel bars at the transverse joints between existing and replacement PCCP and at transverse joints between replacement slabs.

For transverse joints between existing and replacement PCCP, place ½" thick preformed joint filler on existing PCCP joint face. Drill holes into the existing PCCP and epoxy dowel bars in the locations shown in the plans. For transverse skew joints, provide a positive method for drilling and setting dowel bars parallel to the longitudinal edge of the slabs. Air blast drill holes until all laitance is removed prior to filling with epoxy adhesive. Fill the hole with epoxy adhesive until refusal is noticed after bar placement. Apply bond breaker on the exposed end of the dowel bar after epoxy has set.

For joints between replacement slabs, use wire baskets as specified in Subsection 409.03.09.

Place Class 2 Geotextile meeting the requirements of Subsection 731.03.03 on the base prior to pouring the replacement slab.

Use concrete that meets the requirements for Class AA Modified concrete in Section 501, with the following modifications:

a) For mix design approval, a minimum compressive strength of 2,500 psi is required at 3 hours or at contractor's proposed time for opening to traffic. In addition, a minimum 28-day compressive strength of 4,000 psi is required.
b) The maximum total cementitious content shall be 850 pounds per cubic yard.

c) Cements conforming to ASTM C150 Type III or ASTM C1600 may be used in lieu of the requirements of Subsection 501.02.03. The minimum pozzolan requirement is hereby waived.
d) On-site batching using volumetric mix trucks may be used if approved by the Engineer.

Tining of the concrete surface is not required.

Sawn joints shall consist of a single 1/8" wide saw-cut to the depth shown on the plans. Use a power driven early entry saw designed for sawing fresh concrete without the use of water. Cut joints when saw cutting equipment can be placed on the surface without raveling, tearing, spalling, or causing any other damage to the newly placed concrete pavement. Determine the exact time to saw joints.

After the joint is sawed, clean the saw cut and adjacent concrete surface with a dry vacuum.

Immediately revise any procedure used to saw joints which results in uncontrolled random cracking.

Keep a standby power saw on the project at all times when concrete paving operations are under way.

Grind the replacement slab and 10 feet of the existing concrete on both sides in the same lane. Use grinding machines that are power driven, self-propelled and specifically designed to remove, profile, smooth, and texture concrete pavement. The grinding operation shall conform to Subsection 409.03.16.

Seal joints according to the plans. Use a joint sealant listed in Section 707.03.04 of the QPL. Backer rod shall conform to ASTM D5249.

The finished pavement surface shall meet the straightedge requirements of Subsection 409.03.12, paragraph (a) Straightedge Measurement. The profilograph measurement will not be required.

Unless directed, do not permit traffic or equipment on the concrete before 3 hours after the concrete has been placed, nor before the concrete has developed a compressive strength of at least 2,500 psi. Cure the concrete in accordance with 409.03.13 until opening to traffic.

409.03.16 Grind Concrete Pavement. This work consists of grinding and texturing the existing concrete pavement to eliminate joint faulting, improve ride characteristics, and to restore proper drainage to the pavement surface. Profile grind prior to joint sealer operations.

Profile grind the existing concrete pavement to remove, profile, smooth, and texture the pavement using grinding machines specifically designed for this purpose meeting the requirements of Subsection 409.03.12 paragraph (b) Profilograph Measurement, subparagraph nine. Profile grind the existing concrete pavement to meet the riding tolerances specified in Subsection 409.03.12 paragraph (a) Straightedge Measurement.

Perform grinding in the longitudinal direction. Satisfactorily grind to produce a uniform textured surface over the pavement areas designated for grinding. Accomplish the grind in a manner that provides positive lateral drainage by maintaining a constant cross slope between grinding extremities in each lane and shoulders.

Do not cause strain or damage to the underlying surface of the pavement with the grinding machine. Do not use grinding and texturing equipment that causes ravels, aggregate fractures, spalls, or disturbance of joints.

Pick up and dispose of all water, loose residues, and grinding waste materials in accordance with Subsection 107.14.

409.03.17 Saw and Reseal Joints. Saw the existing joints as necessary to meet the minimum depth requirements shown on the Joint Design table below. Complete the joint sealer operation after the grind concrete pavement has been completed.

Remove all existing sealant and backer rod material prior to sand blasting.

Sand blast both faces of the joint and use saw-mounted wire brushes to remove old joint sealant before cleaning with air. Air blast with clean air obtained from compressors equipped with water and oil traps visible to the Engineer. Air tanks are to be maintained per the manufacturer's recommendations.

Install new backer rod after thoroughly cleaning the joints. Place non-absorptive closed cell backer rod in the joints to the depths recommended by the manufacturer. The backer rod shall be at least 25% wider than the joint widths.

Use a joint sealant listed in Section 707.03.04 of the QPL to reseal the joints. Place joint sealant in accordance with the manufacturer's recommendations and the table below. Prevent spills and excess sealer material from coming in contact with the horizontal surface of the concrete pavement on either side of the joints. Remove any such spills of excess material to the satisfaction of the Engineer.

Joint Design – Silicone Sealant								
Joint Width, Inch	¼	3/8	½	5/8	¾	7/8	1	>1
Minimum Saw Depth, inch	1	1-1/4	1-1/2	2	2-1/4	2-1/2	2-3/4	>2-3/4
Backer Rod Diameter, inch	3/8	½	5/8	¾	1	1-1/8	1-1/4	Approximately 25% larger than joint width
Minimum Backer Rod Depth, Inch	½	½	½	5/8	¾	7/8	1	1
Sealant Bead Thickness, inch	1/8	3/16	¼	5/16	3/8	7/16	½	½
Minimum Sealant Recess Below surface, inch	1/8	¼	¼	¼	3/8	3/8	½	1/2

Remove and replace sealant that is not placed within the specified tolerances described in these Special Provisions at no additional payment.

Complete joint sealing after the diamond grinding operations have completed and install joint sealing in a recessed condition.

409.04.01 Measurement. This Subsection of the Standard Specifications is hereby deleted and replaced with the following:

Concrete pavement will be measured by the square yard.

Saw transverse and longitudinal weakend plane joints will be measured by the linear foot of joint cut in new pavement.

Portland cement concrete pavement curing compound for preparation of grade and for curing the pavement surface will be measured by the gallon.

Repair concrete slab will be measured by the square foot.

Grind Concrete Pavement will be measured by the square yard of surface area ground and accepted, regardless of the number of passes required to achieve acceptable results.

Saw and reseal joints will be measured by the linear foot. Removing existing sealant and backer rod and cleaning existing joints will be considered as incidental to the Pay Item "Saw and reseal joints" regardless of the equipment used.

409.05.01 Payment. Payment will be made under:

Pay Item
Repair Concrete Slab ..... Square Foot
Grind Concrete Pavement ..... Square Yard
Saw and Reseal Joints ..... Linear Foot

SECTION 496 - POLYMER CONCRETE

DESCRIPTION

496.01.01 General. This work consists of preparing concrete surfaces and placing a prime coat, premixed composition of polyester resin binder and dry aggregate, and sand.

MATERIALS

496.02.01 Certificates and Submittals. Materials for polymer concrete shall be tested by a certified lab. Submit a certified copy of test results that are less than 1 year old for review and approval 30 days before polymer concrete placement. Identify all materials by source and type. Submit test reports for the polyester styrene resin binder and the high molecular weight methacrylate resin prime coat. The materials so tested and certified shall be of the same composition as the materials used on the project.

496.02.02 Polymer Concrete. The prime coat shall be a wax free, high molecular weight methacrylate resin conforming to the following requirements:

TEST	TEST METHOD	REQUIREMENT
Viscosity (b) @ 25 °C (77 °F), Pa·s (poises)	ASTM D2196 (a)	0.025 (0.25) Maximum
Specific Gravity @ 25 °C (77 °F)	ASTM D1475 (a)	0.90 Minimum
Flash Point, °C (°F)	ASTM D3278 (a)	82 (180) Minimum
Tack-Free Time @ 25 °C (77 °F), minutes	Calif. 551 or ASTM C679	400 Maximum
Bond Strength (c) @ 21 ± 1 °C (70 ± 2 °F), MPa (psi)	Calif. 551	3.5 (500) Minimum

(a) Perform test before addition of the initiator.
(b) Brookfield RVT with UL adaptor, 50 rpm.
(c) PCC Saturated Surface-Dry Bond Strength at 24 hr.

The promoter/initiator system for the methacrylate resin shall consist of a metal drier and peroxide. If supplied separately from the resin, at no time shall the metal drier be mixed with or allowed to contact the peroxide directly. Do not store the containers in a manner that will allow leakage or spillage from one material to contact the container or material of the other.

Accompany each shipment of high molecular weight methacrylate resin, promoter, and initiator with a Material Safety Data Sheet.

Polymer concrete consists of polyester resin binder and dry aggregate.

Polyester resin binder shall be an unsaturated isophthalic polyester-styrene co-polymer, contain not less than 1% of silane coupler by mass, and shall conform to the following requirements:

TEST	TEST METHOD	REQUIREMENT
Viscosity (b) @ 25 °C (77 °F), Pa·s (poises)	ASTM D2196 (a)	0.075 to 0.20 (0.75 to 2.0)
Specific Gravity @ 25 °C (77 °F)	ASTM D1475 (a)	1.05 to 1.10
Elongation (d), Type I at 11.5 mm/min., %	ASTM D638	35 Minimum
Tensile Strength (d), Type I at 11.5 mm/min., MPa (psi)	ASTM D638	17.5 (2,500) Minimum
Styrene Content, % by mass, as volatiles	ASTM D2369 (a)	40 to 50
Bond Strength (c) @ 21 ± 1 °C (70 ± 2 °F), MPa (psi)	Calif. 551	3.5 (500) Minimum

(a) Perform test before addition of the initiator.
(b) Brookfield RVT, No. 1 Spindle, 20 rpm.
(c) PCC Saturated Surface-Dry Bond Strength at 24 hr.
(d) Thickness = 6.5 ± 1 mm. Sample Conditioning: 18hr/25 °C/50% + 5hr/70 °C according to ASTM D618.

The silane coupler shall be an organosilane ester, gamma-methacryloxy-propyltrimethoxysilane. The promoter shall be compatible with suitable methyl ethyl ketone peroxide (MEKP) and cumene hydroperoxide (CHP) initiators.

Obtain materials for polymer concrete from one of the sources listed in the QPL.

Accompany each shipment of polyester styrene resin with a Material Safety Data Sheet.

Aggregate shall conform to the following gradation requirements when tested according to Test Method Nev. T206.

Sieve Size	Percent Passing by Mass
3/8 inch	100
No. 4	62-85
No. 8	45-67
No. 16	29-50
No. 30	16-36
No. 50	5-20
No. 100	0-7
No. 200	0-3

Aggregate retained on the No. 8 sieve shall have a maximum of 45% fractured faces as determined by Test Method No. Calif. 205. Aggregate passing the No. 8 sieve shall consist of natural sand only.

Aggregate absorption shall not exceed 1.0% as determined by Test Method No. Calif. 206 or 207 or Nev. T493, as applicable.

The moisture content of the aggregate, as determined by Test Method No. Nev. T112 (Method A), shall not exceed 50% of the aggregate absorption capacity at the time of mixing with the resin.

The pre-bagged aggregate may be furnished in two or more sizes. The combined proportions of each size shall meet the above requirements. Provide 1 five-gallon bucket aggregate sample for testing.

Provide a mix design detailing the description and quantity of polyester resin, aggregates, promoter, and accelerant required to produce an acceptable product. Include certified lab testing results for the individual materials and the following properties of the cured polymer concrete:

1. Unit Weight (lb/ft^3) per Test Method No. Nev. T435 modified to use a disposable container.

2. Tensile Strength (psi) per ASTM C1583 modified as approved.

Include the ambient and surface temperature limitations for batching and placement of the polymer concrete within the restrictions of Subsection 496.03.04.

Submit the mix design for approval a minimum of 20 days prior to the trial batch placement. Do not place trial batch until the mix design is approved in writing.

CONSTRUCTION

496.03.01 General. Before placing polymer concrete, furnish the following:

1. Skilled technical service relating to application of materials, including a representative present during the trial batch and initial full-production placement of polymer concrete.

2. Health and safety training for personnel who are to handle the materials. In addition, provide a soap and water wash station for the workers at the job site.

3. Submit proposed locations of the longitudinal and transverse joints for approval. Place longitudinal joints on lane lines.

496.03.02 Trial Batches. The materials used in the trial batches shall be the same as those used in the mix design. If at any time different materials are to be used, a new mix design and trial batches will be required.

When the polymer concrete will be used for an overlay application, place one or more trial batches on a previously constructed concrete base to demonstrate the effectiveness of the proposed mixing, placing, and finishing equipment. Each trial batch shall be 12 feet wide, at least 12 feet long, and the same thickness as the overlay to be constructed.

Place trial batches under similar conditions anticipated to be encountered during placement of the permanent overlay.

Adjustments to the approved mix design may be made by the technical service representative with approval.

As necessary, remove and dispose of the concrete base and materials used in the trial batches according to Subsection 107.14.

496.03.03 Bridge Deck Preparation. After removal of bituminous surfacing and before deck preparation, repair bridge decks as provided for in Subsection 502.03.15. After repairs are complete, scarify the bridge deck by shot blasting. Use of scabblers, milling machines, or sand blasting will be at the discretion of the Engineer. If shot blasting is utilized, use a 75 hp minimum self-propelled machine equipped with vacuum recovery.

The scarifying procedure shall produce a uniform rough texture, removing concrete and exposing the coarse aggregate to a depth not to exceed 1/4 inch. The prepared surface shall be sound and clean.

Adequately isolate expansion joints and weakened plane joints before overlaying or saw them by approved methods within 4 hours after overlay placement. The exact time of sawing will be determined.

Immediately before applying the prime coat, sweep the surface clean with compressed air to remove accumulated dust and loose material.

496.03.04 Concrete Placement. Before applying the prime coat, the concrete area to receive the prime coat shall be dry and moisture free when tested according to ASTM D4263. Test in a low area or an area that drains slowly to be certain that the surface is sufficiently dry. Use a transparent, 4 mil thick polyethylene sheet left taped in place a minimum of 6 hours. Use tape that will stick to the substrate and ensure that all edges are completely sealed after 6 hours. Moisture shall not be visible on the polyethylene sheet after 6 hours. A digital or analog moisture meter that has been calibrated within the last 6 months and meets the requirements of ASTM F2659 may be used in lieu of ASTM D4263. Testing should be conducted at multiple locations within the application area, and all results shall be less than 4.50%. The concrete surface temperature shall be between 50 °F and 100 °F during application of the prime coat and polymer concrete. If necessary, propose methods to heat or cool the concrete surface for approval.

Use edge forms for placement of prime coat and polymer concrete that is not constrained by existing concrete or existing polymer concrete. Use forms that are leak-proof, preventing loss of prime coat or polyester resin. Remove polyester concrete that exhibits resin leaking. Slip form paving with no edge constraints may require up to 4 inches of the polymer concrete to be removed on each side of the pass. Construct longitudinal joints parallel to the roadway alignment. Construct vertical joints perpendicular to the deck surface. Saw cut vertical joints that are not perpendicular to the deck surface.

Apply the prime coat to the surface prior to placement of polymer concrete.

Apply the prime coat at an approximate rate of 0.09 gal/yd^2. Flood concrete surfaces with the prime coat allowing penetration into the concrete and filling of all cracks. Redistribute the applied prime coat in cracks by squeegees or brooms. Do not over-apply the prime coat, including ponding or runoff. A noticeable increase in viscosity prior to placement will be cause for rejection. If the primed surface becomes contaminated or if there is a failure of the material, clean the contaminated or failed area by abrasive blasting and re-prime. Do not allow traffic on the primed surface.

Mix polymer concrete in mechanically operated mixers. Use a sufficient amount of initiator in the polymer concrete to produce set times between 30 and 120 minutes after placement. Determine set times according to Test Method No. Calif. 551. Accelerators or inhibitors may be required to achieve proper set times and shall be used as recommended by the resin supplier.

Initiate and thoroughly blend the resin binder before introduction of aggregate to the binder. Mix the polymer concrete to produce a homogeneous mixture without entrapping air in the mixture.

Place and finish polymer concrete before gelling or within 15 minutes following addition of the initiator, whichever occurs first. Discard polymer concrete not placed within this time.

Use a disposable 3-inch PVC pipe to sample polymer concrete at a minimum of 6 inches in length. Samples will be obtained from both the trial batch and production paving. The samples will be tested for tensile strength performed by a modified version of ASTM C1583 or, for density by a modified version of Test Method No. Nev. T435, and for polyester resin content and gradation by a modified version of Test Method No. Nev.T761.

Use finishing equipment that strikes off the polymer concrete to the established grade, cross section, and nominal depth. Equipment shall include sufficient vibrators to consolidate the overlay material and bring a thin layer of resin to the surface and have grade control capabilities resulting in a finished surface that meets the smoothness requirements in accordance with Subsection 502.03.16.

Embed abrasive sand in the thin layer of resin on the polymer concrete surface. The sand shall be commercial quality blast sand, conforming to the absorption capacity and moisture content requirements of polymer concrete aggregate specified herein. Provide sand such that 95% shall pass the No. 8 sieve and 95% shall be retained on the No. 20 sieve. Apply the sand finish by mechanical means immediately after overlay strike-off. Broadcast sand uniformly onto the surface before gelling occurs at a minimum rate of 2.0 lb/yd^2 and as necessary to cover the entire surface resulting in no visible polyester resin.

Texture the sanded polymer concrete surface with a mechanical spring steel tining device which will form grooves parallel to the centerline of the bridge. Do not perform tining too early, where by the grooves may close up. Make tines of rectangular cross section and of sufficient thickness and resilience to result in grooves spaced 3/4 inch on center, 3/32 to 1/8 inch wide, and 1/8 to 3/16 inch deep in the finished concrete pavement.

Construct tines continuously to within 12 to 15 inches of the deck edge, parapets, gutters, or barrier rail on each side of the bridge deck. Terminate tines a maximum of 12 inches from expansion joints or devices imbedded in the pavement, such as metal joints, access plates, etc. Line up the grooves across construction joints or stopping points to produce grooves that are continuous across the entire surface.

Tine at a speed which keeps up with placement of polymer concrete overlay.

Leave a 3/4-inch gap between each tine strip to prevent overlapping the tined surface and producing a weak surface area.

Maintain the tining device clean and free of debris to ensure uniform groove dimensions.

Perform tining when the concrete has sufficiently set to prevent the material from settling and closing the grooves. Do not attempt to tine polymer concrete which has fully set, whereas the tining operation may lift aggregate out of, tear, or cause excessive roughness to the polymer concrete surface.

If polymer concrete has hardened before tining is performed, apply a grooved finish to the polymer concrete surface. Perform grooving using diamond blades, mounted on a multi-blade arbor on a self-propelled machine which is designed for grooving concrete pavement. Provide a machine with a depth control device which will detect variations in the pavement surface and adjust the cutting head height to maintain the depth of groove specified. Use a machine that uses guides to control alignment and a functioning water recovery system.

Cut grooves parallel to the centerline of the bridge. Run grooves continuously to not less than 12 inches nor more than 24 inches from the deck edge, parapet, gutters, or barrier rail on each side of the bridge deck. Terminate grooves a maximum of 12 inches from expansion joints or devices imbedded in the pavement, such as metal joints, access plates, etc. Line up the grooves across construction joints or stopping points to produce grooves that are continuous across the entire surface.

Make grooves of rectangular cross section and of sufficient thickness and resilience to result in grooves spaced 3/4 inch on center, 3/32 to 1/8 inch wide, and 1/8 to 3/16 inch deep in the finished concrete surface.

Protect the finished polymer concrete overlay from moisture, equipment, and public traffic for not less than 4 hours after finishing.

Do not contaminate concrete surfaces during clean-up of tools and equipment. Do not dump or spill polymer concrete materials or cleaning solvents in areas that will cause environmental or fire hazards.

Provide the necessary equipment and supplies for conducting pull off tests on the completed overlay. Perform pull off tests according to ACI 503R - Appendix A of the ACI Manual of Concrete Practice or ASTM C1583. Perform tests at a frequency of one test per every 60 yd^2 of deck surface up to a maximum of 5 tests per day of placement. Confirm pull off test locations with the Engineer prior to testing. Acceptable pull off test shall exhibit cohesive failure (Type A failure) within existing material below the interface. Pull off tests that fail in the prime coat (Type B failure) are acceptable if a minimum of 250 psi is obtained. Newly placed polymer concrete that fails (Type C failure) with a strength of less than 500 psi is deemed unacceptable and shall be removed and replaced. Patch test holes with primer and polymer concrete immediately after testing.

Repair or replace areas that have been defaced or damaged from construction operations and areas that are determined unacceptable. Remove all low areas full depth and replace to the correct elevation. Skin patches will not be allowed.

The polymer concrete in each travel lane shall be uniform and shall have a Skid Number (SN) of not less than 55. Test the finished surface once per lane, per structure for the specified SN according to ASTM E274. In lieu of ASTM E274, a coefficient of friction value of 0.75 at 60 km/h can be obtained according to ASTM E1911. Grind or groove, parallel to the centerline, any portions of surfaces that do not meet the above requirements according to Subsection 502.03.16 until the finished surface requirements are met.

After required grinding by abrasive means has been performed, the surface of the concrete shall not be smooth or polished but shall have a satisfactory surface texture. Produce ground areas of uniform texture and of neat and approximately rectangular patterns which extend laterally to the nearest lane line and longitudinally so that the grinding begins and ends at lines normal to the centerline. Re-groove ground areas as directed to meet the tining requirements.

METHOD OF MEASUREMENT

496.04.01 Measurement. Polymer concrete aggregate will be measured by the pound for furnishing the placed polymer concrete aggregate. Mass will be determined by sack count of verified sack masses.

Polymer concrete resin will be measured by the pound for furnishing the placed polyester styrene resin binder. Mass will be determined by container count of verified container masses.

The quantities of polymer concrete aggregate and resin shown on the estimate and proposal are based on the nominal thickness shown on the plans with an estimated mixture of 125 pounds of aggregate and 17.5 pounds of resin per cubic foot of completed polymer concrete. The actual pay quantities will be adjusted and based on the approved mix formula and quantities used.

Materials used in the trial batches or the trial overlays will not be measured for payment.

Bridge deck preparation and concrete placement will be measured by the square yard for preparing the bridge deck surface, furnishing and placing the prime coat, placing the polymer concrete, and furnishing and placing sand.

BASIS OF PAYMENT

496.05.01 Payment. The accepted quantities, measured as provided above, will be paid for at the contract price per unit of measurement for the pay items listed below that are shown in the proposal. Payment will be full compensation for the work prescribed in this Section.

Payment will be made under:

Pay Item	**Pay Unit**
Bridge Deck Preparation and Concrete Placement	Square Yard
Polymer Concrete Aggregate	Pound
Polymer Concrete Resin	Pound

SECTION 501 - PORTLAND CEMENT CONCRETE

501.02.01 General. Class AA concrete shall be required where the option of Class A or Class AA concrete is indicated on the plans or the specifications. Class DA may be substituted for Class AA concrete.

Class S and SA concrete may be substituted for selected applications for Classes A, AA, D, DA, PAA, Modified A, AA, Modified D, DA, as approved by the Engineer. When the option of Class S or SA concrete is approved, submit details of a representative test section (mockup) for approval. Produce a trial batch of Class S and SA concrete, conforming to the proposed mix design. Place a test section when the atmospheric conditions approximate the conditions anticipated for placing the final work. Finish and cure the mockup according to this Section. If it is determined that the trial batch is not workable or not able to be properly placed or finished, modify the mix design or batching sequence. Submit the revised mix design and batching sequence and place another test section. Repeat the submittal and trial pour process until a workable and finished trial batch is produced. Do not place Class S or SA concrete until the mockup pour has been accepted.

Prepare a Concrete Quality Control Plan (CQCP) that addresses the production, informational quality control testing, transport, contingency plans for equipment breakdown or inclement weather, placement, finish, and cure of Portland cement for foundations, abutments, superstructures, decks, drainage structures, pavement and all other pours over 100 cubic yards. The submittal of a quality control plan, revisions, and weekly reports shall be considered as a necessary portion of the work; therefore, partial payments or portions thereof, as set forth under Subsection 109.06 may not be forthcoming until this requirement is complied with. Submit a weekly report each Monday whenever there was testing or inspections performed in the previous week. Include all necessary test results and inspection reports in the weekly report.

Submit the CQCP 20 working days before the start of work. The quality control plan shall include a specific description for concrete placement in foundations, abutments, superstructures, decks, drainage structures, pavement and all other pours over 100 cubic yards. The quality control plan shall include the Department's pre-pour agenda information with a pre-pour inspection checklist form for each major structural pour. Do not proceed with major concrete work until the quality control plan has been submitted and approved. Approval of the CQCP does not imply any warranty by the Department that the plan will result in consistent contract compliance. Be responsible to demonstrate such compliance. Deviations from the plan shall be approved in writing. Failure to comply with the quality control plan may result in work suspension.

The CQCP shall include identification of sources and producers of all components used in the mix, aggregate production, informational quality control testing, delivery, placement, finish, and curing equipment and methods. Include personnel and their specific duties. Describe procedures to be followed in preparation of the pour, the event of equipment breakdown or inclement weather during placement, finishing, and curing. When pumping concrete for major structural pours, include, as part of the CQCP, a detailed plan addressing corrective measures to be taken to ensure in-place concrete properties meet the specified requirements. Curing procedures shall include when and how the concrete and the curing system are to be placed, frequency for monitoring, maintaining, and re-wetting the curing system. Include methods of protecting the covers from displacement from wind or weather, and method of preventing heat and moisture loss. In addition, describe the method to be used to protect pedestrian and vehicular traffic under structures.

Designate a quality control supervisor who shall be responsible for the preparation, submittal, implementation, and oversight of the quality control plan. The quality control supervisor shall be an employee of the Contractor, under the direct supervision of the superintendent, solely dedicated to the Contract and shall not be responsible for other day-to-day operations on the project. The quality control supervisor shall have the authority to stop any and all work outlined in the quality control plan if the work is not properly performed. The quality control supervisor shall be available for contact 24 hours a day during the placement and cure of any concrete. The quality control supervisor shall be capable of being on-site within 45 minutes of notification.

The quality control supervisor shall perform and document a pre-pour inspection 24 hours prior to the pour and at least 4 concrete inspections the day of the pour. The inspections shall be made before placement, during placement, when curing begins, and during curing. Inspect concrete forms, reinforcing steel adequately tied and supported, concrete quality control testing reports, fogging, and curing process and equipment. Submit a completed pre-pour inspection checklist 24 hours prior to each major structural pour. Include these quality control inspection reports in the weekly report and provide them within 24 hours of end of concrete placement, if requested.

The quality control supervisor shall also perform and document at least 6 daily cure inspections during the required cure period for each bridge deck pour, at a maximum of 4 hours between inspections. The inspections shall be made at the beginning of primary shift, at approximate time of high temperature, at approximate time of low temperature, and at the end of primary shift. Prepare a daily inspection report which includes date and time of inspection, weather conditions, locations of bridge deck where curing was checked (at least 3 representative locations), moisture condition of deck and burlap, surface temperature of deck concrete, and condition of curing equipment. Include the daily cure inspection reports in the weekly report and provide them within 24 hours, if requested.

The CQCP shall include performance of informational quality control testing by contractor personnel. Furnish personnel, laboratory, equipment, and materials needed to perform the required tests. Personnel, including the Quality Control Supervisor, shall require qualification in the Nevada Alliance for Quality Transportation Construction (NAQTC) Sampling and Density Module and Aggregate Module, or the Western Alliance for Quality Transportation Construction (WAQTC) Aggregate Module, as well as ACI Field Testing Certification, Grade I. Include test results in the weekly report and provide them within 24 hours of completion of each concrete pour, if requested. Material that does not meet contract requirements shall not be incorporated into the work. The quality control testing and required frequencies are as follows:

CONCRETE AGGREGATES		
Test	**Test Method**	**Minimum Sample Frequency**
Moisture Content	Nev. T112	One per 100 yd^3 or fraction thereof
Sieve Analysis	Nev. T206	One per 300 yd^3 or fraction thereof
Sand Equivalent	Nev. T227	One per 300 yd^3 or fraction thereof
Cleanness Value	Nev. T228	One per 300 yd^3 or fraction thereof
Specific Gravity and Absorption (Coarse)	Nev. T492	One per 500 yd^3 or fraction thereof
Specific Gravity and Absorption (Fine)	Nev. T493	One per 500 yd^3 or fraction thereof

PORTLAND CEMENT CONCRETE (Except Class S, SA, and PCCP)		
Test	**Test Method**	**Minimum Sample Frequency**
Air Content	Nev. T431	One per 50 yd^3 or fraction thereof
Unit Weight	Nev. T435	One per 50 yd^3 or fraction thereof
Slump	Nev. T438	One per 50 yd^3 or fraction thereof

CLASS S AND SA CONCRETE		
Test	**Test Method**	**Minimum Sample Frequency**
Slump Flow	Nev. T417	One per Truck Load or fraction thereof
Visual Stability Index	Nev. T417	One per Truck Load or fraction thereof
J-Ring	Nev. T418	One per 50 yd^3 or fraction thereof
Unit Weight	Nev. T416	One per 50 yd^3 or fraction thereof
Air Content	Nev. T416	One per 50 yd^3 or fraction thereof

PCCP		
Test	**Test Method**	**Minimum Sample Frequency**
Air Content	Nev. T431	One per 100 yd^3 or fraction thereof
Unit Weight	Nev. T435	One per 100 yd^3 or fraction thereof
Slump	Nev. T438	One per 100 yd^3 or fraction thereof

Sample concrete aggregates from each stockpile to be used in pour in accordance with Test Method No. Nev. T200.

Sample Portland cement concrete in accordance with Test Method No. Nev. T425.

Sample and perform all tests for Class S and SA concrete within the first two trucks for the first sample frequency.

501.02.03 Cement. The second sentence of the first paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

In lieu of this requirement, Type II cement with a minimum of 20% pozzolan by mass or Type IL cement with a minimum of 20% pozzolan by mass or Type IP cement may be substituted therefore.

The second paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

For Class S and SA concrete, the maximum shrinkage requirement of 0.06% in 28 days air dry after 28 day wet cure (ASTM C157) shall apply, excluding drilled shaft applications.

501.02.04 Admixtures. The last sentence of the last paragraph on page 208 of the Standard Specifications is hereby deleted.

Class S and SA concrete admixture systems shall conform to AASHTO M194 (ASTM C494) Type F or Type G, or ASTM C1017 requirements.

For Class S and SA concrete include viscosity modifying admixtures (VMA) in the mix design. The mix design shall outline the dosage rate in oz/cwt. VMA's shall conform to ASTM C494, Type S. Adjust the dosage rate within the manufacturer's recommended range to obtain the desired flow and segregation characteristics while maintaining the required VSI.

Class EA concrete used on the bridge deck, and approach slabs shall include a shrinkage reducing admixture and polymer fiber. Class EA concrete used in barrier rail do not require polymer fiber. Use a shrinkage reducing admixture, in accordance with the specific manufacturer's recommendations, to reduce shrinkage in Class EA concrete used on the bridge deck. During the mix design process, test the concrete in accordance with ASTM C157. Use a prism of 4" square cross section according to Section 7.2 of ASTM C157. Remove specimens from the molds 23 ± 1 hours after mixing the concrete and place in lime water at 73 ± 3 °F for 7 days. Take a comparator reading at 7 days age and record as the initial reading. Then store specimens in a humidity controlled room maintained at 73 ± 3 °F and 50 ± 4 percent relative humidity for the remainder of the test. Subsequent readings shall be taken at 7, 14, 21, and 28 days drying. Do not include fibers when performing ASTM C157. Provide concrete that has a length of change no greater than 0.030% after 28 days in the humidity controlled room.

Submit a mix design with a maximum paste content of 30%. Paste content is calculated by adding the volumes of cement, other cementitious materials, water and liquid admixtures, in cubic feet, and dividing by 27.

Include at least 1 pound of microfibers and 3 pounds of macrofibers in each cubic yard of concrete. Fibers shall conform to ASTM D7508. Microfibers shall be 0.5 to 2 inches in length. Macrofibers shall be 1 to 2.5 inches in length. Submit a certificate of compliance for each shipment and type of fibers. Submit fiber manufacturer's product data and instructions for use.

Remove fibers from the shipping bag prior to placing in mixer. Mix concrete as necessary to evenly distribute the macrofibers in the concrete. Concrete will be rejected if clumps of fibers or any non-uniformly mixed concrete is observed.

Concrete used in bridge soffits, girders, pier caps, and decks shall have a maximum 28-day shrinkage of 0.030%. See Subsection 501.02.04 for modifications to ASTM C157.

501.02.05 Concrete Making Properties. In the first paragraph of this Subsection of the Standard Specifications, the Test for Aggregate Correction Factor is hereby deleted.

In the first paragraph of this Subsection of the Standard Specifications, the requirement of Test Method for Test Specific Gravity and Absorption of Coarse Aggregate of "Nev. T492" is hereby deleted and "Nev. T111" substituted therefore.

Add the following to the table on the top of page 209 of the Standard Specifications:

Static Modulus of Elasticity and Poisson's Ratio of Concrete in Compression ..... ASTM C469
Permeability ..... ASTM C1202

In Table I on the middle of page 209 of the Standard Specifications, the Cement Range for Class S and SA Concrete of "380-545 (639-925)" is hereby deleted and "475-545 (799-925)" is substituted therefore.

The second paragraph from the bottom of page 209 of the Standard Specifications is hereby deleted and the following substituted therefore:

Furnish a concrete mix design for extruding barrier or bridge rail. The slump range is 12.5 mm to 50 mm (0.5 in. to 2 in.).

For Class S and SA concrete, the unit weight, air content, and compressive strength will be tested according to Test Method No. Nev. T416.

Concrete used in bridge decks, approach slabs, and bridge deck rail shall have a maximum permeability of 2000 Coulombs at 56 days.

The requirement for Static Modulus of Elasticity and Poisson's Ratio of Concrete in Compression will be specified on the plans.

In addition to meeting the requirements of this Subsection, Class S and SA concrete shall meet the additional following requirements:

TEST	TEST DESIGNATION	REQUIREMENTS
Slump Flow	Nev. T417	(a)
J-Ring	Nev. T418	(b)

Column Static Segregation	Nev. T420	Segregation Index 10% Max.

(a) The slump flow shall be a single value between 18 and 28 inches and shall be shown on the mix design. The slump flow of the tested concrete shall be within ± 2 inches of the value specified on the mix design. The maximum Visual Stability Index shall not exceed 1.
(b) The difference in slump flow values between Test Method No. Nev. T417 and Test Method No. Nev. T418 shall not exceed 2 inches.

Add the following to item “9.” in the first paragraph on page 210 of the Standard Specifications:

Not applicable for Class S and SA concrete, except for extended time slump requirements for concrete used in drilled shafts as specified in Subsection 509.02.01.

Add the following to the first paragraph on page 210 of the Standard Specifications:

22. The permeability of concrete (if required).
23. The modulus of elasticity of concrete (if required).

For Class S and SA concrete, add the following to the first paragraph on page 210 of the Standard Specifications:

24. The slump flow, visual stability index, j-ring measurement, and column static segregation index.

501.03.01 Equipment. Provide a concrete curing box that is equipped with heating/cooling capabilities, automatic temperature control, and a maximum/minimum (high/low) temperature readout in order to maintain the concrete test cylinders within the temperature range and duration required by Test Method Nev. T428. The lid of the concrete curing box shall have a lock mechanism or a loop to accommodate a padlock for the purpose of locking the concrete curing box. Supply 110 V of electrical power to the concrete curing box and provide a secure location where the test cylinders are not subject to vibration. The concrete curing box shall be of sufficient size or number to store, without crowding or wedging, the required number of test cylinders based upon the Contractor’s plan of operations. The concrete curing box and location shall be as approved.

501.03.03 Storage of Aggregates. In the third sentence of the third paragraph on page 212 of the Standard Specifications, the words “according to Test Method No. Nev. T112” are hereby added after the word “aggregates.”

501.03.04 Proportions. When mixing batches of 4 cubic yards or less, the tolerance for Mineral Admixture shall be - 0% to + 4%.

501.03.06 Mixing. In the twelfth paragraph on page 214 of the Standard Specifications, the words “or additional water” are hereby deleted.

Prevent cement balling (intermittent clumping) and mix foaming by controlling the batch sequence, mixing speed, and mixing time.

Segregated concrete, as determined by Test Method No. Nev. T417 or Test Method No. Nev. T418, shall not be incorporated into any component of the concrete work.

For Class S and SA concrete, when delivering the concrete to the work site, completely discharge each delivery truck within 60 minutes. The discharge time can be extended to 90 minutes for drilled shafts. In hot weather, or under conditions contributing to quick stiffening of the concrete, a delivery time of less than 60 minutes may be required. The Contractor may propose delivery time exceeding 60 minutes if they can demonstrate during a trial pour that all required fresh concrete properties are maintained for the maximum proposed delivery time. The trial pour shall be completed in similar weather conditions to the anticipated placement conditions.

For Class S and SA concrete, completely discharge each delivery truck within 20 minutes. Place the concrete in continuous layers. When it is necessary by reason of emergency or other delay to place less than a complete horizontal layer in one operation, terminate the layer by using a vertical bulkhead. Do not rod or vibrate the concrete to attempt to restore the fluidity to the mix.

501.03.08 Curing. The second paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Cure all bridge decks and approach slabs according to (d) Bridge Deck Curing, with a product conforming to Subsection 702.03.04.

501.03.10 Trial Slab and Process Control Testing. Construct a trial slab at least 30 days prior to placement of concrete on a bridge deck. Submit a written plan for the casting of the trial slab. The written plan shall include, but is not limited to, the location of the slab, the equipment and personnel used for construction, and disposal of the slab. Prior to placement of the trial slab, conduct a pre-construction conference.

Use approved mix designs. Place concrete at a location other than the bridge deck, but under conditions similar to those that exist during bridge deck concrete placement. The trial slab shall have a minimum length and width of 50 feet and have a depth of 8 inches. Reinforce slab with a top and bottom mat of # 5 bars spaced 6 inches longitudinally and transversely. Place top mat at a depth 2.5 inches from the top of the slab. Place bottom mat at a depth 1.5 inches from the bottom of the slab. The trial slab shall be wet-cured as specified for bridge decks according to Subsection 501.03.08. Use personnel such as the superintendent, key operators, and finishers that are the same personnel who will be involved in the construction of the bridge deck. Demonstrate the use of equipment, proficiency of personnel, and techniques for mixing, transporting, placing, and curing of the concrete during the trial. Fifteen days after placement of the trial slab, conduct a post construction critique of the trial slab placement.

Do not commence placement of the bridge deck concrete until after issues from the post construction critique of trial slab construction have been resolved to the satisfaction of the Engineer.

Upon notification, remove and dispose of trial slabs according to Subsection 107.14.

501.05.01 Payment. Full compensation for construction and removal of trial slabs and trial pours shall be considered as included in the contract unit price paid for other appropriate items and no separate payment will be made therefore.

SECTION 502 - CONCRETE STRUCTURES

502.01.01 General. This work consists of single slope concrete barrier rail, concrete superstructure repair, profile grind concrete deck slab, seismic retrofit of columns, and special concrete barrier rail.

502.02.02 Integral Color. Provide integral color for all special barrier rails, bridge rail, single slope barrier rails, median barrier rail and all rails matching color Dunn Edwards Wooden Peg DE6215. Apply clear matte sealer. See aesthetic pattering Subsection 212.02.10, 212.03.10, and plans for form liner requirements.

Colors throughout the project shall be consistent, regardless of type, without perceivable difference in appearance or color at the discretion of the Engineer.

The color pigment shall consist of synthetic mineral oxide specifically manufactured for coloring concrete. Obtain integral concrete by mixing the pigment material with the Portland cement and aggregates. Water in sequence and by methods that will result in a uniform mixture.

Any patching material must have integral color matching specified color of barrier rail. Provide mock up of patching material for approval prior to patching.

A minimum of 30 days prior to pouring, construct test panels, 10 feet in length at an approved location for each item and concrete mix to receive integral color. Use those materials planned for use in actual form liners, release agent and integral color pigment that utilizes a flat finish. Do not begin construction of the barrier rail or barrier rail without approval of each the test panel by NDOT Landscape Architecture Section and the Engineer.

502.03.16 Finish of Horizontal Surfaces. The sixth, seventh, and eighth full paragraphs on page 237 of the Standard Specifications are hereby deleted and the following substituted therefore:

Test the finished concrete surfaces as well as pavement within 50 feet of the leading edge and within 50 feet of the trailing edge of the bridge deck (including approach slabs) by means of an inertial profiler or multipurpose surface profiler according to Test Method No. Nev. T448 Section II. The maximum allowable International Roughness Index (IRI) for localized roughness is 175.000 inches/mile. Locate and correct areas exceeding profile requirements by grinding.

Obtain a minimum of two profiles per traffic lane and one profile for each shoulder. Obtain the profile runs parallel to and in the direction of traffic. Measure the profiles within each traffic lane 3 feet from the respective left or right traffic lane lines. Measure the profiles within each shoulder approximately 3 feet from the curb or rail face. Where the combined width of the bridge deck and/or approach slab shoulder and adjacent traffic lane is 16 feet or less, the profile measurement for that shoulder is not required.

When a straightedge 12 feet long is laid on the finished surface both perpendicular and parallel with the centerline of the bridge deck and approach slabs, the surface shall not vary by more than 0.25 inch from the lower edge of the straightedge.

When the bridge deck and approach slab concrete are indicated to be covered by plantmix bituminous surfacing, measure and correct the pavement surface according to Subsections 402.03.05 and 403.03.04.

The first sentence of the ninth full paragraph on page 237 of the Standard Specifications is hereby deleted and the following substituted therefore:

Perform grinding in accordance with Subsection 402.03.05.

502.03.23 Portable Precast Concrete Barrier Rail. Paint portable precast concrete barrier rail white with paint conforming to Subsection 714.03.03.

502.03.25 Seismic Retrofit of Columns. The Contractor performing the seismic retrofit shall have a minimum experience of 10 similar type of projects within the last 5 years. Provide a list of project references including owner contact information as part of the working drawing submittal. Provide written verification that the employees performing the work and the supervisors and foremen overseeing the work have been fully trained and possess past experience in completing similar type construction. Submit supporting documentation for review and approval prior to commencing construction.

Provide a technical representative from the composite casing manufacturer to provide on-site project oversight and training to contractor personnel on materials, equipment and procedures for preparing concrete surfaces and placing and curing the composite casing. The technical representative shall be present during the installation of all composite casing and shall provide written verification that proper surface preparation, placement and curing procedures were followed in accordance with manufacturer's recommendations.

Perform seismic retrofit of columns according to the plans and as specified herein:

(a) Preparation of structural members. The surface to receive composite casing shall be free from fins, sharp edges and protrusions that will cause damage or voids behind the installed casing or that in the opinion of the Engineer, will damage the fibers. Fill existing uneven surfaces to receive composite casing with epoxy or other approved material. Do not use Portland cement based fillers on columns that are to receive composite casing. The contact surfaces shall have no free moisture on them at the time of application of the filler.

Round off sharp and chamfered corners to a radius of 1-3/8 inch by means of grinding or forming with epoxy or grout. Variations in the radius along the edge shall not exceed 1/2 inch for every 12 inches.

Remove and high pressure air blast column surfaces of all foreign materials. Stripping off well-adhered paint or concrete from repair surfaces is not required.

No repair work shall proceed if the temperature of the concrete surface is less than 41 ºF or greater than 98 ºF.

(b) Working Drawings. Design the composite casing, number of layers and thicknesses, based on the design criteria shown in the plans. Submit composite casing system material information, installation procedures, and working drawings, along with the design calculations for review and approval according to Subsection 105.02. Calculations and working drawings shall be prepared and stamped by a Nevada Registered Professional Civil Engineer. The drawings shall contain details of the dry sheet, fabric or winding thickness; the number of wraps or layers to construct the composite thickness; fiber volume; details of joints and ends of fiber construction; details of the transition composite thickness; plan for curing; methods for coring and for fabrication of test samples; name of independent testing facility to be used to test samples and cores; and all information required for the proper construction of the system at each location including any required revisions or additions to drainage systems or other facilities. The drawings shall also include the precautions that are necessary to protect the workmen and the public from hazardous materials that may be present or generated during composite casing construction.

The working drawings for composite casing shall include the material suppliers name, material safety data sheets, and commercial material designation for all the material designation for all the materials to be used in the composite casing. The following properties for the resin shall be included with the working drawings: mix ratio by weight and volume, pot life, shelf life, resin gel time at proposed cure temperatures, mixing and application temperature ranges.

(c) Composite Casing. Construct composite casing by wrapping the structural member with layers of continuous fiber embedded in resin.

Per manufacturer recommendations, application process method shall be based on either System 1 or System 2 as described below. System 1 shall be continuous filament woven fabric, and the primary fibers shall be E-glass or carbon. System 1 resin shall be field impregnated. System 2 shall consist of polyacrylonitrile (PAN) based continuous carbon fibers, bundled into tows and resin shall be pre-impregnated (towpreg).

Provide epoxy resin for composites that are recommended by the manufacturer of the composite wrap. Submit manufacturer's MSDS sheets, material information, test data, and prior history of use on similar installations for approval.

The composite casing shall also be selected from the following list of pre-qualified composite casing systems:

Composition	System Identification	Manufacturer
E-Glass	SEH 51/TYFO S	Fyfe Co. LLC 8380 Miralani Drive San Diego, CA 92126 (858) 642-0694 (858) 444-2982 fax
E-Glass	HEX 3R Wrap 107/HEX 3R Epoxy 300	JPS Composite Materials Eric Smith 2200 South Murray Ave. Anderson, SC 29624 (864) 260-6593
Carbon	SCH-41/TYFO S	Fyfe Co. LLC Mike McCullagh 8380 Miralani Drive San Diego, CA 92126 (858) 642-0694 ext. 26 (858) 444-2982 fax
Carbon	REPLARK 30/L700S-LS	Mitsubishi Chemical, USA One Lexington Ave. Lexington Ave. White Plains, New York 10601 (914) 286-3600
Carbon	MBrace CF130	ACME/(BASF) Debbie Steiger 95 Pineview Dr. Amherst, NY 14228 (716) 691-7566 ext. 5410
Carbon	UT70-30/L700S-LS	Toray 700 Park Square, Suite 275 Flower Mound, TX 75028 (972) 899-2930
Carbon	CFU10T/CFU20T	CarbonWrap Solutions Faro Mehr 2820 E. Fort Lowell Road Tucson, AZ 85716 faro@carbonwrapsolutions.com
Carbon	VELACARB 335u/VELLOXX LR VELACARB 600u	Edge Structural Composites 21881 Eight Street East Sonoma, CA 95476 (707) 343-1560

System 1: Application. The contact surfaces of the structural member shall be completely dry at time of application of the composite. The ambient temperature and temperature of epoxy resin components shall be between 50 ºF to 95 ºF at time of mixing and application. Apply the composite when the relative humidity is less than 90% at the site and the surface temperature is more than 5 ºF above the dew point. Begin application within 1 hour after a batch has been mixed.

Replace or repair composite damaged by the elements.

Prior to application of the composite, completely coat the area of the structural member to be encased with a compatible resin. The components of epoxy resin may be proportioned and mixed by automatic equipment. Make provision for checking the accuracy of proportions and mixing. Do not use components that have exceeded their shelf life. Accurately measure, combine, and uniformly apply both epoxy resin and fabric at the rates shown on the approved working drawings.

Apply fabric, which is comprised of the woven fibers, to the surface of the structural member by wrapping using methods that produce a uniform constant tensile force that is distributed across the entire width of the fabric. Place successive layers of composite materials before the onset of gelation of the previous layer of epoxy is too complete to achieve complete bond between layers. The primary fibers of the fabric shall not deviate from a horizontal line more then 1/2 inch per foot, and the transverse fibers shall be approximately perpendicular to the primary fibers.

The epoxy application rate for each layer of composite shall be such as to ensure complete saturation of the fabric. Fill gaps between adjoining fabric layers with epoxy. Cover the final layer of fabric, including exposed edges, with a 15 mil, minimum, thick coat of resin that produces a uniform finished surface. The resin used in the final layer cover shall be a system-compatible resin formulated to resist crazing and chipping. Seal all cut edges of the composite casing with epoxy prior to applying the final 15 mil resin coat. Undulations in the surfaces of composite casings shall not exceed 1/4 inch per foot in any direction.

Release or roll out entrapped air beneath each layer before the epoxy sets, and firmly bed and adhere each individual layer and ending of composite to the preceding layer or substrate. The cured composite shall have uniform thickness and density, bond between layers and lack of porosity.

System 2: Application. The contact surfaces of the structural member shall be completely dry at time of application of the composite. The ambient temperature shall be at least 40 ºF at time of applying the towpreg to the structural member. Apply the composite when the relative humidity is less than 90% at the site and the surface temperature is more than 5 ºF above the dew point.

Replace or repair composite damaged by the elements.

Prior to application of the composite, completely coat the area of the structural member to be encased with a system-compatible resin.

Apply bands of towpreg to the surface of the structural member by wrapping, using methods that produce a uniform constant tensile force that is distributed across each towpreg of the band.

The primary fibers of the fabric shall not deviate from a horizontal line more than 1/2 inch per foot.

Towpreg shall be continuous throughout the wrap, except as required for splicing. Towpreg splice ends shall overlap by at least 15 inches. Stagger splices so that the minimum distance between towpreg splices is 6 inches.

Undulations in the surfaces of composite casings shall not exceed 1/4 inch per foot in any direction.

Completely cure casing in accordance with manufacturer’s recommendations. For composite casings 0.15 inches or less in thickness, the temperature shall be monitored and controlled by devices installed at or near the surface of the casing. For composite casings greater than 0.15 inches in thickness, the temperature shall be monitored at both the surface and at the structural member to casing interface and controlled by devices installed on the surface of the composite casing.

After cure of the final layer of towpreg, cover the towpreg, including exposed edges, with a 15 mil, minimum, thick coat of resin that produces a uniform finished surface. The resin used in the final layer cover shall be a system-compatible resin formulated to resist crazing and chipping.

(d) Job Control Tests, Inspection, and Repair. During progress of the work, perform job control tests on samples and cores of composite casing. If requested, also furnish check test cores. Samples and cores for job control tests of composite casing shall be taken by the Contractor and tested at the Contractor's expense in the presence of the Engineer, unless otherwise directed. The job control testing shall be done at an approved independent testing facility. Furnish a copy of the job control test results within two weeks following sample fabrication and within sufficient time to allow for review and correction of any deficiencies without delaying completion of work.

The composite samples for job control tests shall be used to verify compliance with the requirements for ultimate tensile strength, ultimate elongation, tensile modulus, and flammability of the composite casings. The composite samples shall consist of 2-ply laminates for System 1 or 3-ply laminates at 12 tows per inch of width per lamination for System 2. Each sample of composite shall be at least 4 square feet in total area for each type of composite to be used, and may consist of one piece or individual pieces not less than 12 inches by 12 inches in area. One sample of each day's production of composite casing shall be tested. Each composite sample shall be manufactured and cured in the same manner as composite used in the field installation.

The composite casings shall have at least the number of wraps and thickness as shown on the approved working drawings, and shall conform to the requirements for fiber volume and glass transition temperature for composite casings. These dimensions and properties shall be verified, after wrapping and cure, by taking 1/2 inch diameter cores from the composite for job control testing. One job control core shall be taken by the Contractor on each thickness, as shown on the plans, of composite casing on each structural member at locations determined by the Engineer. If requested, one check test core shall be taken by the Contractor and furnished to the Engineer for testing for each structural member at a location determined. Take care during coring operations to ensure that undamaged cores are obtained, and that minimal damage occurs to the adjacent composite and structural member. Place all cores in labeled and sealed polyethylene bags prior to shipment to the testing facility or furnishing to the Engineer. Fill core holes with a system-compatible resin and smoothed flush prior to painting the composite casing.

Should the test results on the samples or cores in any job control test fail to comply with these specifications; the composite casing represented by that test will be rejected.

Construct composite casings in a manner consistent with the best commercial practices and in accordance with manufacturer's recommendations. The cured composite material encasing structural members will be inspected for defects consisting of external abrasions or blemishes, delaminations, voids, external cracks, chips, cuts, loose fibers, foreign inclusions, depressible raised areas, or fabric wrinkles. The following criteria shall apply:

All defects with a dimension greater than 1-1/2 inch, defect areas greater than one square inch, or defect areas with any dimension greater than 1 inch within one foot from another defect area of similar size shall be repaired or replaced as determined by the Engineer.

Within either the full casing height or any 10 feet of casing height, whichever is smaller, composite casings with a total number of 10 or more defects of any size shall be repaired or replaced as determined by the Engineer.

(e) Preparing Surfaces and Painting Composite Casing. Clean and paint exposed surfaces of composite casing, including surfaces to 12 inch below ground. Lightly roughen the surfaces to be cleaned and painted by uniform abrasive blasting using an abrasive no larger than 80 mesh. The air pressure at the nozzle used for abrasive blasting shall not exceed 80 psi. The abrasive shall be of appropriate hardness to roughen the surface without damage to the fiber portion of the composite. Do not expose the fiber portion of the composite by the abrasive blasting operation. Abrasive blasting will not be required for System 1 if the first coat of paint is applied within 72 hours after mixing the components for the final 15 mil resin coating.

Remove dust and residue from all surfaces by flushing with clean water before painting. All cleaned and roughened surfaces of the composite casing shall be completely dry before receiving 2 coats of paint. Paint shall be the Top Coat of one of the Approved Coating Systems found in Subsection 714.03.01 in the QPL. Provide written verification of compatibility between the selected composite casing system and paint product. The first coat of paint may be applied in 2 applications, provided the total dry film thickness is at least 2 mil. Provide a total dry film thickness of at least 2 mil for the second coat of paint. Allow a minimum drying time of 12 hours between applications of paint or as recommended by the paint manufacturer. Successive applications of paint shall be of such a shade as to contrast with the paint being covered.

For finish color, see Landscape & Aesthetic plans.

502.04.01 Measurement. There shall be no additional compensation for traffic control associated with Concrete Bridge Deck Repairs as shown or directed in the plans which are measured and paid for by force account. Rent traffic control devices as shown in the proposal shall be inclusive of all traffic control associated with Concrete Bridge Deck Repairs.

Single slope concrete barrier rail and special concrete barrier rail will be measured by the linear foot.

Concrete superstructure repair, and profile grind concrete deck slab will be measured by force account.

Seismic retrofit of columns will be measured by the lump sum.

502.05.01 Payment. Payment will be made under:

Pay Item	Pay Unit
Single Slope Concrete Barrier Rail (type)	Linear Foot
Special Concrete Barrier Rail	Linear Foot
Concrete Superstructure Repair	Force Account

Profile Grind Concrete Deck Slab ..... Force Account
Seismic Retrofit of Columns ..... Lump Sum

SECTION 503 – PRESTRESSED CONCRETE AND PRECAST MEMBERS

503.03.06 Prestressing. The last sentence of the last paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Preliminary release of prestressing strands in precast pretensioned members may be performed using acetylene torches by heating each strand, as indicated in the approved shop drawings, equally on either side of the member until the strand breaks. When torches are used to release strand, cutting shall be done away from concrete surface and extended strand ends. Dimensions to cutting plane(s) shall be shown in the shop drawings. Final cutting of prestressing steel shall be performed using an abrasive saw, or equal, and cut flush with the end of the member, unless otherwise shown in the plans. Coat exposed ends of the prestressing steel with an approved zinc-rich paint.

SECTION 506 – STEEL STRUCTURES

506.01.01 General. This work consists of approach slab restrainer units.

506.02.02 Railing. Paragraphs one and two of this Subsection of the Standard Specifications are hereby deleted and the following substituted therefore:

Galvanize all components of Pedestrian Rail, Type V, Type V (Modified) and Type X. Apply paint in accordance with 212.03.12 painting galvanized surfaces, to all components. Paint is inclusive of pedestrian rail (type).

506.04.01 Measurement. Approach slab restrainer units will be measured by the each.

506.05.01 Payment. Payment will be made under:

Pay Item	Pay Unit
Approach Slab Restrainer Unit	Each

SECTION 509 – DRILLED SHAFT FOUNDATIONS

509.03.01 Construction Sequence. The first sentence of the first paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Complete excavation to the bottom of the shaft without pauses or stops, except for casing splicing or removal of obstructions, before shaft construction begins, unless noted or approved.

The second sentence of the second paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Do not leave shaft excavations unprotected for more than 12 hours.

509.03.02 Construction Methods. The second sentence of Paragraph (a) of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

The dry construction method consists of drilling the shaft excavation, removing any loose material from the excavation, placement of the reinforcing cage, and placement of concrete in a dry excavation.

Subparagraph 1 of Paragraph (a) of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

1. The excavation is above the groundwater table.

Add the following to the end of Paragraph (c) of this Subsection of the Standard Specification:

Where the casing construction method is used for shaft excavations below groundwater, the wet construction method should be used in conjunction with the casing construction method.

509.03.04 Excavations. Add the following to the beginning of the second paragraph of this Subsection of the Standard Specifications:

Overream sidewalls of shafts left open for more than 24 hours from the start of shaft excavation, unless casing construction method is used.

509.03.05 Excavation Inspection. The fourth sentence of the second paragraph of this Subsection of the Standard Specifications is hereby deleted.

509.03.08 Casings. Add the following after the second sentence of the first paragraph of this Subsection of the Standard Specifications:

Temporary shoring consisting of corrugated metal pipe used as worker protection above the construction joint of the drilled shaft shall not be considered temporary casing, and shall be removed prior to concrete placement.

The seventh paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

(b) Permanent Casing. Use permanent casing when shown in the contract documents. The permanent casing shall be installed in advance of the excavation by driving, oscillating, or rotating, and the soil or rock excavated from within the protection of the casing. If the annular space between soil and casing due to the cutting shoe is greater than ½ inch, the annular space shall be tremie grouted. Provide continuous full-length casing between the top and bottom elevations of cased shaft section per the plans. Splice permanent casing according to Article 6.13.3. of the AASHTO LRFD Bridge Design Specifications. Cut off permanent casing, after installation is complete, at the prescribed elevation, and complete the shaft construction by installing necessary reinforcing steel and concrete in the casing.

509.03.09 Slurry. Add the following to the beginning of the first paragraph of this Subsection of the Standard Specifications:

Introduce slurry into the excavation during drilling prior to encountering groundwater and maintain the slurry level a minimum of 5 feet above the groundwater table at all times, until concrete is placed to that level.

Subparagraph (c) of this Subsection of the Standard Specifications is hereby deleted.

SECTION 608 – DOWNDRAINS

608.02.01 General. The third paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Metal pipe plate thickness shall be 12 gage for pipe sizes 15-inch to 24-inch and 10 gage for pipe sizes 30-inch and 36-inch for steel and 1.5 mm (16 gage) for aluminum unless otherwise noted on the plans.

SECTION 609 – INLETS AND MANHOLES

609.01.01 General. This work consists of adjust manhole, adjust covers (special), connect to existing manhole, and stormwater treatment vault.

609.02.01 General. The stormwater treatment vault selected by the design engineer was based on the required removal criteria, maintenance considerations, constructability, and flow rates.

The stormwater treatment vault to be installed will be shown on the plans.

If requesting to install a unit other than the unit specified, demonstrate that the substitute unit has the same or higher removal capability than the unit shown on the plans, provide an operational cost analysis between the desired substitution and the unit specified (analysis shall include initial installation costs and average yearly maintenance costs for a period of 20 years), demonstrate that the unit can be maintained by equipment readily available to the Department, identify construction difficulties, provide a complete analysis of the storm drain system that ties to the unit using Department design standards, and identify all the necessary design and construction modifications. Compile this information in a report and have such report signed and stamped by an engineer who is registered as a Civil Engineer in the State of Nevada. If the report is approved, provide final shop drawings and a hydraulic design report according to Department standards. Have the shop drawings and hydraulic design report signed and stamped

by an engineer who is registered as a Civil Engineer in the State of Nevada. The Department will determine if the substitution will be allowed.

609.03.01 General. Install the stormwater treatment vaults as shown on the plans and according to the manufacturer's recommendations.

609.03.02 Adjusting Manhole and Valve Covers. In the first sentence of the fifth paragraph of this Subsection of the Standard Specifications, the "90%" is hereby deleted and "95%" substituted therefore.

609.03.05 Adjust Manhole. Remove existing concrete collar and dispose of according to Subsection 107.14. Perform removal of the collar without damaging the frame or cover. Remove the cover, frame, risers, and tapered manhole section and stockpile. Remove or add precast manhole sections to accommodate the change in profile grade at the manhole location. Reinstall the tapered section, grade rings, frame, and cover to finish grade. Place a concrete collar as shown in the Standard Plans. Perform excavation and backfill as necessary to accommodate the work.

Repair or replace damaged or missing components and provide new materials as necessary to complete the adjustment.

609.03.06 Connect to Existing Manhole. Excavate existing manhole according to Section 206 for access to new connection point. Saw cut opening into manhole large enough to accommodate new pipe. Remove concrete debris and dispose of according to Subsection 107.14. Place pipe at correct elevation shown on the plans. Backfill excavated area and re-compact according Section 207.

609.03.07 Adjusting Covers Special. This work consist of lowering survey monument wells.

609.04.01 Measurement. Adjust manhole, adjust covers (special), connect to existing manhole, and stormwater treatment vault will be measured by the each.

609.05.01 Payment. Payment will be made under:

Pay Item	Pay Unit
Adjust Manhole	Each
Connect to Existing Manhole	Each
Adjusting Covers (special)	Each
Stormwater Treatment Vault (type)	Each

SECTION 610 - RIPRAP

610.01.01 General. This work consists of furnishing and installing erosion control mats.

610.03.02 Riprap. Class 300 riprap to be used in seeding areas shall be medium to dark gray with tan and brown tones. Provide sample mockup of Class 300 riprap with decorative rock for review and approval.

610.03.06 Articulated Concrete Blocks. Articulated concrete blocks shall be pre manufactured as an assembly of articulated concrete blocks, with specific hydraulic capacities, and shall be staggered and interlocked for enhanced stability. Construct mats of open cell blocks. The open cell blocks shall have openings with sufficient wall thickness to resist breakage during shipping and installation. Select appropriate articulated concrete block from the approved QPL List.

Place the articulated concrete block on geotextile.

Concrete blocks will only be accepted when accompanied by documented hydraulic performance characteristics, derived from tests under controlled flow conditions.

Design the concrete blocks to a minimum safety factor of 1.5. Perform the analysis based upon the stability of the mat due to gravity forces alone, neglecting forces which may be due to pinning, cabling, mechanical anchorage, contact with adjacent blocks, or other restraint not attributable to gravity based forces. The mat shall have an open area of not more than 20%.

The interlocking surfaces shall not protrude beyond the perimeter of the blocks to such an extent that they reduce the flexibility or become damaged or broken when the mats are lifted during shipment or placement.

Units shall be sound and free of defects that would interfere with the proper placing of the unit or impair the strength or permanence of the construction. Surface cracks incidental to the usual methods of manufacture, or surface chipping resulting from customary methods of handling in shipment and delivery, will not be deemed grounds for rejection.

Mats rejected prior to delivery from the point of manufacture shall be replaced. Mats rejected at the job site with not more than 10% of blocks damaged or as directed shall be repaired with structural grout.

Grade the slope to a smooth plane surface to ensure that intimate contact is achieved between the slope face and the geotextile, and between the geotextile and the entire bottom surface of the articulated concrete blocks. Slope deformities, roots, grade stakes, and stones which project normal to the local slope face shall be regraded or removed. Holes, "pockmarks", slope board teeth marks, footprints, or other voids greater than 1 inch in depth normal to the local slope face will not be permitted. Grooves or depressions greater than 1/2 inch in depth normal to the local slope face with a dimension exceeding 12 inches in any direction will not be permitted. Where such areas are evident, they shall be brought to grade by placing lightly compacted homogeneous material. The slope shall be uniformly compacted, and the depth of layers, homogeneity of soil, and amount of compaction shall be as required. Backfill the openings in the mat and lightly compacted with suitable material as provided for in Section 211, to assure that there are no voids. The depth of the fill over the mats shall be up to the top of the surface of the blocks.

Immediately prior to placing the geotextile and articulated concrete blocks, the prepared area will be inspected. Do not place fabric or blocks until that area has been approved.

Seed or plant articulated concrete block as provided for in Section 211.

610.04.01 Measurement. Articulated concrete block will be measured by the square yard.

610.05.01 Payment. Payment will be made under:

Pay Item	**Pay Unit**
Articulated Concrete Block	Square Yard

SECTION 613 – CONCRETE CURBS, GUTTERS, AND SIDEWALKS

613.02.01 General. The fourth paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Use detectable warnings listed in the QPL. Detectable warnings shall have a natural patina color.

SECTION 614 – PAINTING

614.02.02 Paint for Metal Work. Paint type for use on aesthetic metal work support systems, bolt connections and support hardware that is visible to the public and not powder coated shall be a high UV resistant acrylic polyurethane with a gloss factor matching the powder coat finish. Contractor may elect to paint all metal work using acrylic polyurethane (automotive grade) instead of power coating. Film thickness minimum shall be 5.0 mils. Prepare and prime surfaces in accordance with paint manufacturer’s recommendations.

Submit color samples of each color and paint manufacturer technical data for review and approval.

614.03.06 General. Use or match paint colors as shown on the plans.

Deliver materials in the original sealed containers, clearly marked with the manufacturer’s name, brand, and type of material, batch number and date of manufacture. Store materials in accordance with manufacturer’s recommendation.

Apply a test section of each color of proposed paint to surface for approval. It may be required to have different shades of the colors or variance of shades on the same test panel to make a selection. Prior to test paint application, blast and pressure wash the test panels as specified below. Perform additional surface preparation as recommended by the paint manufacturer. Allow the test panel to fully dry. Apply test paint in accordance with the manufacturer’s recommendations using a manufacturer certified applicator. Demonstrate that the paint adheres to the surface. Do not begin application of the paints on this project until the paint colors have been approved and application methods demonstrate successful results.

Dispose of test panels after completion of project or as directed.

Coating for color finishing shall be formulated for exterior application with resistance to freeze/thaw, moisture, alkali, acid and mildew, mold or fungus, discoloration, peeling or degradation. Apply paint in accordance with the manufacturer's recommendations using a manufacturer certified applicator.

Give notification not less than 72 hours prior to the commencement of application of paint.

Finish surfaces to receive paint to a smooth even surface of uniform texture and appearance, free of unsightly bulges, depressions, and other imperfections. Sand areas which do not exhibit the required smooth even surface of uniform texture and appearance with power sanders or other approved abrasive means. The use of power carborundum stones or disks may be required to remove bulges and other imperfections.

Prepare surfaces prior to painting to break the surface film and to remove laitance, curing compounds, and other substances detrimental to the finish coating performance in accordance with manufacturer's recommendations.

Prior to painting, clean surfaces per manufacturer's recommendations. Sandblasting will not be allowed for cleaning surface. Perform additional surface preparation as recommended by the paint manufacturer. Allow surfaces to fully dry prior to application.

Apply paint at the surface temperatures recommended by the manufacturer.

Do not apply paint when winds are 5 mph or greater or when there are dusty conditions. Do not apply paint during fog, mist, or when the relative humidity exceeds 85%, at temperatures less than 5 °F above the dew point, or when precipitation is imminent.

Provide drop clothes or other forms of protection for surrounding surfaces of overspray and splashing. Protect traffic and pedestrians from overspray.

614.03.07 Powder Coat Painting Aluminum Aesthetics. Powder coating shall be performed in approved controlled shop facilities. Finish shall be applied to sides and surfaces visible to public.

Apply powder coat paint at the surface temperatures recommended by the manufacturer. Some metalwork graphics will require multiple colors on the same aluminum panel. Paint shop shall provide a 12 inch by 12 inch aluminum test panel showing three separate colors applied for review and approval.

Use a powder coating material that is thermosetting, durable and a polyurethane as recommended by powder coat manufacturer for use on aluminum to create a high UV resistant "low gloss" finish. Use manufacturers' recommendations for coating powder's particle size distribution.

Prior to painting aluminum surfaces, prepare the surface using a multistage system employing appropriate cleaners and imparting a phosphate conversion coat approved by the powder coat manufacturer to provide a suitable substrate for the powder coat material. Use water rinses during the cleaning process. Water rinse between stages to clean the items and prepare them for the subsequent stages. Water shall be potable with a hardness of not more than 250 ppm as CaCO3 and a combined chloride and sulfate level less than 100 ppm, unless otherwise specified. The final cleaning stage is the seal rinsing.

Remove all surface defects using hand or power tools.

The aluminum surface shall be clean and free of oils and grease prior to applying powder coating. This can be accomplished by power washing the article to remove surface contaminants or one of the following.

(a) Aqueous Alkaline cleaning; the alkaline solution nominally is 2 to 5 % sodium compounds, with small additions of emulsifying, chelating, or sequestering agents, or a combination thereof. This solution can be applied through immersion in a tank filled with the solution, sprayed, or brushed with a soft bristle brush, usually nylon and not steel or copper. When dipping or spraying, the solution works best in the temperature range from 60 to 85°C. After cleaning, rinse thoroughly in hot water or water under pressure. Allow to dry completely before proceeding. Whenever aluminum is rinsed, it is desirable to use heated drying to accelerate the complete removal of water from the surface.

(b) Solvent cleaning; typical cleaning solvents, such as mineral spirits or high-flash naphtha, can be used to remove oil and grease. The procedure to be used is as specified in SSPC Surface Preparation Specification 1. Proper rags or brushes should be used to wipe the parts.

NOTE 1—Caution: These rags or brushes should be cleaned or recycled often since oil can accumulate on their surfaces and be transferred back to the part. Small parts may be dipped or cleaned in ultrasonic baths of solvents. After cleaning, rinse thoroughly in hot water or water under pressure. Allow to dry completely before proceeding.

(c) Hand or Power Tool Cleaning; Hand or power tool cleaning may be used to clean light deposits of aluminum reaction by products as specified in SSPC Surface Preparation Specification 2 or 3.

Other treatments may be considered provided they are approved by the powder coat paint material supplier and does not damage the aluminum surface.

Following phosphating, place all items to be powder coated in an oven capable of maintaining a temperature of 500 °F. Bake at a temperature of 25 °F above the normal cure temperature for the selected powder. Specimens shall remain in the oven for a minimum of 20 minutes after having equalized to the temperature of the oven to remove any residual moisture from the preparation phase and insure expulsion of any entrapped gases or moisture. Specimens are typically pre-baked for one hour. Procedure will vary for multi-color applications to the same metal plate. A meeting shall be held with paint shop to discuss how this process will be performed to achieve the final finish similar to a one-color system process.

The powder coating material manufacturer shall supply a Product Data Sheet specifying application and curing techniques. Materials shall be used that are specified by the product manufacturer to be compatible as an overcoat to an aluminum substrate. A super durable formula shall be used to preserve color integrity. Apply polyester power through electrostatic/tribomatic application guns. Apply powder in multiple coats. The first coat shall have a thickness of 1.5 to 3 mils. Partially cure each intermediate coat at a temperature of 350 °F to insure adhesion. Apply subsequent coats in 1.5 to 3 mil increments to bring the specimen to its final cured thickness as required by the specification. The final cured thickness shall not be less than 7 mils. This process shall vary to apply multiple colors to same plates.

Cure the powder coating by heating the coated specimens to temperature and duration specified by the powder coat material manufacturer. The coating shall be uniform in color and free of pinholes, blisters, and other surface defects. Check for correct cure by a solvent rub test.

Properties of cured coating shall conform to the following:

Minimum film thickness	TGIC7.0	mils
Direct impact	ASTM D 2794	160 in./lb (9.0 m/kg)
Reverse impact	ASTM D 2794	160 in./lb (9.0 m/kg)
Pencil hardness (scratch/gouge)	ASTM D 383	2H
Flexibility (Mandrel test)	ASTM D 522	1/8 in. (3m mm)
Minimum adhesion	ASTM D 3359	5A, 5B (100% crosshatch)
Salt spray	ASTM B 117	+ 1000 hrs < 2mm

Repair powder coated material by the following methods:

a) Damage shall be defined as exposed aluminum surface.
b) Repair damaged coatings that are less than 1/2 of 1% of the surface areas. Recoat damage greater than that amount. Final finish shall be damage free.
c) Touch up the repaired coatings as recommended by the powder coating supplier.

Accomplish touch up and/or field repair by using either powder coating material or paint. Acrylic based paint is recommended by the powder coating material manufacturer and applied either by spray or brushed on liquid is used for touch up and repair of the powder coating.

SECTION 616 –FENCING

616.01.01 General. This work consists of installing metal gate (special) and temporary orange fencing around avoidance areas identified on the Landscape Plans.

Use T-section posts conforming to Subsection 724.03.02. Use plastic fence material 1.2m (4 ft) high, manufactured by one of the companies listed in the QPL.

616.04.01 Measurement. Temporary fence and metal gate (special) will be measured by the linear foot.

618.05.01 Payment. Payment will be made under:

Pay Item	Pay Unit
Temporary Fence	Linear Foot
(size) Metal Gate (Special)	Linear Foot

SECTION 618 - GUARDRAIL

618.01.01 General. This work consists of removing and resetting guardrail.

618.03.03 Remove and Reset Guardrail. Remove the existing guardrail and end treatment panels and blocks, place blocks behind posts, and temporarily re-install panels to accommodate the work. After the required work is completed, reset the guardrail and end treatment to a condition compliant with the Standard Plans.

Remove and reset guardrail shall not start more than 7 days prior to the start of work requiring the removal and resetting of guardrail. Place guardrail in a condition compliant with the Standard Plans prior to shutdown periods greater than 7 days or within 7 days of the completion of work that required the removal and resetting of guardrail.

Guardrail shall be placed in a condition compliant with the Standard Plans prior to winter suspension.

618.04.01 Measurement. Remove and reset guardrail will be measured and paid for once regardless of how many times it needs to be adjusted. Remove and reset guardrail will be measured by the linear foot.

618.05.01 Payment. Payment will be made under:

Pay Item	Pay Unit
Remove and Reset Guardrail	Linear Foot

SECTION 623 – SIGNALS, LIGHTING, AND INTELLIGENT TRAFFIC SYSTEMS

623.01.01 General. This work consists of furnishing, installing, and testing ITS equipment including ITS vault, ITS pole, red light detector, modify detector, special detector surface sensor, radar detector system, traffic actuated controller, communication cabinet, flashing beacon controller, ethernet cable, field hardened ethernet switch, removal of traffic signal controller cabinet, removal of existing electrical system, removal of conduit and conductors, removal of pole, remove pole mounted controller, remove and reset video image detection system, remove and reset steel pole, transformer, metal conduit, multiduct conduit, fiber optic branch cable, removal of existing cable, underground integrated fiber optic splice / termination unit, video optical transceiver (votr) pair, CCTV lowering device, CCTV camera (PTZ), CCTV camera (fixed), CCTV camera (detectable), steel post, rectangular rapid flashing beacon, rectangular rapid flashing beacon controller, landscape lighting, special M-1 cabinet, automated vehicle classification system, and all materials associated with the installation of these devices and ancillary equipment as shown on the plans and as specified.

The location of the AVC, ATR, and speed detector loops shown on the plans are approximate and will be adjusted in the field. Give notification a minimum of 5 working days prior to installing loop detectors. The Engineer will contact Zach Koch at (775) 888-7474 or (775) 720-4067 – Brian Reinert at (702) 730-3355 or (702) 496-7195 to determine the exact location of the speed loops.

623.01.02 Abbreviations and Definitions. Architecture. The manner in which hardware or software is structured. Architecture typically describes how the system or program is constructed, how its components fit together. Network architecture defines the functions and description of data formats and procedures used to communication between communication buildings or workstations.

Communication building. It is the central or field site that functions as a collector point for the many communication links emanating from field device locations. Typically, the equipment located within the communication building is responsible for routing, multiplexing, or de-multiplexing the communication links between the server room located at the TMC/ROC and the field device locations.

Central Equipment. Equipment that receives information from the communication huts, processes the information, and distributes the output to operator workstations, video wall, etc.

Central System Software (CSS). Software that is located within the TMC/ROC that is responsible for most of the data processing that needs to occur between the operator workstation and the field devices.

Communication Edge Equipment. Communication equipment at the extremities of the communication system. Typically, communication edge equipment are the last communication devices within a communication system that interface the field device controllers.

Encoder. Devices located along with the CCTV field equipment that converts an analog video feed to Digital.

Field Devices. Devices located along the roadways such as CCTV, DMS, ramp meters, detection stations, and Road Weather Information System (RWIS).

Fiber Optic Conduit. Conduit designated on the plans to contain fiber optic cables.

Operator Workstation. The computer equipment interface where personnel will operate, observe, and manage the Freeways.

Optical Transceiver. Fiber optic transmitter/receiver located at each field device and communication building to send information between field devices and communication building. Also known as a fiber modem.

Protocol. A specific set of rules, procedures or conventions relating to format and timing of data transmission between two devices. A standard procedure that two data devices must accept and use to be able to understand each other.

Road Operations Center (ROC). Site at which the Department operational staff and equipment capable of controlling and coordinating the arterial, freeway, and other roadways traffic management system is located. The central equipment for District II is located at the District building in Reno.

System Integrator. Contractor responsible for the work embraced herein and as shown on the plans.

The System Integrator shall have the following minimum qualifications:

B.S. or B.A. degree in Electrical Engineering, Electronic Engineering, Computer Science, Mathematics, or related discipline.

Experience implementing intelligent transportation systems involving computer and communications hardware, software, and firmware.

Ability to participate directly in the integration of hardware, software, and communication elements.

Proficiency in software/hardware implementation, configuration, and troubleshooting.

Proficiency in the development of test plans, procedures, and techniques.

Possesses a thorough knowledge of diagnostics techniques specifically relevant to the hardware and software subsystems furnished to this project.

Possesses at least a working knowledge of each of the following: computer operating system principles, LAN/WAN network elements, wire-line and wireless communications equipment, CCTV camera subsystems, Fiber Optic communication equipment, TCP/IP communication protocols, and data communications equipment.

Possesses the ability to provide technical project direction.

Proficiency in the use of project management methodologies and techniques.

Possesses strong organizational, analytical, and problem-solving skills.

The System Integrator shall be available to be contacted by the Engineer 24 hours a day for the life of this contract and shall be capable of being on-site within 45 minutes of notification.

Submit a resume of the qualified System Integrator for approval no more than 14 days from NTP.

Terminal Server. A device that provides the ability for multiple low speed serial links to communicate through an Ethernet network. The terminal server receives Ethernet data packets and routes the data to the appropriate low speed serial link. It also receives serial data from the low speed links and routes this data onto the Ethernet network.

Traffic Management Center (TMC). Site at which the Department operational staff and equipment capable of controlling and coordinating the arterial, freeway, and other roadways traffic management system is located. The central equipment for District I is located at the FAST building in Las Vegas and for District III at the District building in Elko.

623.01.03 Regulations, Codes, and Jurisdictional Policies. Except when otherwise stated, ensure that electronic equipment meets the minimum environmental requirements of NEMA Standards Publication No. TS 2-1998, Section 2, Environmental Requirements, including, but not limited to:

1. Power;
2. Temperature and Humidity;
3. Transients, Power Service and Input Terminals;
4. Non-destruct Transient Immunity;
5. Vibration; and
6. Shock.

The temperature, humidity, vibration and shock requirements of NEMA TS 2-1998 are waived for electronic equipment installed in the FAST TMC building.

Provide equipment in field cabinets that have corrosion resistant housing that protects internal circuitry from dust buildup.

Provide AC to DC power conversion as needed to match the power requirements of each component.

Use power and control cables that meet IMSA 20-1 specification requirements (latest revision). Use UL approved power cords.

623.01.04 Submittals, Equipment List and Drawings. (a) Submittal Data. Furnish group submittal data for proposed equipment, materials, and testing schedule to the Engineer for approval, unless otherwise permitted in writing. Do not fax submittal data.

Provide a digital PDF file of submittal data containing enough information and details to permit full evaluation of each item for adherence to the requirements of the contract documents. Highlight, circle, or otherwise mark what is being submitted and all pertinent information showing that it meets contract documentation. Any submittal missing this information will be rejected. When appropriate, carefully address the functional and technical interrelationships among the various items. Include appropriate catalog cut sheets and specifications for all standard, off-the-shelf items. For custom-made items, include shop drawings and other necessary data.

When compiled literature such as catalog cut sheets are used to satisfy some or all of the submittal data requirements, ensure that there are no statements on the literature that conflict with the requirements of the contract documents. Cross off and initial any conflicting statements. Provide written explanation of how the item will be changed from the literature.

Group submittal data for related items together according to Table 623.1. Subject to the discretion of the Engineer, no items in any group will be accepted until all items in the group are accepted.

Table 623.1 – Submittal Groups.

Group	Equipment
1	Poles and supporting structures for Signals, Lighting, and ITS equipment including shop drawings and calculations for structures, foundations, and mounting details.
2	Radio Towers including shop drawings and calculations for structures, foundations, and mounting details.
3	All types of conduit, detectable pull tape, warning tape, and plugs. Pull boxes and associated equipment including racks and hooks.
4	AC power distribution equipment.
5	DC solar power generation equipment.
6	All other traffic signal system equipment (including signal cabinets and controllers)
7	All roadway lighting luminaires (including luminaire photoelectric-cell or shorting cap) and luminaire review matrices
8	Rectangular Rapid Flashing Beacon (RRFB) Pedestrian Crossing system controller and equipment
9	Communication cabinets and other field cabinets (excluding signal cabinets); and System Integrator resume.
10	Controllers and equipment for ramp meters, WWD, & Curve Warning systems; radar detector system equipment; and System Integrator resume.
11	CCTV (fixed and PTZ) equipment (including camera assemblies, surge suppressors, cables and lowering device) and System Integrator resume.
12	DMS equipment (including display, cabinet, and controller) and System Integrator resume.
13	Flashing beacon controllers, web relays, and static sign flashers; and System Integrator resume.
14	RWIS and HAR system equipment and System Integrator resume.
15	Various fiber optic cables and related splice and fiber optic distribution equipment; and System Integrator resume.
16	Communication edge equipment (including Ethernet Switches and Cellular Modems) and System Integrator resume.
17	Unlicensed Microwave radio equipment (including PTP and PTM radios) and System Integrator resume.
18	Licensed Microwave radio equipment (including PTP and PTM radios) and System Integrator resume.
20	Communication Building and Communication Building equipment (anything in the Communication Buildings); and System Integrator resume.
21	Central equipment (anything at the TMC/ROC) and System Integrator resume.
22	Equipment that does not fall under any of the groups identified above.
23	SALT test results
24	SST test results
25	Warranty Administration Plan (WAP) Submittal
26	As-built plans (a PDF file of the as-built plans must be sent to NDOT Traffic Operations at (t.o.signalslightingitsdl@dot.nv.gov)

Use a transmittal control sheet or sheets similar to the form presented in Figure 623.1 at the end of this Subsection. Specifically, list on the transmittal sheet each item or element included in the transmittal. An element is one part of several pieces of information related to the same item. List each drawing separately. Identify each drawing in a group with a unique drawing number that can be referenced.

Obtain approval for all groups of submittal data. Provide 30 days for the Engineer to review a group of submittal data and sufficient time for revisions and subsequent reviews. No time extensions will be granted as a result of the need to resubmit various items for review. No payment will be made for any item that has not been approved.

Following review, one complete set of submittal information and transmittal sheet, with date-stamp, will be returned with comments and disposition of acceptance or rejection.

The Engineer will mark each item of a group of submittal data in one of the following five ways:

1. No exception taken;
2. No exception taken, resubmit with complete group submittal;
3. Exceptions as noted;
4. Corrections required – resubmit; or
5. Rejected - resubmit

Work may proceed with equipment for groups where all items are marked “No exceptions taken”. In order to proceed with groups marked “exceptions as noted,” it is necessary to provide written concurrence that noted exceptions are agreed to; in which case, re-submittal of the group of submittal data is not required. Do not proceed with items marked “no exception taken, resubmit with complete group submittal” until all items in the group have been submitted, reviewed, and found satisfactory. For items marked “corrections required – resubmit,” make required corrections or provide additional information and resubmit for review. Redesign items or choose new items for those submittals marked “rejected – resubmit” and resubmit for review.

Submittals that are insufficient to permit proper evaluation will not be reviewed.

If previously approved equipment is subsequently resubmitted (e.g., a different unit at a better price is found), furnish complete product information with the resubmittal, provide a reason for the substitution and reference the associated group number.

Following approval of a submittal group and the submittal package is in its complete and final form, submit a final submittal packages (in PDF format) including any written concurrence (i.e. contractor agreeing to submittal exceptions).

Submit test procedures for review in the same manner described for submittal data and meet other requirements outlined under Test Procedures in Subsection 105.03. Test procedures will be reviewed in the same manner described for submittal data.

(b) Documentation and As-builts. Keep as-built documentation of the work current (no longer than 30 days behind actual) throughout the duration of the project. Furnish as-built documentation in PDF format for approval prior to initiation of the SST. If all project construction is not complete at the initiation of the SST, submit as-built documentation of the portion of the project that SST is starting on.

Obtain approval of final integration as-built documentation prior to the completion of the SST. The SST will not be considered complete until the as-built documentation is approved. Required documentation and as-builts include, but are not limited to, installation manuals, operation and troubleshooting manuals, test procedures, equipment assembly drawings, cabinet and rack wiring diagrams, electrical schematics, system connection diagrams, fiber optic splices and enclosures, and documentation for Contractor supplied test software.

Submit drawings and diagrams on electronic media. If a drawing or diagram serves more than one location, label it with all appropriate locations.

For all electronic media submittals, create logical groupings for all standard letter size documentation and submit to the Engineer. Clearly label each grouping with its own page for each label at the start of each group.

Furnish two sets of all test software source codes on an approved electronic media.

Provide the following drawings and diagrams as part of the as-built documentation:

1. Cabinet and Rack Wiring Diagrams. Provide drawings and wiring diagrams for each field cabinet and equipment rack per the requirements of the Standard Specifications stated for controller cabinets.

2. Electrical Schematic and Wiring Diagrams. Provide an electrical schematic and wiring diagram for each different type or model of equipment supplied. Provide separate drawings and diagrams for each distinct model of equipment. For equipment such as central computers, network switches, CCTV cameras, video switch and video multiplexing, the manufacturer’s installation, operating, and troubleshooting manuals will suffice.

3. System Connection Diagrams. Provide connection diagrams for the entire system, including block diagrams, terminal numbers, and conductor color codes for the work performed by the Contractor. Include field conduits, pull boxes, field cabinets, etc., on the connection diagram.

4. Fiber Optic Splices and Splice Enclosures. Place a hardcopy of the as-built fiber assignment drawing for the applicable splice enclosure in each field cabinet. Place a hardcopy of the applicable fiber assignment drawing in each fiber optic distribution rack.

(c) Ownership of Contract Submittals, Copyrights, and Other Property Rights. Assign, transfer, and release to the State, its successors, or agents, all rights, title, and interest in and to any contract submittals as defined in the next paragraph, that is written or produced by the Contractor or its agents for the State under this contract and in any subsequent upkeep, including amendments and updates, including the copyright and all exclusive rights of copyright ownership, for such term as is now or hereafter authorized by law. Agree to obtain and assign supporting documentation to the State any copyright for any submittal prepared by any subcontractor, supplier, consultant, or agent. Waive any right to any claim that may be associated with the contract submittals and related copyright, including any claim for royalties and acknowledge that same are the property of the State.

Contract submittals include, but are not limited to, test procedures, plans, specifications, diagrams, reports, typical drawings, technical proposals, manuals, as-builts, work plans, schedules, operator's manuals, maintenance procedure manuals, equipment assembly drawings, cabinet rack wiring diagrams, electrical schematics, connection diagrams, test software, software documentation, and all other written or recorded documents which relate to or are associated with the contract. Although the term "Contract Submittal" is not intended to include documents which existed before the contract, the term "Contract Submittal" does include any alterations of pre-existing documents, which alterations or modifications were prepared as a submittal under the present contract.

Ensure the State has the right, as assignee and transferee of the Contractor, to secure copyright registration and copyright renewals, if any, in and to the Contract submittals in the name of the State. Sign any documents necessary for the State to obtain such copyright. For documents supplied by the Contractor that are protected by copyright or other restriction, grant the Department the right to reproduce up to 25 copies for use by the Department.

Do not reprint, reproduce, copy, or disseminate any contract submittals included or that can be included within this agreement, or give permission to any other entity to reprint, reproduce, copy, or disseminate such contract submittals, without the State's written consent.

Figure 623.1 Sample Transmittal Control Sheet.

CONTRACTOR'S LETTERHEAD

TRANSMITTAL CONTROL SHEET ____ OF ____

Project Title:
Contract Number: Submittal Number:
Received by Engineer: Date:
Engineer's Action By:

			Engineer's Action**				
Bid Item Number*	Element Description	Previous Submittal Number If Any	No Exception Taken	Exceptions as Noted	No Exceptions Resubmit With Complete Group Submittal	Corrections Required Resubmit	Rejected Resubmit

* Show Bid Item Number in Upper Right Hand Corner of Each Document Being Transmitted
** Initial and Date Engineers Action Taken

623.01.05 Warranties, Guarantees, and Instruction Sheets. Except when otherwise stated, provide a minimum 3 year manufacturer's warranty for all equipment, associated devices, and work performed under Section 623. The warranty begins at the time the Department accepts the project (after completion and acceptance of the SST).

Warranties are included in the unit price for the item covered.

Include warranty information with equipment submittals.

Within 120 days following approval of the final submittal group, submit a preliminary Warranty Administration Plan (WAP). In the WAP, address how the warranty period will be administered, including detailed information on manufactures warrantee with product information, serial numbers, installed location, manufactures contact information, and expiration date of warrantee.

Submit the final WAP for approval prior to the initiation of the SST.

Within 30 days of the completion of the SST, submit the following in electronic format and as hard copies for approval:

1. A complete list of all equipment (by serial number) that have warranties extending beyond the one year period, including test and spare equipment, down to the lowest replaceable unit level utilizing Figure 623.2 or similar approved form. Include with this list, any special requirements for warranty equipment storage such as time, temperature, humidity, stacking restrictions, etc.

2. Warranty paperwork transferring ownership of the warranties to the Department. This includes all test equipment and all spare parts.

Figure 623.2 – Extended Equipment Warranties.

Extended Equipment Warranties

Submitted by: _____ State Project No.: _____

Federal Project No.:_____

Date: _____

Spec Reference No.	DESCRIPTION	WARRANTY DURATION	EXPIRATION DATE	DATE OF TRANSFER	CONTACT PERSON

623.02.09 Transformers. Furnish and install 120/240 volt to 600 volt step up and 600 volt to 120/240 volt step down transformer in transformer cabinets as shown on the plans. This includes the transformer, surge protection, breakers, cabinet/foundation, and any required mounting hardware. Make all conductor and power connections for a complete and operational transformer installation.

623.02.11 Standards and Posts. The use of galvanized steel standards is mandatory on this contract.

623.02.14 Trenching, Excavation, and Backfill. The second sentence of subparagraph 2. of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Use sand bedding conforming to the sieve size requirements for fine aggregate specified in Subsection 706.03.03 or the sieve size requirements for granular backfill specified in Subsection 704.03.11 with an additional requirement of 100 percent passing the 9.5 mm (3/8 in.) sieve.

Perform directional drilling required for the installation of conduit at locations shown on the plans or as approved and as follows:

Perform directional drilling with a drill head that will accommodate the number of conduits in that section. When drilling, utilize a drilling fluid that will stabilize the hole.

Locate, record, and correct the path of the drill head a minimum of every 10 feet.

Use a backreamer sized no larger than 2 inches greater than the outside diameter of the conduit. Use a backreamer that injects mixing mud to fill any voids in the hole while pulling conduit through. Use mixing mud designed and rated by the manufacturer specifically for preserving the integrity of the soil and preventing collapse during and following directional drilling.

623.02.16 Conduit. Install detectable pull tape in any empty conduit and conduit containing fiber optic cable. Detectable pull tape shall run continuous allowing for the detectable feature of the tape to function between all ITS Vaults. Do not use nylon pull rope. Attach the detectable pull tape to the plug on each end and provide enough slack in the pull tape that both plugs can be removed up to 6 feet from the end of the conduit without removing the pull tape.

Use conduit plugs, caps, or sealing fittings for sealing empty conduit and occupied conduit that contains or is intended to contain the trunkline fiber optic cable. Use plugs that are durable, easily removable, reusable, and produce a watertight seal. Use plugs, caps, and sealing fittings that are specifically designed for the diameter of the conduit/innerduct and cable and have provisions for anchoring the pull tape. Ensure that the plugs provide a watertight and airtight seal of at least 138 kPa. For occupied conduit and innerducts, use plugs of the split design that allow installation and removal around in-place cables without damaging the cable.

Use dielectric conduit spacers. Ensure that spacers remain in position during backfilling, compaction, and pavement installation operations.

Paint all metal conduits, boxes, and attaching hardware to match the structure it is attached to.

All plastic conduit shall be HDPE with a wall thickness of SDR11 or thicker (lower SDR indicates a thicker wall). PVC conduit is not allowed.

For conduit intended to contain the NDOT trunkline fiber optic cable, use 1 each of white, black, blue, and orange color impregnated HDPE innerducts. If additional trunkline conduits are called for, also use colors red and green. Use the approved color scheme throughout the project. Locate the black innerduct directly below the longitudinal print line of the outerduct.

For conduit intended to contain the Utility trunkline fiber optic cable, use 1 each of brown, gray, yellow, purple (Lilac), pink, and Terracotta (or beige) color impregnated HDPE innerducts. Use the approved color scheme throughout the project. Locate the brown innerduct directly below the longitudinal print line of the outerduct.

Only use galvanized rigid metal conduit (RMC) for all exposed conduit. Install conduit clamps on exposed conduit at maximum 3 foot spacing for vertical runs; maximum 10 feet spacing for all other conduit runs; and within 3 feet of junction boxes and conduit bends. Use expansion couplings when RMC conduit crosses a structural abutment or expansion joint. Provide a minimum of 3 feet between expansion couplings. When exposed conduit is installed between equipment, install a grounding conductor on the conduit. Use appropriate fittings that meet NEC

requirements.

Prior to any activity that involves existing conduits, provide an inventory that documents the condition of all damaged sections or identifies any runs or sweeps that are unsuitable for the intended installation. Repair or replacement of existing conduits that are damaged or unsatisfactory for the intended purpose, as deemed necessary, will be paid for as additional work.

Seal the ends of non-trunkline conduit with duct sealing compound listed in the QPL.

Adhere to the following installation requirements for conduit that is designated on the plans to contain, or is intended to contain in the future, trunkline fiber optic cable:

Route fiber optic conduit around obstructions by deflecting the conduit at a rate of at least 10:1. If conditions prohibit a 10:1 deflection, then a minimum of 3 foot radius, maximum 45 degree bends, may be used upon approval, provided the least degree bend needed to clear the obstruction is used.

During shipping and while on the job site, seal the open ends of all sections of fiber optic conduits with removable conduit and innerduct plugs to prevent the entry of rodents, dirt, sand, and other foreign materials. Only remove these plugs when in the act of joining sections together, testing, or pulling cable. Immediately re-plug or seal the open ends after completion of the work specified herein.

Install fiber optic conduit warning tape above fiber optic conduit installed in open trenches. Install warning tape with the message side facing up. Use fiber optic conduit warning tape fabricated of bright orange pigmented polyolefin film with black letters of approximately 3/4 inch printed on one side. Repeat the warning message at approximately 3 foot intervals.

623.02.17 Pull Boxes and Junction/Splice Boxes. Pull boxes and junction boxes shall have secured and locked lids or be buried as specified on the plans. See plans for exact location of pull boxes and details. Securing pull boxes and junction boxes shall be considered incidental to pull box items.

Remove and salvage existing pull box lids, and reroute conduit to pull boxes for complete system as shown on the plans.

Provide a rack and hook assembly along the interior of both long sides of all ITS vaults. Use rack and hooks that are designed for attaching coiled cabling and splice enclosures weighing as much as 100 pounds. For metallic racks, use ASTM A36 galvanized or stainless steel.

For each size and type of pull box, submit manufacturers' certification that the structural and cable racking (when applicable) requirements of this Subsection are met.

Add the following after "6." on page 386 of the Standard Specifications:

7. "NDOT FIBER" where pull boxes contain fiber optic.

The first sentence of the first paragraph in subparagraph (c) on Page 386 of the Standard Specifications is hereby deleted and the following substituted therefore:

Install pull boxes at maximum spacing indicated on the plans.

Provide locator balls in the bottom of pull boxes.

Larger pull boxes may be installed in place of a smaller pull boxes to facilitate work. No additional payment will be made for placing pull boxes larger than those shown on the plans.

When the use of existing pull boxes are noted on the plans, inspect each one for suitability and damage. Prior to any activity that involves existing pull boxes, provide an inventory that documents the nature of the damage or reasons the pull box is considered unsuitable. Be aware that prior to final acceptance, if the Engineer concludes that pull boxes and covers have been damaged, they will need to be repaired or replaced at no additional expense.

Existing pull boxes that are not sized adequately or are otherwise unsatisfactory for the intended purpose or found to be damaged by activities not related to construction, will be paid for as additional work, when approved.

Provide locks for all pull boxes. Locks shall be an NDOT District approved lock. Contractor shall contact NDOT facilities supervisor, John Angel; 775-834-8300; jangel@dot.nv.gov prior to ordering locks to confirm lock and key type.

623.02.19 Conductors. Furnish and install cable tagging in pull boxes.

(h) Conductor Identification. All power cables for fiber optic equipment shall be banded by a single, waterproof band inside each pull box and labeled with a “NDOT ITS POWER” designation, the service pedestal and circuit numbers, and what it is used for. All other power cables shall be banded by a single, waterproof band inside each pull box and labeled with a “NDOT POWER” designation, the service pedestal and circuit numbers, and what it is used for.

(i) Composite cable shall consist of the required communications control cable for the CCTV cameras, an ethernet cable, and a coaxial cable.

(j) Aluminum conductors shall be terminated using compression crimped copper termination connector that prevents possible corrosion in the future. Use an antioxidant paste on all aluminum terminations. All aluminum conductors/connectors shall be compressed to manufactures requirements.

623.02.20 Fiber Optic Cable. This Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Furnish, install, and test fiber optic outside plant (trunk) cable, fiber optic branch (drop) cable (CDCA), fiber optic jumper (patch) cable, interior distribution cable (pigtails), termination units, integrated fiber optic splice closures (underground), and related equipment.

Obtain fiber optic outside plant (trunk) cable, CDCA, fiber optic jumper (patch) cable, interior distribution cable (pigtails), and distribution equipment from a certified ISO 9001 or 9002 manufacturer. Supply all optical glass from the same manufacturer and that has been produced no earlier than 6 months prior to “Notice to Proceed.”

(a) Materials.

1. Fiber Optic Outside Plant (Trunk) Cable. Use only single-jacket / single-armored (non-dielectric), single-mode OS2 fiber optic (SMFO) cable that is of loose tube construction, utilizing fiber strand count indicated in the plans. Cable must contain water-blocking tape and powder, or powder-only (no gel-filled cable) in the cable core and within all buffer tubes. The cable must be suitable for installation in underground conduits, vaults, pull boxes, and field cabinets. Use a cable that is approved for use by the Rural Utilities Service (RUS) and complies with Telcordia GR20-CORE and TIA/EIA-4720000-A standards.

   SMFO cable shall have a central strength member designed to prevent buckling of cable.

   Use cable that has tensile strength members designed to minimize cable elongation due to installation forces and temperature variation. Use cable that can withstand a 2700 N tensile load applied per EIA-455-33 where the change in attenuation at 1550 nm does not exceed 0.15 dB during loading and that no fiber displays a measurable change after load removal. Use cable rated for an installed tensile service load of 890 N or more.

Use fiber optic cable that complies with the following specifications:

Property	Requirement
Core Diameter	8.2 µm (nominal)
Cladding diameter	125 +/- .7 µm
Core-to-cladding offset	≤ 0.8 µm
Cladding non-circularity	≤.7%
Maximum attenuation	0.35 dB/km at 1310 nm; 0.25 dB/km at 1550 nm
Attenuation uniformity	No point discontinuity greater than 0.1 dB at either 1310 nm or 1550 nm
Mode-field diameter (matched cladding)	9.3 +/- 0.5 µm at 1310 nm; 10.5 +/- 1.0 µm at 1550 nm
Maximum chromatic dispersion	3.2 ps/ (nm x km) from 1285 nm to 1330 nm and < 18 ps/ (nm x km) at 1550 nm
Fiber polarization mode dispersion	0.5 ps / $(km)^{1/2}$
Fiber coating	Dual layered, UV cured acrylate applied by the fiber manufacturer
Coating diameter	245 µm +/- 5 µm
Minimum storage temperature range	- 40 °C to + 70 °C
Minimum operating temperature range	-20 °C to + 70 °C
Rated life	Certify at least 20-year life expectancy when installed to manufacturer's specifications

Fiber optic trunk cable outer jacket shall be factory-labeled as follows:

a. Date of manufacture and manufacturer's name.
b. A numerical sequence (footage indicator) at intervals no greater than 10 feet
c. Type of fiber and strand count (e.g. SMFO, 144, 72, etc.)

When ordering fiber optic cable, ensure manufacturer provides the following in weatherproof packaging securely attached to the reel:

a. Factory order number
b. Job number
c. Ship date
d. Manufacturer's cable code
e. Type of cable (e.g. single mode, outdoor, indoor)
f. Beginning and ending length markings
g. Measured length and attenuation

2. Fiber Optic Branch (Drop) Cable (CDCA). CDCA shall be Optical Fiber Non-Conductive Riser (OFNR) rated, single mode all dielectric cable that is ultraviolet-resistant and fully waterproof for outdoor applications. Cable shall have a single 3.0 mm buffer tube containing 12 strands of color-coded fibers unless otherwise indicated on plans. Minimum tension pull rating shall be 50 pounds.

   Furnish and install CDCA that is factory-terminated cable with integrated epoxy-filled patch panel (patch panel equipped with 12 - LC type ports) mounted inside cabinet.

3. Fiber Optic Jumper (Patch) Cable. Use patch cables that meets the following requirements:

   a. Factory manufactured
   b. 250 µm buffering of each fiber
   c. 900 µm buffering of each fiber applied after initial 250 µm buffering
   d. Maximum factory measured insertion loss of 0.5 dB
   e. Strengthened with aramid yarn
   f. Sheathed with 3 mm PVC jacket
   g. Factory terminated with LC connectors
   h. Color = yellow for single mode
   i. UPC polish
   j. Appropriate lengths between fiber termination panel and equipment while maintaining the neatness and integrity of the cable

   Use duplex jumper cables only. Adhere to manufacturer recommended installation and minimum bend radius requirements. Perform all length measurements and order jumpers so that there is no more than 24 inches of slack in a cable management tray, or 12 inches of slack on each end if utilizing vertical raceways for routing of jumpers between the two connected devices.

(b) Installation. verify the integrity of the fiber prior to installation. Visually inspect fiber reel for any obvious damage. Test all optical fibers in each buffer tube from one end of cable with an Optical Time Domain Reflectometer (OTDR). Test for fiber continuity, uniform length, any anomalies, and attenuation level. Record buffer tube color and fiber numbers within each tube tested. If cable does not test to specifications, return to the manufacturer and obtain a replacement.

1. Fiber Optic Outside Plant (Trunk) Cable. Base the length of trunk cable required on field measurements. Include in the measurement the required amount of slack cable at pull boxes, ITS vaults, and communication buildings. Slack requirements are 30 foot coil (15 feet per side) for No. 7 pull boxes, 200 foot coil (100 feet per side) for ITS vaults, and 100 foot coil in communication buildings (fiber huts). All cable slack coils shall be mounted to support racks in ITS vaults and communication buildings (fiber huts).

   Install fiber optic cables in conduit continuous without splices between allowable splice points as identified in the contract documents. Only splice fibers at underground splice closures in ITS vaults as indicated in the plans and within fiber optic splice cabinets that are housed inside communication buildings (fiber huts). See paragraph (c) for splicing details.

   Follow the cable manufacturer's recommended procedures when installing fiber optic cable, including maximum pulling tension. Use pulling lubricant approved by the cable manufacturer and follow the lubricant manufacturer's procedures for use.

   Install fiber optic marker posts along fiber paths. Fiber markers shall be installed at least every 500 feet and within 3 feet of ITS vaults and pull boxes. Markers shall indicate an ITS vault or pull box at all vault and pull box locations.

   Install locate posts according to the fiber splicing section. Locate posts shall have terminal boards at the top of the post with locking caps.

2. Fiber Optic Branch (Drop) Cable (CDCA). CDCA is to be used between the fiber optic trunk line splice points indicated in the plans and the field communication cabinets. Determine the length of CDCA cable required, including slack. CDCA cable slack requirements are 15 foot coil for No. 7 pull boxes, 100 foot coil for ITS vaults, 100 foot coil in communication buildings (fiber huts), and 20 foot of slack in communication cabinets. All cable slack coils shall be mounted to support racks in ITS vaults and communication buildings (fiber huts), and coiled and secured in the bottom of communication cabinets.

   Provide 12 AWG insulated copper conductor buried with conduit between Cabinet and splice vault for location service purposes related to CDCA fiber path.

3. Fiber Optic Jumper (Patch) Cable. Furnish and install fiber optic jumper (patch) cables at appropriate lengths to make a complete connection between CDCA ports in the integrated patch panel and the ITS Ethernet switch located in the cabinet. Maintain the cables in a neat manner that preserves the cable integrity.

(c) Fiber Splicing.

1. Splicing Method. Use fusion-splicing only for all splices. Perform all splicing in a controlled environment (e.g., splice trailers, splicing tents with floors, etc.). Use equipment with auto fiber alignment, and automatic light injection with detection devices or profile alignment algorithms to estimate splice losses. Ensure that each splice does not exceed 0.03 dB attenuation as measured by the fusion splice equipment. Re-splice any splice found to exceed 0.03 dB attenuation until this requirement is met or a minimum of 5 attempts have been made. Any required re-splicing efforts shall be performed at contractor’s expense. If unable to meet this specification after the required attempts have been made, contact the Engineer to route request, including demonstrated remediation efforts, for further instructions to the Department’s Fiber Manager.

2. Integrated Fiber Optic Splice/Termination Unit. Use splice closures having the capacity to accommodate a minimum of 144 splices each. New splice closures must be equipped with the number of splice trays sufficient to accommodate 144 splices, regardless of the number of splices identified in the plans. Use butt-type cylindrical underground splice closures to protect splices that are housed in vaults. The unit shall be capable of being opened and resealed without the need to purchase a resealing kit. Use corrosion resistant, water-tight splice closures that meet the requirements of GR-771-CORE,

most recent issue. Ensure that the splice closure seals, provides for grounding/bonding, and provides efficient routing, storage, organization, and protection of fiber optic cable and splices. Splice closure shall be provided with a minimum of two express ports for ingress and egress of uncut trunk line cable, and at least four additional ports to accommodate any additional trunk or branch cables that may be required in the future, or as otherwise indicated in the contract documents. Use splice closures that incorporate splice protection stands on all splice trays, and which accommodate protective heat-shrink sleeves with integrated strength members.

Use the following approved Integrated Fiber Optic Splice/Termination Unit or approved equal:

a. CommScope (must include all parts for each unit):
    i. Trays: FOSC_ACC_C_TRAY_24_SMV60
    ii. Closure: FOSC450_C6_6_NT_0_C_C6_N
    iii. Mounting Bracket: FOSC_ACC_WALL_PMT_BRKT

Enclose each splice in a protective heat-shrink sleeve and secure in the splice tray.

Supply Fiber Optic Splice/Termination Unit that is capable of being installed in the Department's ITS vaults along with the required fiber optic cable slack.

Secure Fiber Optic Splice/Termination Unit in vaults per the manufacturer's recommendations. Orient the splice closure such that the longest edge is horizontal and level. The centerline of the closure shall be centered vertically with respect to the ITS vault wall.

Do not deviate from the splice details shown in the plans unless approved. Only perform full cable splices where indicated in the plans.

(d) Bonding/Grounding.

1. Cable Location Service Provisioning. Splice closures and armored fiber cabling shall be bonded and grounded as per industry standard practices and according to NEC 770.100, ANSI/TIA-8-C.0 and ANSI-J-STD-607. Extend conductive path from cable bond and earth ground points from all splice vaults to fiber optic locate station at top of locate posts placed within 4-feet of all butt splice vaults and vaults with more then one lateral trunk fiber cable routed through the vault in order to facilitate connection of utility location equipment transmitters. If a new butt splice or lateral trunk fiber cable is added to a vault, a new fiber optic locate station must also be added. Verify proper bonding of the trunk fiber cable armor to earth ground. Resistance measurement to ground should be no more than 5 Ohms when measured with a meter. Terminal board located within the fiber optic locate station shall provide for multi-directional cable locating services where armored trunk cable extends in two or more directions in relation to the connected splice closure/vault. Cable bond leads must be clearly labeled on terminal board for cable direction from vault. Fiber optic locate station terminal board shall be located at top of post, and covered by a locking cap provided by the fiber optic locate station manufacturer. In situations where a fiber optic locate station is not practical due to conditions such as concrete/asphalt/pedestrian or vehicle traffic, location service terminal board will be installed inside the vault. Cable locate provision must be tested with locating equipment upon completion of fiber installation to confirm operational status.

   In the case of a lateral trunk splice, ensure that the cable armor is bonded between each side of the trunk cable to reestablish electrical continuity along the armor of the cable.

2. Communication Building. Perform fiber cable terminations at the communication hut as per plans. If armored cable enters building, it must be bonded and grounded to the building ground system. Route trunk line cable into the designated fiber entrance splice cabinet, typically wall mounted. Route buffer tubes from inbound trunk cable to associated splice trays. Route pigtail fiber cables between fiber entrance cabinet and fiber distribution panels installed in designated Fiber Distribution Panel (FDP) relay rack utilizing lacing cord to secure the cable to the overhead ladder racking. No tie wraps are to be used for this purpose, other than to temporarily secure the cables to the racking while dressing the cables. Once dressed into the relay rack, route fiber optic cables to the rear of the relevant fiber patch panels. Secure any fiber optic cable sheath and central strength member outside of the panel. Route buffer tubes into the panel. Use spiral wrap to group and protect buffer tubes entering panel. Plug all panel/cabinet entry holes not utilized.

Within the FDP(s) at relay rack, separate the buffer tubes and secure them within the panel utilizing incorporated fiber management, terminate pigtail fiber connectors to relevant ports on panel with adequate slack loops for maintenance purposes. Use spiral wrap (or similar approved method, submit to Traffic Operations Technology Section for approval) to group and protect the fiber routed into the panel. Once cables have been dressed in and terminated to FDP ports in relay rack, return to fiber entrance cabinet, finish dressing cable and route buffer tubes to applicable splice trays. Splice fibers to outside plant trunk fibers dressed into splice trays at the fiber entrance splice cabinet.

Terminations: Ensure that the attenuation at each termination does not exceed 0.5dB. Keep protective covers on couplers until jumper or pigtails are installed.

(e) Connectors. Use OS2 single mode fiber optic jumper cables with LC connectors for terminating fiber optic cables at field cabinets and other outdoor locations.

Do not exceed 0.5dB each inclusive of coupler and mated test connector (measured at the factory). Do not use connectors with factory measured reflectance greater than -40dB from 14 °F to 140 °F or factory measured attenuation exceeding 0.25dB.

Keep protective covers on the ends of connectors until terminated on equipment. Always clean and scope fibers prior to terminating to ensure minimal loss.

(f) Labeling. Provide flag style labeling in accordance with the latest version of TIA-606. All labelling must be black lettering with a white background. At a minimum, provide the following labeling:

1. Label trunk and branch cables at pull boxes/ITS vaults, cabinets, racks, and all other points of entry with the appropriate cable ID, identifying cable and cable direction (e.g., 144ct / I-580 Trunk southbound). Use permanently printed, removable cable sleeves.

2. Label both ends of fiber optic jumper cables and pigtails within communication huts. Labels on each end of jumper should contain both near-end and far-end locations (e.g., relay rack number, panel, or equipment rack-unit number, port number).

3. Sequentially label the front side of patch panels in a consistent manner throughout the project (e.g., associated cable, port /fiber numbers).

4. Label splice trays identifying applicable tubes, fiber strands and cable with cable direction relative to that location (e.g., 144-cnt, I-580 Trunk southbound, Blue tube, fibers 1-12, Orange tube, fibers13- 24, etc).

5. Label patch panel doors with applicable information such as direction of associated cable and fiber strands terminated within (e.g., eastbound cable ports 1-72, 73- 144, etc.)

(g) Cable Management. Group and neatly tie cables to the racks on the wall of vaults and pull boxes when applicable. Coil, tie, and stow slack or excess cable.

Provide strain relief for fiber optic cable, jumper cables, and pigtails.

At facilities with sub-flooring, horizontally route jumper cables from the front face of the termination unit to either side of the rack. Stow jumpers within the horizontal cable rings of the termination unit. Next, bundle the jumper cables using spiral wrap, and route them down the side of the rack via the vertical cable management channels and through the floor. Beneath the rack, group the jumper cables into sub-bundles for each rack destination. Route sub-bundles beneath the floor to the appropriate equipment rack and up the sides of the rack. Break out individual jumper cables from the sub-bundles and route them horizontally to the equipment. Route bundles of jumper cables between equipment racks as needed.

At facilities with overhead fiber raceways, route jumpers through vertical management on sides of relay rack up to overhead horizontal raceways via split duct interconnection. Route cables from horizontal raceway to applicable terminating equipment in same fashion.

When using intermediate patch panels (e.g., Multi-fiber Push On (MPO), etc.) to connect equipment, route jumpers through relay rack cable management to relevant patch panel(s).

Cable ties are not allowed to be used for cable management. Approved methods for cable management are:

1. Hook and loop
2. Waxed string

623.02.21 Wiring. Mechanical devices such as winches or other power actuated pulling device may be used to facilitate installation of cable. If mechanical devices are used, the device must be equipped with a tensiometer or other device used for measuring and monitoring pulling tension such that the pulling tension does not exceed manufacturer's pulling specifications. The tensiometer shall be capable of halting the pulling operation or relieving excessive tension if the pulling tension approaches manufacturers pulling specifications. During the submittal process, submit documentation explaining how the tension will be monitored during cable installation.

623.02.22 Bonding and Grounding. Add the following after the second paragraph of this Subsection of the Standard Specifications:

Connect the grounding conductors or bonding jumpers by exothermic welding, listed pressure connectors, listed clamps, or other listed means. Do not use connection devices, including sheet metal screws, or fittings that depend solely on solder, to connect grounding conductors to enclosures.

Electrolytic grounding may be used in lieu of ground electrodes for the cabinet grounding system. Use electrolytic grounding systems that are 100% self-activating, sealed and maintenance free. Provide an electrolytic ground system that hydroscopically extracts moisture from the air to activate the electrolytic process without addition of chemicals or water. Do not use any hazardous material to improve the grounding performance of the electrolytic ground. Provide an UL listed electrolytic system with a minimum life expectancy of 30 years.

Bond and ground underground electrical services and meter pedestals in accordance with the requirements set forth for service equipment and the contract documents.

On new and existing footings verify the resistance to ground of the cabinet grounding system is 5 ohms or less using the 3 terminal fall of potential method. If the tested resistance is greater than 5 ohms, install as many ground electrodes as is necessary to meet the requirement.

Mount a terminal block to the cabinet rack for surge protection. Bond the surge protection terminal block directly to the cabinet ground using a #8 AWG copper ground wire.

623.02.30 Inductive Loop Vehicle Detectors. (h) AVC Detector Loops. The piezoelectric sensors shall be 6 foot Class I Brass Linguini axle sensors. Suppliers of the Class I Brass Linguini axle sensors are listed in the QPL.

623.02.32 Flashing Beacon Controller. Furnish, install, test, and make operational a Flashing Beacon Controller (FBC) assembly as specified herein and as directed. The FBC shall include but not limited to a controller mounted in cabinet or as stated on plans, all mounting hardware, all miscellaneous cabling and conduit required inside the cabinet including required cabling between the network switch and controller, integration, testing, training, and acceptance activities.

Supply a controller capable of communicating with the NDOT Freeway Management Software. Protocol available upon request. Controller shall have native IP functionality.

Furnish all communication equipment required to communicate between the network switch and the controller.

Make all required wiring connections and conduct all required integration activities.

Provide at a minimum a 3 year warranty on all installed FBC systems and associated equipment beginning at system acceptance for each device. This includes all associated solar and wireless equipment, if applicable.

(a) Submittal. Submittal shall have a Matrix listing the following:

- Specification section number.
- Short specification section description.
- Description and statement of conformance to specification section.
- Location of supporting data (if more than one document is included in submittal).

Highlight all pertinent specification conformance statements within submittal document.

(b) Performance Testing. Perform testing according to Subsection 105.03 and the following:

1. SALT. The system shall be fully functioning, except for communication back to the TMC/ROC.

2. SST. Systems shall be fully functioning back to the Freeway Management Software at the TMC/ROC for 45 days without failure. Failures not associated with controller equipment shall not be considered a failure of the controller system. At any time during this 45 day test, NDOT reserves the right to require field verification of the equipment.

Failure of any item to meet the requirements for any test will be counted as a defect and the equipment under test will be subject to rejection. Rejected equipment shall be re-tested provided all areas of non-compliance have been corrected and evidence thereof is submitted. For equipment that has failed and subsequently been repaired or modified, prepare and deliver a report that describes the nature of the failure and the corrective action taken.

The contract period shall not be extended for time loss or delays related to testing.

See Subsection 623.03.21 for additional required testing plans and checklists.

623.02.33 Radar Detector System. Furnish, install, test, and make operational a radar detection system as shown on the plans. The system includes, but is not limited to, a detector head assembly, mounting hardware, miscellaneous cabling, surge protection (mounted in a small NEMA 3R enclosure) at the standard and at the controller cabinet, and a terminal server or 2070 controller with a contact closure card as required for a complete and working system. Supply the required amount of input cards to monitor all lanes of travel covered by each detector.

All radar detector systems shall be natively-IP addressable.

Provide at a minimum a 3 year warranty on all installed Radar Detector Systems and associated equipment beginning at system acceptance for each device. This includes all associated solar and wireless equipment, if applicable.

Supply a Radar Detector System from the following list or approved equal:

- Wavetronix Smart sensor HD 101-0415 or approved replacement

Furnish power supplies for above equipment as per manufacturer's recommendations.

(a) General Requirements. Determine detector equipment that is compatible for each location, given installed offset, number of lanes requiring detection, and total range of the device.

Furnish and install radar detection cabling. The radar detector system installation shall include supplying and installing the required cabling from the detector head assembly to pole mounted surge protector panel. The cable from the pole mounted cabinet to the controller cabinet shall be paid for under their respective bid item.

Install and configure pole-mounted radar detector system sensors, wireless radio transceiver, antenna, enclosures and other accessories as required per manufacturer's recommendations and instructions. Mount new pole-mounted equipment as shown on the plans.

Separate radar detector systems shall be installed for each direction of travel on the mainline. The use of a single detector to monitor traffic in both directions shall not be allowed.

(b) Submittal. Submittal shall have a Matrix listing the following:

- Specification section number.
- Short specification section description.
- Description and statement of conformance to specification section.
- Location of supporting data (if more than one document is included in submittal).

Highlight all pertinent specification conformance statements within submittal document.

(c) Performance Testing. Perform testing according to Subsection 105.03 and the following:

1. SALT. The system shall be fully functioning, except for communication back to the TMC/ROC.

2. SST. Systems shall be fully functioning back to the Freeway Management Software at the TMC/ROC for 45 days without failure. Failures not associated with controller equipment shall not be considered a failure of the controller system. At any time during this 45 day test, NDOT reserves the right to require field verification of the equipment.

Failure of any item to meet the requirements for any test will be counted as a defect and the equipment under test will be subject to rejection. Rejected equipment shall be re-tested provided all areas of non-compliance have been corrected and evidence thereof is submitted. For equipment that has failed and subsequently been repaired or modified, prepare and deliver a report that describes the nature of the failure and the corrective action taken.

The contract period shall not be extended for time loss or delays related to testing.

See Subsection 623.03.21 for additional required testing plans and checklists.

623.02.34 Communication Cabinet. Following are the minimum requirements for Communication Cabinets used to house communication equipment, other control devices, and auxiliary accessories.

Furnish, install, and test field cabinets that consist of an enclosure, power distribution assembly or wiring per the block diagram in the plans, power distribution unit (PDU), uninterruptable power supply (UPS) or battery backup system (BBS), GPS transceiver, and other equipment and accessories as needed. Cabinet shall include shelving; cabinet lighting; surge protection, air filters; field cabinet termination strip, and all accessories, labor, testing, submittals and incidentals to complete an operational cabinet.

Provide at a minimum 3 year warranty for the Communication Cabinet and associated equipment beginning at system acceptance for each device. This includes all associated solar and wireless equipment if applicable.

(a) General Requirements. Provide all cabinets as a complete unit to include all foundations, anchor bolts with template, fans, LED lights, AC receptacles, shelves, door stops, locks, filters, etc.

Enclosure shall be a weatherproof aluminum, steel, or other approved metal enclosure, meets NEMA Type 3R standard, corrosion resistant, and painted or powder coated white inside and out or as directed in the plans. Include the following:

- Top mounted fan for ventilation. Fan shall activate when ambient temperature exceeds 65 °F and shall deactivate when temperature ceases to exceed 65 °F.
- 2 interior LED lights, 1 above each door, that are automatically activated when the door is opened, and automatically deactivated when the door is closed.
- 2 AC receptacles with a separate 15A breaker.
- 1 pull out shelf and 2 fixed shelves.
- 2 hinged doors with each door mounted with hinges welded to door and jamb.
- 2 hook type door stops for each door. Make the hook end at least 40mm (1.5in) long. Door stops shall be located at the top and bottom of the door and shall allow for securely fastening the door opened to 90° and 180°.
- Furnish each door with a standard integral locking system – teeth shall face up.
- Furnish each door with a hasp for additional agency-approved lock, and an agency approved lock.
- Replaceable pleated paper filter behind door vents. Door vents shall have louvre vent covers.

Contact the agency representative prior to ordering additional agency locks to confirm lock and key type for use.

- District 2 representative: Brad Wilkus; 775-315-1715; d2commtechs@dot.nv.gov

Each cabinet enclosure must fit the anchor bolt pattern as specified in the current NDOT Standard Plans for Road and Bridge Construction. Modification of cabinet enclosure base to fit a non-standard anchor bolt pattern shall not be permitted without approval.

(b) Additional Cabinet Equipment. Furnish and install a dual circuit, IP addressable 120 VAC 16-outlet rack mounted PDU with an Ethernet connection capable of operating each outlet individually. PDU shall have an internal clock and be capable of being programmed with up to 100 events. PDU shall have an operating temperature of -30

°F to 165 °F. Provided PDU shall be as listed:

- PDU – Digital Loggers, Inc., Ethernet Power Controller 7

Furnish and install an uninterruptible power supply (UPS) or battery backup system (BBS) for ramp meter cabinets and District Communication Cabinets as specified. UPS shall be rack mounted within the communication cabinet; BBS shall be housed in a side mounted NEMA Type 3R enclosure. See plans for details. Provide adequately sized DC-AC inverter for all AC-powered equipment. Provided UPS or BBS shall be as listed:

- Rack mounted
    - Alpha Technologies, FXM 2000
    - TrippLite SU2200RTXL2UN
- Side mounted
    - ICT, ICT IPS BMMD LDMP 48V
    - Newmar, SRS48 RM 648

Furnish and install side mounted cabinet for BBS. Side mounted cabinet shall be supported by the foundation. Support shall be bolted to the foundation and utilize square tubing or a bolted rack and shall be approved by the Engineer.

Furnish and install a Field Hardened Ethernet Switch (FHES) or as indicated on the plans.

Furnish and install a native IP GPS transceiver that will transmit the geocoordinate location of each Communication Cabinet.

Furnish and install separate ground bus bars for grounding and neutral terminations.

Furnish and install 4 grounding terminal blocks. The field cabinet termination blocks consist of an isolated equipment ground bus bar, isolated power ground bus bar, isolated DC ground bus bar, and isolated neutral bus bar.

Furnish and install trip-free circuit breakers that are approved and listed by UL and plainly marked with the trip and frame size. Use breakers that have silver alloy contacts and are quick-make/quick-break on either manual or automatic operation. Provide a minimum interrupting rating capacity of 5,000 amperes root mean squared (RMS). For multi-pole circuit breakers, use the common trip type.

Furnish and install appropriately sized adapter lugs to interface large conductor sizes to the circuit breakers.

Furnish and install cabinet labeling per the current edition of the NDOT Standard Plans for Road and Bridge Construction.

Cabling shall be neat and firm. Cabling shall be secured using adjustable hook-and-loop fastener straps. Cabling shall be labeled upon completion of system installation. Labeling shall be weather-resistant printed labels.

Provide power one-line diagram, or block diagram, for the cabinet which depicts how power and communications are delivered to the installed equipment.

Provide wiring diagram prints for each cabinet, reproduced from a reproducible drawing provided by the manufacturer, pursuant to Subsection 623.01.04. Equip cabinet with a plastic envelope to house one or more cabinet wiring diagrams.

(c) Submittal. Submittal shall have a Matrix listing the following:

- Specification section number.
- Short specification section description.
- Description and statement of conformance to specification section.
- Location of supporting data (if more than one document is included in submittal).

Highlight all pertinent specification conformance statements within submittal document.

(d) Performance Testing. Perform testing according to Subsection 105.03 and the following:

1. SALT. The system shall be fully functioning, except for communication back to the TMC/ROC.

2. SST. Systems shall be fully functioning back to the Freeway Management Software at the TMC/ROC for 45 days without failure. Failures not associated with controller equipment shall not be considered a failure of the controller system. At any time during this 45 day test, NDOT reserves the right to require field verification of the equipment.

Failure of any item to meet the requirements for any test will be counted as a defect and the equipment under test will be subject to rejection. Rejected equipment shall be re-tested provided all areas of non-compliance have been corrected and evidence thereof is submitted. For equipment that has failed and subsequently been repaired or modified, prepare and deliver a report that describes the nature of the failure and the corrective action taken.

The contract period shall not be extended for time loss or delays related to testing.

See Subsection 623.03.21 for additional required testing plans and checklists.

623.02.35 CCTV Camera (Fixed). Furnish, install, test, and make operational a fixed, color, closed-circuit television (CCTV) camera at designated field locations and equipment cabinets as shown on the plans.

Supply hardware, software, and ancillary components required for the proper operation of the Fixed CCTV as described on the plans. Materials furnished, assembled, fabricated, and installed under this item shall be new, corrosion-resistant, and conform to the specifications.

Camera shall be a H.264 High Definition Ethernet CCTV camera.

The Fixed CCTV Camera, operating in conjunction with the current version of the Freeway Management System (FMS) at the TMC or ROC, shall form a complete CCTV system.

Provide at a minimum a 3 year warranty on all installed Fixed CCTV and associated equipment beginning at system acceptance for each device. This includes all associated solar and wireless equipment, if applicable.

(a) Approved Equipment List. The CCTV camera shall be the following or an approved equal:

CohuHD 3430 HD IP67 Camera System
WTI Viper V-MAX Ultra Series
AXIS Q1635-E with Artic Temperature Control

Property	Requirement
Image Sensor	1/2.8" progressive scan CMOS or larger (closer to 1 inch is better)
WDR	Support Wide Dynamic Range
Lens – Aperture	fixed f/1.3, fixed f/1.4, or adjustable f/1.6 ~ f/2.8
Lens - Focal length	4.7 mm ~ 84.6mm or better,
Lens - Horizontal Angle of View	Horizontal angle of view: 55° ~ 4° or better
Focus	Auto/Manual (Near, Far)
Day/Night Modes	Auto, Color, B/W
Sensitivity/Minimum illumination	Color: 0.5 lux (0.04 fc) or better, B/W: 0.04 lux (0.004 fc) or better, 0 lux with IR illumination on (optional)
Video	H.264 (MPEG4 Part 10/AVC) Mainline and Baseline Profiles Motion JPEG
Resolution	1920x1080 to 320x240
Frame Rate	From 1 to 30 frames per second (60/50 Hz) in all resolutions
Video Streaming	Multiple, individual configurable streams in H.264 and Controllable frame rate and bandwidth VBR/CBR H.264 RTSP, RTP/UDP, RTSP, Multicast
Zoom	18x optical zoom or better
Defog / Dehazing Mode	Off/Auto/Manual
Electronic Image Stabilization	Enabled/Disabled
Security	Password protection, HTTPS encryption, and IEEE 802.1X
Supported Protocols	Static IP, IPv4, HTTP, HTTPS, SSL/TLS, FTP, CIFS/SMB, SMTP, SNMP v1/v2c/v3 (MIB-II), DNS, NTP, RTSP, RTP, SFTP, TCP, UDP, IGMP, RTCP, ICMP, SSH
Freeway Management System Support	FAST or AXIS VAPIX protocol
Protection/Environmental Rating	IP66, IP67, or IP68

Power over Ethernet Supported Standards	PoE (IEEE 802.3af), PoE+ (EEEE 802.3at), or PoE++ (802.3bt Type 3)
IR illumination	Range of reach up to 15 m (50 ft.) in wide field of view and up to 40 m (130 ft.) in full tele view (optional)
Media Player Compatibility	VLC or any media player compliant with RFC 2326, 3984, 3550, 2435, ISO/IEC13818-1
Operating Temperature	-34° C to 50 °C (-29.2 °F to 122 °F)

Note: All equipment can have better performance beyond the specification but must include at a minimum all fixed CCTV characteristics as described in the table above.

(b) Hardware/Software Requirements. The Fixed CCTV camera shall be equipped with image stabilization to minimize vibration due to vibration, wind, or other external factors.

The Fixed CCTV camera shall include an integrated video encoder with a secure web interface for onsite camera control of the camera. The Fixed CCTV camera shall support programming through the unit's secure web interface and through a manufacturer's application platform used for configuring the advanced camera site settings and extended camera control functions. The Fixed CCTV camera shall allow local control by the technician or remotely by the Freeway Management System (FMS) in the form of first-in and first-out commands.

Local control of the CCTV camera shall be accomplished using the integrated encoder through the secure web interface for zoom and focus. Switching between local and remote control shall be automatic.

The unit shall support Real-time Transport Protocol (RTP) multicast (RFC 3550 compliant) and Real Time Streaming Protocol (RTSP) unicast (RFC 2326 or RFC 7826 compliant) that is compatible with the Freeway Management System (FMS) video player.

The CCTV camera system shall support the FAST or the VAPIX Axis open application programming interface protocols for controlling the camera. The system shall also support National Transportation Communications for Intelligent Transportation System Protocol (NTCIP) 1205, Pelco-D and Pelco-P pan, tilt, and zoom protocols.

The unit shall include an automatic and manual toggle feature for zoom and focus control with an indicator on the current state while using the secure web interface.

(c) Cabling/Wiring. The cable used for CCTV camera control, video, and power shall be a single CAT6 (TIA 568.C.2 compliant) cable.

The Outside Plant (OSP) CAT6 cable shall be an indoor/outdoor cable rated for outdoor use (CMX compliant), riser rated (CMR compliant), 250 MHz, Foiled/Unshielded Twisted Pair (F/UTP), 23 or 24 AWG solid bare copper conductors, 4 pairs, and support 1 Gbps (1000BaseT) Ethernet speeds.

The Inside Plant (ISP) or Premise CAT6 cable shall be an indoor cable rated, 250 MHz, Unshielded Twisted Pair (UTP), 23 or 24 AWG solid bare copper conductors 4 pairs, and support 1 Gbps (1000BaseT) Ethernet speeds. The Contractor shall use manufacturer pre-terminated CAT6 cables when going from the Ethernet switch to the end-point devices within the cabinet.

The wiring shall be installed from the CCTV unit to the Field Hardened Ethernet switch or Cellular Data Modem. The Contractor shall determine the appropriate length needed and order the correct sizes accordingly. Field terminated ends shall be considered on a case-by-case basis by the Engineer. Cabling shall be secured using adjustable hook-and-loop fastener straps. Cabling shall be labeled upon completion of system installation. Labeling shall be weather-resistant printed labels.

The CAT6 cable shall not exceed 328 feet from the CCTV camera to the Field Hardened Ethernet Switch or Cellular Data Modem. The CAT6 cable shall be connectorized using CAT6 RJ-45 shielded connectors (jacks) appropriately sized for the Outside Plant (OSP) and Inside Plant (ISP) cable sleeve. In field terminated ends, when the insulated conductors are exposed between the Ethernet connector and the cable sleeve, the use of heat shrink shall be used to act as a strain relief that shall cover a portion of the RJ-45 connector, all the insulated conductors, and a minimum of 1 inch of the cable sleeve.

(d) Electrical. The system shall use Power over Ethernet (POE) as the means for power and communications. Sites without PoE++ availability on the Field Hardened Ethernet Switch shall use an industrial grade PoE++ injector rated to NEMA TS2 for temperature. A network POE surge protector must be installed between the POE injector or POE switch port and CCTV port, unless specified otherwise in the plans.

Install surge protection in the CCTV cabinet for all cabling between the pole mounted CCTV camera and the Field Hardened Ethernet Switch or Cellular Data Modem. Surge suppression shall meet the requirements of the equipment manufacturer.

The CCTV camera shall be properly grounded at the top of the pole and surge suppressed in the cabinet.

(e) Submittal. Submittal shall have a Matrix listing the following:

- Specification section number.
- Short specification section description.
- Description and statement of conformance to specification section.
- Location of supporting data (if more than one document is included in submittal).

Highlight all pertinent specification conformance statements within submittal document.

(f) Performance Testing. Perform testing according to Subsection 105.03 and the following:

1. SALT. The system shall be fully functioning, except for communication back to the TMC/ROC.

2. SST. Systems shall be fully functioning back to the Freeway Management Software at the TMC/ROC for 45 days without failure. Failures not associated with controller equipment shall not be considered a failure of the controller system. At any time during this 45 day test, NDOT reserves the right to require field verification of the equipment.

Failure of any item to meet the requirements for any test will be counted as a defect and the equipment under test will be subject to rejection. Rejected equipment shall be re-tested provided all areas of non-compliance have been corrected and evidence thereof is submitted. For equipment that has failed and subsequently been repaired or modified, prepare and deliver a report that describes the nature of the failure and the corrective action taken.

The contract period shall not be extended for time loss or delays related to testing.

See Subsection 623.03.21 for additional required testing plans and checklists.

623.02.36 CCTV Camera Lowering Device (High Mast). Furnish, install, test, and make operation a CCTV camera lowering device (CLD). The CLD shall consist of a CCTV lowering system which includes the umbilical cord, required cabling from the CCTV to the cabinet, 1 power lowering tool per contract, 1 manual lowering tool per device, and any supplemental hardware to make a fully functioning CCTV lowering system.

Provide at a minimum a 3 year warranty on all installed camera lowering devices and associated equipment beginning at system acceptance for each device. This includes all associated solar and wireless equipment, if applicable.

(a) Operational Requirements. If an existing camera is being replaced with a new camera, replace all cabling from the camera to the cabinet. Replacement of cabling is incidental to the new camera bid item.

Use camera lowering devices that shall allow maintenance personnel to lower and raise the camera assembly from the top of a high mast pole, without damaging or degrading the camera assembly. Provide the ability to lower and raise the camera assembly from the base of the pole.

The lowering device shall be installed in a manner that the person lowering the camera is not in the direct path of the camera during the lowering process. The lowering device equipment shall be offset a minimum of 90 degrees from the anticipated final lowering position of the camera.

The camera lowering system shall mitigate obstructions by using additional devices to meet clearance of any obstruction while the device is being lowered.

When the camera assembly is brought back to the raised position, use a tracking guide that supports and aligns the connectors.

(b) Proof of Manufacturer Experience. Furnish a camera-lowering device (CLD) product from a manufacturer with a minimum of 3 years of experience in the successful manufacturing of camera lowering systems. The Contractor shall be able to identify and provide proof and a contact person upon request from the Engineer a

minimum of 3 previous projects where the proposed system has been installed successfully for over a one-year period.

(c) Cabling/Wiring. The camera lowering device shall be supplied with a direct run of a CAT6 cable, wired and sealed directly to the top connector, for a continuous run to the CCTV cabinet.

CAT6 cable shall be Outside Plant (OSP) indoor/outdoor cable rated for outdoor use (CMX compliant), riser rated (CMR compliant), 250 MHz, Foil Shielded (F/UTP), 23 or 24 AWG solid bare copper conductors, 4 pairs, and support 1 Gbps (1000BaseT) Ethernet speeds.

The camera lowering device shall be installed with an Outside Plant (OSP) RJ-45 connector at the top of the pole. Supply leads sealed directly to the top connector and run continuously to the CCTV cabinet.

Splices will not be allowed between the camera and cabinet, except for the Outside Plant (OSP) RJ-45 connector located in the camera connection box.

Provide length of cable from camera to cabinet, plus additional 20 feet slack for termination in cabinet. Verify actual conduit route and length prior to ordering CCTV cable.

The CAT6 cable length shall not exceed a maximum of 328 feet from the camera to the Ethernet switch.

Cabling shall be secured using adjustable hook-and-loop fastener straps. Cabling shall be labeled upon completion of system installation. Labeling shall be weather-resistant printed labels.

(d) Supplementary Equipment. Provide lowering device equipment including a channeled mast arm, pole top junction box, camera connection box, pulley system, 1 manual lowering tool per device, and 1 power lowering tool per contract.

Ensure that equipment meets the environmental requirements of Subsection 623.01.03.

a. Channeled Mast Arm. Construct the mast arm as a continuously divided pipe such that the power and control cables can remain separated within the pole and mast arm. Attach the arm to the mounting plate of the pole using stainless steel hardware. Align the arm so that it is perpendicular to the roadway.

b. Pole Top Junction Box. Construct the junction box out of cast aluminum or stainless steel that meets NEMA 3R standards. Provide a junction box that is sufficiently large enough to accommodate wiring connections if necessary.

c. Camera Connection Box. Use a camera connection box that consists of an upper and lower portion made of cast aluminum or stainless steel that meets NEMA 3R standards. Ensure that the interface between the camera assembly and the lowering system is compatible with the applicable components of the camera assembly.

Provide additional weights and/or counterweights in the lower portion of the camera connection box as necessary to ensure the following:

1. Proper connection and alignment of connectors is achieved when the camera assembly is returned to the raised position.
2. Proper disengaging of the camera assembly from the upper camera connection box.
3. There is no deflection in the camera when in the raised and functioning position and subjected to a 60mph wind with a 30% gust factor. (Provide Vendor certification)
4. Sway of the camera connection box and camera assembly when in the lowered position does not exceed 12 inches from center during 60 mph wind with a 30% gust factor. (Provide vendor certification)

d. Pulley System. Use pulleys that have sealed, self-lubricated bearings, oil tight bronze bearings, or sintered bronze bushings. Use a stainless-steel lowering cable that has a minimum 5/32-inch diameter and a minimum breaking strength of 7740 N. Ensure that only the lowering cable is permitted to move within the pole or lowering device during lowering or raising. Install cable guides at the top and bottom of the pole to provide positive alignment for the lowering cable.

e. Multi-Contact Connectors. Provide a multi-contact connector assembly for the upper and lower camera connection boxes. Use a spring-loaded upper connector with sufficient tension to allow the upper and lower socket connectors to securely fasten to each other. Provide environmental protection for all socket contacts such that there

shall always be a clean, dry connection.

There shall be a minimum of 16 contacts, all 12-gauge or larger for large style connectors. Contacts shall be Mil-spec gold plated over nickel plated copper to ensure optimum conductivity. Brass contacts are not allowed. The cable(s) from the CCTV control cabinet shall be continuous from the control cabinet and wired directly into the sealed connector. No pole top splices or junctions shall be allowed.

f. Lowering Tool. Provide a portable lowering tool to lower and raise the camera assembly. Provide a tool that has a heavy-duty reduction gear box and a braking system to control lowering and raising speed and direction and to prevent “freewheeling”. Provide provisions that shall permit use of either a hand crank or power drill to raise or lower the camera assembly. Supply two hand cranks and one 373 W (0.5 HP) variable speed, reversible power drill with 1/2 key type chuck with appropriate bits to operate the lowering tool. Provide hand cranks and a power drill assembly that can be used interchangeably at every location with a lowering device.

g. Umbilical Cord. Supply 1 connectorized umbilical cord per cabinet to facilitate a fully functional connection between the camera assembly and the control cabinet when the camera assembly is in the lowered position at ground level. Furnish the umbilical cord with connector(s) on one end that mate with the multi-contact connectors at the lower connection box, such that full operation is achieved without opening the CCTV camera enclosure. Furnish the umbilical cord with rubber grommet water-resistant connectors and in a length that accommodates the connection from the cabinet to the lowered camera assembly with no strain.

(e) Proof of Installation. The lowering device Manufacturer shall furnish a factory representative or a trained, qualified Manufacturer’s Representative to assist the electrical contractor with the assembly and testing of the first lowering system onto the pole assembly. The Manufacturer shall furnish the applicable DOT engineer documentation certifying that the Electrical Contractor has been instructed on the installation, operation, and safety features of the lowering device within the last 12 months.

(f) Training. Be responsible for training Maintenance Personnel and other NDOT staff on the lowering system. Provide training for Maintenance Personnel and other NDOT staff upon completion of at least 1 installation. Training shall cover basic maintenance, troubleshooting, system set up, operation, adjustments, and any other vendor-recommended topics.

Provide 10 USB drives and 10 hard copies of all training material and user manuals.

(g) Submittal. Submittal shall have a Matrix listing the following:

- Specification section number.
- Short specification section description.
- Description and statement of conformance to specification section.
- Location of supporting data (if more than one document is included in submittal).

Highlight all pertinent specification conformance statements within submittal document.

(h) Performance Testing. Perform testing as required Subsection 105.03 and the following:

Conduct testing in accordance with the Fixed and PTZ CCTV Testing Procedures.

1. SALT. The system shall be fully functioning, except for communication back to the TMC/ROC.

2. SST. Systems shall be fully functioning back to the Freeway Management Software at the TMC/ROC for 45 days without failure. Failures not associated with controller equipment shall not be considered a failure of the controller system. At any time during this 45 day test, NDOT reserves the right to require field verification of the equipment.

Failure of any item to meet the requirements for any test will be counted as a defect and the equipment under test will be subject to rejection. Rejected equipment shall be re-tested provided all areas of non-compliance have been corrected and evidence thereof is submitted. For equipment that has failed and subsequently been repaired or modified, prepare and deliver a report that describes the nature of the failure and the corrective action taken.

The contract period shall not be extended for time loss or delays related to testing.

623.02.37 CCTV Camera (PTZ). Furnish, install, test, and make operational a color, closed-circuit television (CCTV) Pan-Tilt-Zoom (PTZ) Camera at designated field locations and equipment cabinets as shown on the plans.

Supply hardware, software, and ancillary components needed for the proper operation of the PTZ CCTV as described on the plans. Materials furnished, assembled, fabricated, and installed under this item shall be new, corrosion-resistant, and conform to the specifications.

Camera shall be a H.264 High Definition Ethernet CCTV camera.

The PTZ CCTV Camera, operating in conjunction with the current version of the Freeway Management System (FMS) at the TMC or ROC, shall form a complete CCTV system.

Provide at a minimum a 3 year warranty on all installed PTZ CCTVs and associated equipment beginning at system acceptance for each device. This includes all associated solar and wireless equipment, if applicable.

(a) Approved Equipment List. The CCTV camera shall be the following or an approved equal:

For AC sites:

Cohu Rise 4261 HD Series
WTI VS720P-H.264-HD30L Series

For Solar Sites:

Axis Q6155-E with Artic Temperature Control Series

Property	Requirement
Image Sensor	1/2.8" progressive scan CMOS or larger (closer to 1 inch is better)
Dynamic Range	Support Dynamic Range or Wide Dynamic Range
Lens – Aperture	f/1.6 ~ f/4.7 or better
Lens – Zoom	30x Optical Zoom with 12x digital zoom
Lens - Focal length	4.4 mm ~ 129mm (124 mm effective range) or better
Pan Range	360° continuous rotation
Tilt Range	360°
Pan and Tilt Speed	45°/second
Focus	Auto/Manual (Near, Far)
Day/Night Modes	Auto, Color, B/W
Sensitivity/Minimum illumination	Color: 0.5 lux (0.04 fc) or better, B/W: 0.04 lux (0.004 fc) or better,
Video	H.264 (MPEG4 Part 10/AVC) Mainline and Baseline Profiles Motion JPEG
Resolution	1920x1080 to 320x240
Frame Rate	From 1 to 30 frames per second (60/50 Hz) in all resolutions
Video Streaming	Multiple, individual configurable streams in H.264 and Controllable frame rate and bandwidth VBR/CBR H.264 RTSP, RTP/UDP, RTSP, Multicast
Defog / Dehazing Mode	Off/Auto/Manual
Security	Password protection and HTTPS encryption
Supported Protocols	Static IP, IPv4, HTTP, HTTPS, SSL/TLS, FTP, CIFS/SMB, SMTP, SNMP v1/v2c/v3 (MIB-II), DNS, NTP, RTSP, RTP, SFTP, TCP, UDP, IGMP, RTCP, ICMP, SSH
Freeway Management System Support	FAST protocol
Protection/Environmental Rating	IP67 or IP68
Power over Ethernet Supported Standards	PoE (IEEE 802.3af), PoE+ (EEEE 802.3at), or PoE++ (802.3bt Type 3)
Media Player Compatibility	VLC or any media player compliant with RFC 2326, 3984, 3550, 2435, ISO/IEC13818-1
Operating Temperature	-37°C to +74 °C (-35 °F to +165 °F)

Note: All equipment can have better performance beyond the specification but must include at a minimum all PTZ CCTV features as described in the table above.

(b) Hardware/Software Requirements. The PTZ CCTV camera shall be equipped with image stabilization to minimize vibration due to vibration, wind, or other external factors.

The PTZ CCTV camera shall include an integrated video encoder with a secure web interface for on-site control of the camera. The PTZ CCTV camera shall support programming through the unit's secure web interface and through a manufacturer's application platform used for configuring the advanced camera site settings and extended camera control functions. The PTZ CCTV camera shall allow local control by the technician or remotely by the Freeway Management System (FMS) in the form of first-in and first-out commands.

Local control of the PTZ CCTV camera shall be accomplished using the integrated encoder's secure web interface for pan, tilt, zoom, and focus. Switching between local and remote control shall be automatic.

The unit shall support Real-time Transport Protocol (RTP) multicast (RFC 3550 compliant) and Real Time Streaming Protocol (RTSP) unicast (RFC 2326 or RFC 7826 compliant) that is compatible with the Freeway Management System (FMS) video player.

The CCTV camera system shall support the FAST or the VAPIX Axis open application programming interface protocols for controlling the camera. The system shall also support National Transportation Communications for Intelligent Transportation System Protocol (NTCIP) 1205, Pelco-D and Pelco-P pan, tilt, and zoom protocols.

The unit shall include an automatic and manual toggle feature for zoom and focus control with an indicator on the current state while using the secure web interface.

(c) Cabling/Wiring. The cable used for CCTV camera control, video, and power shall be a single CAT6 (TIA 568.C.2 compliant) cable.

The Outside Plant (OSP) CAT6 cable shall be an indoor/outdoor cable rated for outdoor use (CMX compliant), riser rated (CMR compliant), 250 MHz, Foiled/Unshielded Twisted Pair (F/UTP), 23 or 24 AWG solid bare copper conductors, 4 pairs, and support 1 Gbps (1000BaseT) Ethernet speeds.

The Inside Plant (ISP) or Premise CAT6 cable shall be an indoor cable rated, 250 MHz, Unshielded Twisted Pair (UTP), 23 or 24 AWG solid bare copper conductors, 4 pairs, and support 1 Gbps (1000BaseT) Ethernet speeds. Use manufacturer pre-terminated CAT6 cables when going from the Ethernet switch to the end-point devices within the cabinet.

The wiring shall be installed from the CCTV unit to the Field Hardened Ethernet switch or Cellular Data Modem. Determine the appropriate length needed and order the correct sizes accordingly. Field terminated ends shall be considered on a case-by-case basis by the Engineer. Cabling shall be secured using adjustable hook-and-loop fastener straps. Cabling shall be labeled upon completion of system installation. Labeling shall be weather-resistant printed labels.

The CAT6 cable shall not exceed 328 feet from the CCTV camera to the Field Hardened Ethernet Switch or Cellular Data Modem. The CAT6 cable shall be connectorized using CAT6 RJ-45 shielded connectors (jacks) appropriately sized for the Outside Plant (OSP) and Inside Plant (ISP) cable sleeve. In field terminated ends, when the insulated conductors are exposed between the Ethernet connector and the cable sleeve, the use of heat shrink shall be used to act as a strain relief that shall cover a portion of the RJ-45 connector, all the insulated conductors, and a minimum of 1 inch of the cable sleeve.

(d) Electrical. The system shall use Power over Ethernet (PoE) as the means for power and communications. Sites without PoE++ availability on the Field Hardened Ethernet Switch shall use an industrial grade PoE++ injector rated to NEMA TS2 for temperature. A network POE surge protector must be installed between the POE injector or POE switch port and CCTV port, unless specified otherwise in the plans.

Install surge protection in the CCTV cabinet for all cabling between the pole mounted CCTV camera and the Field Hardened Ethernet Switch or Cellular Data Modem. Surge suppression shall meet the requirements of the equipment manufacturer.

The CCTV camera shall be grounded at the top of the pole and surge suppressed in the cabinet.

(e) Submittal. Submittal shall have a Matrix listing the following:

- Specification section number.
- Short specification section description.
- Description and statement of conformance to specification section.

- Location of supporting data (if more than one document is included in submittal).

Highlight all pertinent specification conformance statements within submittal document.

(f) Performance Testing. Perform testing according to Subsection 105.03 and the following:

3. SALT. The system shall be fully functioning, except for communication back to the TMC/ROC.

4. SST. Systems shall be fully functioning back to the Freeway Management Software at the TMC/ROC for 45 days without failure. Failures not associated with controller equipment shall not be considered a failure of the controller system. At any time during this 45 day test, NDOT reserves the right to require field verification of the equipment.

Failure of any item to meet the requirements for any test will be counted as a defect and the equipment under test will be subject to rejection. Rejected equipment shall be re-tested provided all areas of non-compliance have been corrected and evidence thereof is submitted. For equipment that has failed and subsequently been repaired or modified, prepare and deliver a report that describes the nature of the failure and the corrective action taken.

The contract period shall not be extended for time loss or delays related to testing.

See Subsection 623.03.21 for additional required testing plans and checklists.

623.02.38 CAT6 Ethernet Cabling. Furnish, install, test, and make operational an Ethernet cable designated for Outside Plant (OSP) or Inside Plant (ISP)/premise locations to provide communications between the device equipment and the network equipment as shown on the plans.

Supply all hardware and assorted components needed for the proper installation of the cabling.

(a) General Requirements. The Outside Plant (OSP) CAT6 cable shall be an indoor/outdoor cable rated for outdoor use (CMP compliant), riser rated (CMP compliant), 250 MHz, Shielded/Unshielded Twisted Pair (S/UTP), 23 or 24 AWG solid bare copper conductors, 4 pairs, and support 1 Gbps (1000BaseT) Ethernet speeds.

The Inside Plant (ISP) or premise CAT6 cable shall be an indoor cable rated, 250 MHz, Unshielded Twisted Pair (UTP), 23 or 24 AWG solid bare copper conductors, 4 pairs, and support 1 Gbps (1000BaseT) Ethernet speeds.

For fiber huts and other Enterprise level buildings and facilities use a universal modular copper cabling platform that can support up to 1 Gbps with factory terminated and serialized CAT6 MRJ21 cable assemblies using two high-density CAT6 cassettes with RJ-45 jacks. Use CAT6 MRJ21 cable assemblies to interconnect the MRJ21 RJ-45 cassettes for communications between groups of relay racks within the same room. Add MRJ21 cable assemblies and MRJ21 RJ45 cassettes as identified on the plans. Additional information is listed in the Fiber Hut Special Provisions.

Use manufacturer pre-terminated CAT6 OSP and ISP/premise cables. Do not exceed 328 feet from the devices outside the cabinet to the Field Hardened Ethernet Switch or Cellular Telephone Modem. Ensure Ethernet cabling complies with 4 pair PoE, Type 4 for up to 100W in accordance with IEEE 802.3bt. Comply with the mechanical requirements of the CAT6 specifications identified in TIA 568.C.2 (ANSI/CEA S-102-732-2009).

Cable all connectors in accordance with the TIA-568B standard.

Field terminated ends shall be considered on a case-by-case basis and shall require a Request for Information (RFI), for each instance, to be sent to the Engineer for evaluation. Field terminations are highly discouraged. In field terminated ends, when the insulated conductors are exposed between the Ethernet connector and the cable sleeve, use heat shrink to act as a strain relief that shall cover a portion of the RJ-45 connector, all the insulated conductors, and a minimum of 1 inch on the cable sleeve.

(b) Electrical. Ground the CAT6 OSP Ethernet shield at the top and bottom of the pole. Determine the length needed and order the correct sizes accordingly. Connectorize OSP cabling with CAT6 RJ-45 shielded connectors (jacks) appropriately sized for the OSP cable sleeve.

Install surge protection for all cabling between the devices on the pole and the Field Hardened Ethernet Switch or Cellular Data Modem. Surge suppression shall meet the requirements of the equipment manufacturer.

(c) Submittal. Submittal shall have a Matrix listing the following:

- Specification section number.
- Short specification section description.
- Description and statement of conformance to specification section.
- Location of supporting data (if more than one document is included in submittal).

Highlight all pertinent specification conformance statements within submittal document.

(d) Performance Testing. Perform the following tests in accordance with the provided testing documents:

Length/link certification testing required for all OSP CAT6 cabling to include, at least the following parameters:

Wiremap
Length
DC Loop Resistance
Signal (Propagation) Delay
Attenuation – Insertion Loss
Near End Cross Talk – NEXT
Attenuation to Crosstalk Ration (ACR)
Power Sum NEXT (PSNEXT)
Return Loss
Far End Crosstalk (FEXT)
Equal Level Far End Crosstalk (ELFEXT)
Power Sum Equal Level Crosstalk (PSELFEXT)

Failure of any item to meet the requirements for any test will be counted as a defect and the equipment under test will be subject to rejection. Rejected equipment shall be re-tested provided all areas of non-compliance have been corrected and evidence thereof is submitted. For equipment that has failed and subsequently been repaired or modified, prepare and deliver a report that describes the nature of the failure and the corrective action taken.

The contract period shall not be extended for time loss or delays related to testing.

623.02.39 Field Hardened Ethernet Switch (FHES). The Ethernet switches shall include required cables, surge protection, power supplies, connections, mounting hardware, and various accessories as needed to provide carrier-level Ethernet communications as shown on the plans.

Supply hardware, licensing, software, and assorted components needed for the proper operation of the unit in the NDOT Intelligent Transportation System (ITS) environment. Install the license for every feature of the Field Hardened Ethernet Switch.

Provide a minimum of a 5 year warranty on all installed equipment, licensing, and software beginning at system acceptance for each device. The warranty on equipment shall be offered by the manufacturer and shall be transferable to the Department at the time of acceptance.

(a) General Requirements. The switch configuration shall be provided by the NDOT Traffic Operations Technology Section (TOTS). The system integrator shall provide the completed ITS Device Integration Sheet to TOTS at least 30 calendar days prior to the first expected switch installation. The ITS Device Integration sheet shall include all ITS devices on the project.

TOTS will provide a link to the system integrator to a cloud file share folder for the uploading of all ITS technical files.

The Field Hardened Ethernet Switch version must be designed to operate in harsh temperature environments in compliance with NEMA TS-2 environmental specifications of -37 °C to 74 °C (-35 °F to 165 °F).

Switches must feature options for single or redundant, hot-swappable AC and DC power supply unit (PSU), including two AC, two DC, or one AC and one DC PSU in redundant arrays rated to meet or exceed NEMA TS2 temperature requirements.
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(b) Approved Equipment List. The switch shall be the following:

For AC Radar Detector System sites with pole mounted cabinet and din rail requiring a FHES:

Supply an Alcatel-Lucent Enterprise OS6465P12RAC5

For AC Communications Cabinet sites:

Supply an Alcatel-Lucent Enterprise OS6865P16XRAC5

For DC Communications Cabinet sites:

Supply an Alcatel-Lucent Enterprise OS6865P16XRDC5

For AC Communications Building sites:

Supply an Alcatel-Lucent Enterprise OS6900X48RACF5

Supply an Alcatel-Lucent Enterprise OS6860NP48MXNIRAC5

For DC Communications Building sites:

Supply an Alcatel-Lucent Enterprise OS6900X48RDCF5

Supply an Alcatel-Lucent Enterprise OS6860NP48MXNIRAC5

For all small form-factor pluggable (SFP) transceivers:

Supply an Alcatel-Lucent Enterprise iSFP-GIG-LX

(c) Submittal. Submittal shall have a Matrix listing the following:

- Specification section number.
- Short specification section description.
- Description and statement of conformance to specification section.
- Location of supporting data (if more than one document is included in submittal).

Highlight all pertinent specification conformance statements within submittal document.

(d) Performance Testing. Perform testing as required in Subsection 105.03 and the following:

1. SALT. The system shall be fully functioning, except for communication back to the TMC/ROC.

2. SST. Systems shall be fully functioning back to the Freeway Management Software at the TMC/ROC for 45 days without failure. Failures not associated with controller equipment shall not be considered a failure of the controller system. At any time during this 45 day test, NDOT reserves the right to require field verification of the equipment.

Failure of any item to meet the requirements for any test will be counted as a defect and the equipment under test will be subject to rejection. Rejected equipment shall be re-tested provided all areas of non-compliance have been corrected and evidence thereof is submitted. For equipment that has failed and subsequently been repaired or modified, prepare and deliver a report that describes the nature of the failure and the corrective action taken.

The contract period shall not be extended for time loss or delays related to testing.

See Subsection 623.03.21 for additional required testing plans and checklists.

623.02.40 Landscape Lighting. Landscape Lighting shall be constructed with the materials as shown on the plans. Landscape lighting shall include but is not limited to excavation, backfill, connections, conduit, conductors, boxes, transformers, dimmers and wiring from pull box to LED luminaire fixture(s), LED drivers, power supply, fixtures, vandal resistant light enclosures, mounting brackets and hardware necessary to complete and make the lighting operational, adjustable and dimmable.

Substitutions must be submitted to the Engineer for authorization.

Submittals:

1. Laboratory certification LED landscape lighting.
2. LED landscape lighting cut sheets.
3. Shop drawings showing how lights will be mounted, dimmers, vaults, junction boxes, wiring diagram, power supply and light enclosure.
4. Installation, operation, and maintenance manual to be supplied with each luminaire and delivered to NDOT Resident Engineer.
5. Mock up in the field for fixture placement.

Landscape Lighting (Type A) shall be one of the following or an approved equal and include a five (5) year minimum warranty:

Orgatech, Architura Signlighter 1400s
Model: 1400s-8-LH-40-ND-120-W-BL-G
1400s 8' LH 4000K Non Dimming, 120 degree optics. Swivel Mount, Black, Glare Shield
12203 Magnolia Ave, Suite 1
Riverside, CA 92503
636-969-6820

ALUZ A1 Series Surface ZIBI Standard
Model A1ZIBI CGL BK 40K 12W EF IP67 UNV 4'
ZIBI Standard Clear Glass Lens, Black Finish, 4000K, 12 Watts, End Feed, Outdoor IP67, Universal Line Voltage, 4' length, connected to make 8' lengths as needed.
1170 N Red Gum St.
Anaheim, CA 92806
1-866-ALUZ-LTG

623.02.41 Automated Vehicle Classification System (AVCS). The AVCS system shall be a high speed Type II system capable of obtaining the required traffic data by the use of piezo sensor technology for all lanes of traffic and all components required for data acquisition.

The AVCS system shall be completely TURNKEY, including documentation, equipment installation and testing.

The AVCS system shall be able to accommodate vehicles and vehicle combinations with up to 13 axles and shall automatically determine, classification, speed, and volume data for each vehicle, by lane of travel.

(a) Materials. Furnish equipment with consistent, reliable performance that will produce quality data.

Obtain the AVCS system from the following vendor:

International Road Dynamics Pat Traffic
1002 South Main Street
Chambersburg, PA 17201
(717) 264 2077
Fax: (717) 264 4941
Contact: Bruce Myers

Provide Measurement Specialties Inc. Brass Linguini, half lane 6ft. Class one Piezo sensor technology for all lanes.

Furnish additional items that may be unique to the design of the system or to meet the contract requirements, even though not individually specified.

(b) Installation. Provide a AVCS representative to assist and supervise the installation of the AVCS system. The AVCS representative shall be an employee of the AVCS vendor and shall be knowledgeable of all aspects of the AVCS installation and operation.

Coordinate equipment installation dates and give notification 30 days prior to installation. The Engineer will contact the Vehicle Size and Weight Section at (775) 888-7536 to notify them prior to installation. Department personnel must be present to observe and inspect the installation. Install all equipment to provide a complete Turnkey system. The vendor shall test the Piezo sensors for Capacitance and Resistance (Ω) prior to and after installation. The loops shall be tested for Loop Resistance (Ω), Inductance (MH) and Leakage to Ground (Ω). The results shall be documented and provided to NDOT upon completion of system. If unforeseen technical problems develop with the installation, provide all engineering and/or manufacture technical assistance for proper installation.

(c) Testing. The testing procedures for acceptance must be carried out jointly by the Contractor and Department personnel at the site. Testing procedures shall demonstrate compliance with the contract requirements. A representative of the Vehicle Size and Weight Section of the Traffic Information Division, NDOT will be the Department personnel required to be present during testing. The Engineer will contact the Vehicle Size and Weight Section at (775) 888-7536 to coordinate such testing.

The vendor will commission the AVCS system so as to fully adhere to ASTM 1318-09 for a type II WIM system with the following exceptions from the TABLE 1 Data Items Produced by WIM System:

Wheel Load
Axle Load
Axle-Group Load
Gross-Vehicle Weight
Equivalent Single-Axle Loads (ESALs)

4.1.2 Type II—This type of WIM system shall be designed for installation in one or more lanes at traffic data-collection sites and should be capable of accommodating highway vehicles moving at speeds from 15 to 80 mph, inclusive. For each vehicle processed, all data items shown in Table 1 except lined out items shall be produced by the system. All other features and options of the Type II WIM system shall be identical to those described in 4.1.1 for the Type I WIM system.

(d) Acceptance. Once the system is considered fully commissioned a final acceptance test shall be conducted. This constitutes a period of 30 consecutive days whereby no remedial action is required by the Contractor or Department personnel to view or obtain data and tables, which are being accumulated and in which the AVCS fully meets or exceeds all ASTM 1318-09 standards for a type II WIM system.

623.02.42 Rectangular Rapid Flashing Beacon System. The system shall consist of Rectangular Rapid Flashing Beacon Controller (Type 1), Rectangular Rapid Flashing Beacons, pedestrian push button with sign, permanent sign items, poles, conduit, and conductor as shown on the plans.

The Rectangular Rapid Flashing Beacon shall be a Federal yellow 24 ± 1/2 inch bar containing two amber 3 inch high by 7 ± 1/4 inch wide LED meeting the current federal flash rate for RRFB's and meet current brightness standards. Include mounting and wiring hardware necessary to make an operating RRFB as indicated on the plans.

Pedestrian push button shall conform to Subsection 623.02.31.

Permanent signs shall conform to Section 627.

623.03.12 Luminaire, General. This Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Furnish and install new LED luminaires as indicated on the plans.

Luminaire shall be LED type with integral driver, produce no up-light, aluminum housing, and shall have an ingress protection rating of IP66.

Access to internal parts requiring replacement shall not require tools (i.e. "tool-less entry").

Luminaires Type A and Type B shall meet the following:

(a) Distribution:

1. Luminaire shall be a Type II medium distribution.
2. Orientate each luminaire so the luminaire lighting distribution and throw is parallel with the roadway.
3. Installation, operation and maintenance manual to be supplied with each luminaire and delivered to NDOT Resident Engineer.
4. Luminaire system efficacy shall be no less than 110 lumen per input watt, based on the initial lumen output.
5. Type A Luminaire:
   23,500 lm ± 5% output for CLO driver luminaires.
   16,500 lm ± 5% output for NON-CLO driver luminaires.
   Type B Luminaire:

18,500 lm ± 5% output for CLO driver luminaires.
13,000 lm ± 5% output for NON-CLO driver luminaires.

6. Include a 7-pin dimming control receptacle with a shorting cap. The receptacle shall be ANSI C136.41 compliant and have 3 power contacts and 4 dimming/signal contacts. Receptacle dimming contacts shall be connected to dimming leads of drivers.
7. 3000 K ± 300 K color temperature.
8. Color Rendering Index (CRI) of 70 or greater per the IES LM-79 test results.
9. LEDs shall have a minimum rated life of 100,000 hours at 70 °F per IES TM-21, at the normal operating driver current for the specific luminaire. The lumen output shall be maintained at 70% of initial rated lumens (L70) or greater over the rated life of the luminaire.
   In order to qualify to supply a NON-CLO driver, the luminaire must meet the following requirements:
   a. Luminaire shall meet a minimum lumen maintenance of 95% at 100,000 hours in 50 °C (122 °F) ambient temperature per reported IES TM-21 with a minimum 17,000 hours of IES LM-80 data.
   b. The luminaire's thermal report, LM-80 report, and IES TM-21 calculation Excel spreadsheet must be provided with the luminaire material submittal. This information must also be added into the luminaire matrix (see subsection e). The IES TM-21 calculation Excel spreadsheet must state the ambient temperature and the case temperature that the luminaire reached at that ambient temperature in the IES TM-21 report.
10. LEDs shall be temperature rated for operation and storage within the range of -40 °C (-40 °F) to +50 °C (122 °F).
11. LEDs shall withstand low and high frequency vibration (ANSI C136.31 Vibration Level 3G) over the rated life of the luminaire.

(b). Cooling System:

1. Mechanical design of protruding external surfaces (e.g. heat sink fins) shall facilitate hose-down cleaning and discourage debris accumulation.
2. The cooling system shall be passive and utilize heat sinks, convection, or conduction.
3. Fans, diaphragms, pumps, or liquids are not acceptable.

(c). LED Drivers:

1. Dimming signal protocols are 0-10 V.
2. Operating voltage shall be 120-277 V, and shall operate normally with input voltage fluctuations of ± 10%.
3. Minimum Power Factor (PF) shall be 0.90 at full input power and across specified voltage range.
4. Total Harmonic Distortion (THD) shall be no more than 20% at full input power and across specified voltage range.
5. 650 mA ± 25% driver. If a CLO driver is used, the CLO driver shall be set at the factory to 70% light output and increase 1.5% each 4,400 hours of operation.
6. Drivers shall be Restriction of Hazardous Substances (RoHS) compliant.
7. All electronics of the power supply and the LEDs shall be protected from all electrical surges with a minimum electrical immunity rating of 10 kV/5 kA per ANSI/IEEE C62.41, including, but not limited to, lighting strikes and stray current in rebar and concrete. Surge protection shall be integral to the LED power supply. Failure of the electrical immunity system shall not result in disconnect of power to luminaire.
8. Electromagnetic interference shall comply with Federal Communications Commission (FCC) Title 47 Code of Federal Regulations (CFR) part 15 non-consumer radio frequency interference (RFI) and/or electromagnetic interference (EMI) standards.

New luminaire shall fit onto the existing poles and operate on the existing power connection. LED luminaire shall not be retrofit to existing luminaire housing; replace housing along with the luminaire as a single unit. Light sources shall be compatible with dimmable drivers supplied with the luminaire in which they are to be installed. All light sources of a similar type shall be provided by the same manufacturer.

New luminaire shall have a minimum warranty of 10 years for all parts, materials and shipping required to repair or replace the luminaire. Provide the manufacturer's warranty to the Engineer prior to installing the luminaire.

(d) Warranty:

The warranty shall cover all failures including, but not limited to:

1. Failure in luminaire housing, wiring, connections, drivers and photoelectric control devices.
2. More than 10% decrease in lumen output at the current driver output setting.

The warranty shall begin upon completion of the project and acceptance of the contract. The bill of lading shall be provided prior to final payment of the lighting.

(e) Lighting Submittal:

Submittal shall have a Matrix listing the following:

1. Specification section number.
2. Short specification section description.
3. Description and statement of conformance to specification section.
4. Location of supporting data (if more than one document is included in submittal).
5. Luminaire's thermal report (for non-CLO driver luminaire).
6. LM-80 report (for non-CLO driver luminaire).
7. Luminaire's TM-21 calculation Excel spreadsheet (for non-CLO driver luminaire).

Highlight all pertinent specification conformance statements within submittal document.

Wiring diagram of all control devices (e.g. photoelectric cell, driver, etc.).

623.03.21 Field Tests. Testing procedures for this Section are available using the following link:

https://www.nevadadot.com/doing-business/about-ndot/ndot-divisions/operations/traffic-operations/signals-lighting-its/623slitestprocedures/-fsiteid-1

623.04.01 Measurement. ITS vault, ITS pole, red light detector, preformed loop detector, modify detector, special detector surface sensor, radar detector system, traffic actuated controller, communication cabinet, flashing beacon controller, special M-1 cabinet, field hardened ethernet switch, removal of traffic signal controller cabinet, removal of pole, remove pole mounted controller, remove and reset video image detection system, remove and reset steel pole, transformer, underground integrated fiber optic splice/termination unit, video optical transceiver (votr) pair, CCTV lowering device, CCTV camera (PTZ), CCTV camera (fixed), CCTV camera (detectable), steel post, rectangular rapid flashing beacon, rectangular rapid flashing beacon controller, and landscape lighting will be measured by the each.

Ethernet cable, metal conduit, multiduct conduit, fiber optic branch cable, and removal of existing cable will be measured by the linear foot.

Removal of conduit and conductors and removal of existing electrical system will be measured by the lump sum.

The Automated Vehicle Classification system will be measured by the lump sum for the complete and functional system.

The rectangular rapid flashing beacon system will be measured and paid for under the separate items of rectangular rapid flashing beacon controller, rectangular rapid flashing beacons, permanent signs, pedestrian push button with sign, conduit, and conductor as shown on the plans. Permanent signs will be measured and paid for according to Section 627.

623.05.01 Payment. Payment shall be made under:

Pay Item	Pay Unit
ITS Vault	Each
ITS Pole (size)	Each
Red Light Detector	Each
Loop Detector (Pre-formed)	Each
Modify Detector	Each
Special Detector Surface Sensor	Each
Radar Detector System	Each
Traffic Actuated Controller	Each
Communication Cabinet	Each
Flashing Beacon Controller	Each
Special M-1 Cabinet	Each

Ethernet Cable ..... Linear Foot
Field Hardened Ethernet Switch ..... Each
Removal of Traffic Signal Controller Cabinet ..... Each
Automated Vehicle Classification System (type) ..... Lump Sum
Removal of Existing Electrical System ..... Lump Sum
Removal of Conduit and Conductors ..... Lump Sum
Removal of Pole ..... Each
Remove Pole Mounted Controller ..... Each
Remove and Reset Video Image Detection System ..... Each
Remove and Reset Steel Pole ..... Each
Transformer (type) ..... Each
(size) Conduit (type) ..... Linear Foot
(size) Multiduct Conduit ..... Linear Foot
Fiber Optic Branch Cable ..... Linear Foot
Removal of Existing Cable ..... Linear Foot
Integrated Fiber Optic Splice/Termination Unit (Underground) ..... Each
Video Optical Transceiver (VOTR) Pair ..... Each
CCTV Lowering Device (High Mast) ..... Each
CCTV Camera (PTZ) ..... Each
CCTV Camera (Fixed) ..... Each
CCTV Camera (Detectable) ..... Each
Steel Post ..... Each
Rectangular Rapid Flashing Beacon ..... Each
Rectangular Rapid Flashing Beacon Controller (type) ..... Each
Landscape Lighting ..... Each

SECTION 624 – ACCOMMODATIONS FOR PUBLIC TRAFFIC

624.01.01 General. This work consists of supplementing traffic control by providing uniformed traffic control officers.

624.03.01 General. The tenth paragraph on page 422 of the Standard Specifications is hereby deleted and the following substituted therefore:

Do not remove guide posts and/or mileposts until final shouldering-up operation. Install new guide posts and/or mileposts within 24 hours of removal. If a guide post and/or milepost is damaged during preliminary shouldering-up operations, replace it in like kind within 24 hours as provided in Subsection 625.03.01.

624.03.03 Flaggers. Equip the flagger at each end of the work zone with a watch or suitable timing device. Flaggers at each end of the work zone shall document times when public traffic is stopped and released. Submit the documentation daily on a suitable form at the end of the shift in conjunction with the reconciliation of flagger hours.

Equip the flaggers at each end of the work zone with two way communication radios to allow them to be in contact with each other to control public traffic through the work zone as conditions require.

624.03.06 Traffic Control Supervisor. The second sentence of this Subsection is hereby deleted and the following substituted therefore:

The persons so designated shall have at least one year of experience directly related to worksite traffic control in a supervisory or responsible capacity and shall be certified as a Traffic Control Supervisor by ATSSA or Department approved equivalent.

624.03.07 Uniformed Traffic Control Officer. Provide Law Enforcement Officers working in accordance with an agreement entered into between the Contractor and the Nevada State Police or the jurisdictional law enforcement agency. Verify jurisdictional authority and submit agreement prior to the use of services.

624.04.01 Measurement. The third paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Traffic control supervisor will be measured by the day, for each eligible working day assessed to the contract. Traffic control supervisor will not be measured during any ordered suspension of work, suspensions mutually agreed upon by the Engineer and the Contractor, or time periods for which working days are not assessed regardless of the actual performance of work in accordance with Subsection 108.02, 108.04, and 108.06. Upon completion of final inspection and acceptance in accordance with Subsection 105.16 and satisfactory conformance with Subsection 624.03.06, the number of days measured will be the number of working days specified in Subsection 108.02, plus or minus authorized changes.

Uniformed traffic control officers will be measured on a force account basis which will be the actual cost as evidenced by copies of invoices from the law enforcement agency who performed the work. To the actual cost will be added the sum of 10% for profit and overhead with no further compensation therefore.

624.05.01 Payment. Payment will be made under:

Pay Item	Pay Unit
Uniformed Traffic Control Officer	Force Account

SECTION 625 – CONSTRUCTION SIGNS

625.02.02 Reflectorization. The second sentence of the eighth paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

When using alternative portable barrier rail, place two way reflectors on top of the rail at a maximum spacing of 20 feet.

625.02.06 Water Filled Barrier Rail. This Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

625.02.06 Alternative Portable Barrier Rail. Alternative portable barrier rail systems may be substituted for portable precast concrete barrier rail required for the contract, when approved.

Use alternative portable barrier rail listed in the QPL. Select an alternative portable barrier rail appropriate for the regulatory speed of the work area.

Install alternative portable barrier rail in accordance with the manufacturer's recommendations prior to beginning work in the area protected by the rail. Furnish all manufacturer's shop drawings, installation instructions, and any other pertinent information prior to installation.

Fill water filled barrier rails with water prior to beginning work in the area protected by the rail. Avoid spillage of water from water filled barrier rail on the traveled way at all times.

625.03.01 General. The fourth paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Immediately after removing guide posts, place and maintain salvaged guide posts in a temporarily installed condition or traffic cones at each guide post location until the new guide posts are installed. Salvaged guide posts or traffic cones will not be required at guide posts removed behind guardrail.

Immediately after removing mileposts, place and maintain salvaged mileposts in a temporarily installed condition until the new mileposts are installed.

625.03.05 Contractor Designed Traffic Control Plans. The second sentence of the second paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

The proposed traffic control plan shall be prepared and/or certified as to conformance with the above by a Professional Traffic Operation Engineer (PTOE), or a Traffic Control Supervisor certified by ATSSA or Department approved equivalent, and shall include the PTOE registration number or Traffic Control Supervisor certification number of the certifying person.

During any traffic control operations on US 395 where an 8 foot wide recoverable shoulder cannot be provided, provide an emergency pull-out every 0.5 mile.

Emergency pull-outs shall be appropriately signed and provide an area at least 12 feet wide, 150 feet long, and have an exit taper consisting of a 20:1 minimum taper rate where barrier rail is required.

Provide an incident response plan which shall include actions to mitigate and remove disabled vehicles.

Remove the 8th paragraph of this section on page 432 of the Standard Specifications and replace with the following:

Maintain a minimum of 11 foot lanes and 2 foot shoulders unless otherwise approved.

Submit plans for any closures and incorporated detours 10 days prior to performing them for approval.

Submit all closures requests to be used within approved traffic control plans 7 days prior to the work being performed.

Traffic control plans that result in an impact to City of Reno and Washoe County roadways must be submitted to the Engineer 14 days prior to use for approval by the City of Reno and Washoe County.

Provide a minimum of 18 changeable message signs for the project 10 days prior to construction. Coordinate content and location with the Engineer.

Flaggers are required for all truck ingress and egress locations and for cross streets and intersections when deemed necessary for safety.

The use of traffic drums in lane tapers or shifts on US 395 will be mandatory.

The use of portable precast concrete barrier rail will be required for this project.

The regulatory speed of 65 mph may be reduced to 55 mph for lane closures or shifts, upon approval. To enhance safety and conspicuity a minimum of 6 trailer-mounted speed feedback signs along with yellow flashing beacons placed on the W3-5A signs shall be used during approved speed reductions. Coordinate location with the Engineer.

The temporary regulatory speed limit should not be left in effect beyond the daily hours of operations unless the conditions for which the speed reduction was implemented continues to exist, or channeling devices are required to route traffic through the work zone area.

The original regulatory speed limit shall be resumed by posting new signs at the end of the work zone for each direction of traffic.

For any traffic control operations that take place at night, the use of portable overhead lighting (trailer mounted balloon lights) will be mandatory at flagging stations, temporary signals, lane tapers and shifts, temporary crossovers, points of ingress/egress of construction traffic, road closures with detours and any other locations within the work zone that need the illumination for the safety of the traveling public as determined by the engineer. The trailer mounted balloon lights shall have a minimum of 100,000 lumen output with a metal halide lighting source. Units shall be self-sufficient, easily relocated and adjusted, and capable of operating continuously 1 hour prior to sunset to 1 hour after sunrise. Place, relocate, and adjust trailer mounted balloon lights as directed.

(a) Smart Travel Time Monitoring System (STTMS). Furnish, install, operate, and maintain a real time STTMS consisting of a central processing system, 5 portable traffic sensors per direction, 2 CMS per direction, a complete communication system, hardware, software, and support necessary to make a complete and operational system that provides advance traffic information to motorists when there is a slowing of traffic due to congestion resulting from lane reductions or other conditions. The condition-responsive notification to the motorist occurs with the use of CMS, and an XML data feed which will display the travel times activated through real-time traffic data collected by portable traffic sensors downstream of the CMS location.

The format of the data feed shall be eXtensible Markup Language (XML), with a known schema shared and made available to the Department. The XML data shall be made available for Department access through standard Internet connectivity and services, with the provision of a data feed address.

The system shall have basic field and network security to protect the system against vandalism and unauthorized use.

The system shall be capable of storing ad-hoc messages created by the System Coordinator and logging this action when overriding any default or automatic advisory message. The STTMS communication system shall incorporate an error detection/correction mechanism to ensure the integrity of all traffic conditions data and motorist information messages. Any required configuration of the STTMS communication system shall be performed automatically during system initialization.

System operator local control functions and remote management operations shall be password protected. The STTMS shall be capable of acquiring traffic information and selecting messages automatically without operator intervention after system initialization. The lag time between changes in threshold ranges and the posting of the appropriate CMS messages shall be no greater than 60 seconds. The system operation and accuracy shall not be appreciably degraded by inclement weather or degraded visibility conditions including precipitation, fog, darkness, excessive dust, and road debris.

The portable traffic sensors shall be capable of collecting traffic speed data. The sensors shall be Bluetooth, doppler, or microwave sensors manufactured for the purpose of collecting traffic data. The processed data is used to determine travel times in the work zone and will remotely display travel times and other derived information on portable CMS, and an XML data feed that is available over the internet. The message trigger thresholds shall be user configurable. The Department will receive a weekly report, or at an interval as directed by the engineer, work zone speed data as collected by the system.

Obtain cellular telephone service, FCC licensing, wireless data networks, satellite and internet subscriptions, and other requirements as necessary to operate the system continuously.

Provide an on-site System Coordinator for the STTMS to maintain the STTMS and system components, monitor and adjust the portable devices as necessary, provide documentation in the form of a written weekly report about the system and respond to emergency situations. The System Coordinator shall either be a system vendor representative or shall have received training on the set-up and operation of the system from the system vendor or manufacturer. The system coordinator may work for the vendor, contractor, or a subcontractor, as approved by the Engineer. Provide certification of any such training to the Engineer prior to system set-up. The System Coordinator shall work with the Engineer on the operation of the STTMS including when to deploy or relocate the field devices, how the system is operating, and when to remove the system. The System Coordinator shall attend pre-construction meetings facilitated by the Engineer or the Contractor. Secure approval from the Engineer on all CMS messages prior to use. Be available 7 days a week and 24 hours a day while the system is deployed. Provide the 24/7 contact information for the System Coordinator and others responsible for maintenance of the system prior to installation of the system.

The system shall provide full functionally upon sensor and CMS relocation and with field adjustments, as needed, to provide adequate warning to the motoring public of traffic congestion ahead.

The system will define miles and travel times to the first interchange downstream of the work zone or alternative destinations as directed by the engineer.

The STTMS shall be installed and operational prior to the start of the placement of the channelizing devices to close any travel lanes. Verify that the system is operating prior to initiating the actual lane closure. The STTMS shall remain in place and operational until after the travel lane is reopened. The system shall constantly monitor traffic and update the messages on the portable CMS within 15 seconds of a traffic condition requiring a system update.

The STTMS shall be in a constant “data collection” mode. In the event communication is lost between any field equipment, provide a means and staff to manually program a CMS message. If communication is lost for more than 10 consecutive minutes, the system shall revert to a fail-safe ROAD/WORK/AHEAD message displayed on the CMS until communication is restored.

During events of stopped traffic or vehicles speeds below 5 mph a message of conditions shall be used instead of travel times. Messages to be approved by the engineer prior to implementation.

The STTMS shall be monitored throughout any period of deployment. The weekly report shall include the following activities during the project:

1. Confirm/note device layout/placement
2. Confirm/note system data collection parameters that were set and adjusted

3. Confirm/note startup and validation activities
4. Note any changes/modifications made throughout the day or any unusual events that may impact the integrity of the data
5. Confirm/note system shutdown processes and identify any changes that may be needed
6. Observe device packing processes for relocation to the next work zone area and note any improvements that may be needed to improve the efficiency of the system deployment
7. Contractor requirements
8. Note any difficulties and or positive feedback that the Contractor had with the system throughout the project for Lessons Learned workshops
9. Number of and types of activations the system performed.
10. Construction work zone deployments
12. The effectiveness of the adjustments made as well as comments from the flagging staff on each end of the active work zone (with and without the STTMS).
13. Public reaction and behavior when in the traffic control.
14. System start up and testing procedures
15. System operational procedures
16. System maintenance procedures
17. System shutdown procedures

Maintain an adequate inventory of parts to support maintenance and repair of the STTMS.

625.04.01 Measurement. The first sentence of the third paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Portable precast concrete barrier rail and alternative portable barrier rail will be measured for rental by the linear foot.

625.05.01 Payment. The second and third paragraphs of this Subsection of the Standard Specifications are hereby deleted and the following substituted therefore:

Partial payment for Rent Traffic Control Devices (Lump Sum) will be made according to Subsection 109.06.

SECTION 627 – PERMANENT SIGNS

627.01.01 General. This work consists of permanent overhead sign panel, reconstruction and permanent signs (Ground Mounted) (Special Metal Supports).

627.02.02 Reflectorization. This Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Use Type XI reflective sheeting material for regulatory and guide sign installations.

Use Type XI fluorescent reflective sheeting for warning sign installations.

Overlay acrylic EC films, inks, and digital imaging used for assembly shall be approved for use by the manufacturer of the sheeting material. The service life of inks and films shall be comparable to the sheeting used.

All letters, numerals, symbols, borders, and accessories as necessary for the sign legend shall be directly applied, digitally printed, or molded to form an integral sign legend and background on all signs.

627.03.06 Permanent Overhead Sign Panel, Reconstruct. Permanent overhead sign panel, reconstruct, consists of modifying an existing sign panel frame and manufacturing new sign panel frame, sign struts, mounting brackets, mounting hardware and any other related work necessary to retrofit the existing sign structure and panel frame.

627.04.01 Measurement. Permanent overhead sign panel, reconstruct will be measured by the each.

Permanent signs (Ground Mounted) (Special Metal Supports) will be measured by square foot.

627.05.01 Payment. Payment will be made under:

Pay Item	Pay Unit
Permanent Overhead Sign Panel, Reconstruct	Each
Permanent Signs (Ground Mounted) (Special Metal Supports)	Square Foot

SECTION 628 – MOBILIZATION

628.01.01 General. Add the following to the second paragraph of this Subsection of the Standard Specifications:

The amount of electricity supplied shall be 48kW and 240V.

SECTION 631 – PRECAST CONCRETE WALL PANELS

631.01.01 General. This work consists of precast concrete wall panels.

METHOD OF MEASUREMENT

631.04.01 Measurement. Precast concrete wall panels will be measured by the square foot.

BASIS OF PAYMENT

631.05.01 Payment. Payment will be made under:

Pay Item	Pay Unit
Precast Concrete Wall Panels	Square Foot

SECTION 632 – PERMANENT PAINTED PAVEMENT MARKINGS

632.03.03 Surface Preparation. The words “and type” in the second paragraph of this Subsection of the Standard Specifications are hereby deleted.

632.03.04 Application. The word “epoxy” in the first sentence of the fourth paragraph of this Subsection of the Standard Specifications is hereby deleted.

The word “waterborne” in the first sentence of the second paragraph on page 445 of the Standard Specifications is hereby deleted.

The word “polyurea” in the first sentence of the twelfth paragraph on page 445 of the Standard Specifications is hereby deleted.

SECTION 634 – PAVEMENT MARKING FILM

634.02.02 Thermoplastic Material. This Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Use preformed thermoplastic materials for the thermoplastic pavement marking items shown in the proposal. The thermoplastic pavement marking materials shall be capable of application on asphaltic surfaces and Portland cement concrete surfaces. Hot applied thermoplastic will not be allowed.

SECTION 636 – TEMPORARY PAINTED PAVEMENT MARKING

636.02.01 General. The second, third, and fourth paragraphs of this Subsection of the Standard Specifications are hereby deleted and the following substituted therefore:

Use waterborne traffic paint material for temporary striping.

636.03.01 General. The second sentence of the last paragraph on page 455 of the Standard Specifications is hereby deleted.

The last sentence of the fourth paragraph on page 456 of the Standard Specifications is hereby deleted.

SECTION 637 – TEMPORARY POLLUTION CONTROL

This Section of the Standard Specifications is hereby deleted and the following substituted therefore:

DESCRIPTION

637.01.01 General. This work consists of the construction, installation, maintenance, and removal of temporary pollution control Best Management Practices (BMPs) in accordance with National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP) requirements issued by the Nevada Division of Environmental Protection (NDEP) Bureau of Water Pollution Control (BWPC), and as directed. Unless noted otherwise, CGP shall refer to the NPDES CGP issued by NDEP BWPC. BMPs are intended to provide prevention, control, and abatement of water, air, and noise pollution to the maximum extent practicable from the first day of construction activities until relief of maintenance has been granted for the project.

Temporary pollution control and erosion control work shall conform to CGP requirements and NDOT's "Construction Site Best Management Practices (BMPs) Manual," hereinafter referred to as the Manual, and addenda thereto issued up to, and including, the date of advertisement of the contract. The Manual can be accessed on the NDOT website. Adhere to the Manual's minimum requirements for the selection and implementation of construction site BMPs. Know, understand, and fully comply with the provisions of the Manual, Federal, State, and local regulations governing stormwater and non-stormwater discharges from both the project site and areas of disturbance outside the project limits during construction.

For projects requiring procurement of a CGP for stormwater discharges, a Stormwater Pollution Prevention Plan (SWPPP) shall be developed and implemented. The Department furnished "Stormwater Pollution Prevention Plan (SWPPP) Template for Construction Activities," Form 018-002SWPPP may be used to develop the SWPPP. The template form can be accessed on the NDOT website under the Environmental section - Stormwater Program or by request.

Refer to the Manual fact sheets for individual BMP requirements. BMPs requiring sizing or design criteria in accordance with the CGP or the Manual shall be designed by a Nevada Registered Civil Professional Engineer (PE), pursuant to NRS Chapter 625, and shall be included as an addendum to the SWPPP.

Refer to the NDEP BWPC website for a copy of the CGP and information pertaining to SWPPP development. Refer to the Environmental Protection Agency (EPA) Region 9 stormwater permitting website for a copy of the EPA CGP and information pertaining to SWPPP development.

The CGP includes and covers stormwater discharges from Department furnished material sources for general fill material, aggregate, and/or staging of a temporary asphalt or concrete batch plant operation dedicated solely to a specific contract. Install, inspect, and maintain temporary pollution control BMPs for these areas and include these areas in the SWPPP.

Be responsible for water quality monitoring of effluent for any Department furnished material sources where groundwater or accumulated stormwater will be discharged. Provide water quality monitoring results for the parameter in Table I a minimum of once per year for the duration of the project for each outfall associated with the dewatering discharge(s).

TABLE I

Parameter	Effluent Limit	Sample Type
pH	6.0 – 9.0 S.U.	Grab

Submit water quality monitoring results within 24 hours from the time of sampling. Water quality monitoring results failing to meet the numeric effluent limitations in Table I shall be documented in an exceedance report. Water quality monitoring exceedance reports shall include the following:

1. Project name, project number and location and/or physical address;

2. Name of receiving water:

3. Monitoring data from the current and previous monitoring events, if applicable;

4. Explanation of the situation, including what actions have been completed or will be completed to correct the violation; and

5. Contact name, title, and phone number.

Submit water quality monitoring exceedance reports to the Department's Stormwater Division Compliance and Enforcement Supervisor at (775) 888-7771 within 24 hours from the time of sampling.

The SWPPP document, including diagrams, maps, and calculations, shall be completed and implemented prior to commencement of earth disturbing activities. The official SWPPP shall remain on the project site or at an easily accessible location from the first day of erosion and sediment control installation activities until relief of maintenance has been granted for the project. A copy of the official SWPPP shall be made immediately available upon request to NDEP, EPA, NDOT, FHWA, or any other State, Tribal, or local agency with jurisdiction of stormwater discharges.

637.01.02 Water Pollution Control Manager. For projects requiring procurement of a CGP, designate a certified Water Pollution Control Manager (WPCM) who has successfully completed the "Water Pollution Control Manager" training class provided by the Associated General Contractors/Nevada Contractors Association. To register for this class, contact the Education and Training Director of the Associated General Contractors/Nevada Contractors Association Las Vegas. Submit a copy of the certificate demonstrating the WPCM's successful completion of the training class. The WPCM shall maintain current standing with the training from the date of contract award until relief of maintenance has been granted for the project. Failure to maintain current certification status may result in the ceasing of all operations not related to maintaining public safety until a WPCM with valid certification is assigned to the project. Working days will continue to be counted.

The WPCM shall be knowledgeable in the principles and practices of the installation and maintenance of erosion and sediment controls in accordance with the CGP, the Manual, and as identified in the current SWPPP. The WPCM shall be capable of identifying existing and predictable effects of the contractor's operations, and shall have complete authority to direct the contractor's personnel and equipment to implement the requirements described herein.

The WPCM shall be an employee under direct supervision of the Contractor, and shall be responsible for developing, implementing, and updating the SWPPP. The WPCM shall be responsible for updating the SWPPP in accordance with the requirements of the CGP.

The WPCM shall be responsible for stormwater inspections and ensuring the installation, maintenance, and removal of temporary pollution control BMPs comply with the requirements of the CGP and SWPPP. The WPCM shall serve as the primary contact for issues related to the SWPPP, permits, or their implementation and shall be available by phone 24 hours a day and shall be capable of being on-site within 24 hours of notification of a deficiency from the first day of activities until relief of maintenance has been granted for the project.

The WPCM shall be responsible for reporting all illicit discharges or illicit connections to the storm sewer system found within the project limits immediately upon discovery. Refer to the CGP and NDEP's Spill Prevention website, in-state hotline at (775) 687-9485, or out-of-state hotline at (888) 331-6337 for additional reporting requirements.

637.01.03 Permits. Not all projects require the permits discussed in this Subsection.

Prepare any applicable discharge permit applications, including any required modifications and amendments thereto, in accordance with Subsection 107.02.

Contact the Department's Stormwater Division at (775) 888-7771 a minimum of 7 days prior to submitting the Notice of Intent (NOI) to obtain coverage under a CGP. The Stormwater Division will provide documentation summarizing NOI requirements.

When submitting a NOI, reference the Department Engineer's name as the appropriate Owner (NDOT) contact, the appropriate District address, and reference NDOT's Contract Number in the Site Name of the NOI. Ensure billing information of the NOI reflects the Operator (Contractor) to receive the invoice for annual permit renewal.

Construction activities may require simultaneous coverage under the CGP and the EPA CGP.

File a separate NOI with NDEP and/or EPA to apply for coverage under the appropriate CGP for land and earth disturbance areas outside of NDOT right-of-way and not displayed on the plans. Contractor furnished material sources, staging areas, plant sites, turnaround areas, or any other contractor caused ground disturbance outside

the right-of-way and not shown on the plans are the Contractor's responsibility and shall be submitted under a NOI package separate from the ground disturbance within right-of-way and shown on the plan sheet details. As these separate CGPs are the sole responsibility of the Contractor, NDOT shall not be listed as an Owner or Operator. Submit a copy of all separate signed NOI certification statements. The Department is not responsible for delays caused by incomplete or inaccurate submittals to NDEP and/or EPA by the Contractor.

Upon notice of award initiate the procurement of permits and submit a copy of executed permits procured prior to commencement of earth disturbance activities requiring permitting.

Regardless of the permitting authority requirements, photograph and submit electronic color photo documentation of existing vegetation and pre-construction site conditions of the entire project, including areas outside of NDOT right-of-way subject to earth disturbance, prior to commencement of earth disturbing activities. Photograph and submit electronic color photo documentation of post-construction site conditions for all lands disturbed by construction activities, including areas outside of NDOT right-of-way, with the relief of maintenance request. All electronic photo documentation shall be date/time stamped.

For project requiring procurement of a CGP, submit a request for relief of maintenance only after completion of an inspection of the sediment and erosion control measures conducted during the final inspection in accordance with Subsection 105.16. Include a copy of the Notice of Termination request or request to transfer full CGP responsibilities to the Department with the relief of maintenance request. When requesting to transfer full CGP responsibilities to the Department, submit a copy of the final SWPPP documenting current field conditions with the relief of maintenance request. Adhere to all permit requirements until relief of maintenance has been granted for the project.

637.01.04 Noxious Weed Management. Develop and follow a Noxious Weed Management Plan to prevent the establishment and spread of Nevada State listed noxious weeds per NRS 555 (available at http://agri.nv.gov/Plant/Noxious_Weeds/Noxious_Weeds_Home/).

Submit a copy of the Noxious Weed Management Plan for review and approval at the pre-construction conference.

The management plan shall include a physical survey of noxious weeds, mapping of existing noxious weed populations, appropriate eradication/control methods based on weed type, location, applicator certification, monitoring, and retreatment as necessary. Include methods for keeping equipment, personnel, staging areas, construction and excavation sites, and roadways clear of noxious weed plants and seeds. The plan shall also address the treatment of weeds in topsoil salvage material.

Equipment leaving noxious weed infested areas shall be cleaned prior to moving to areas free from noxious weeds. Equipment coming into or leaving the project area shall be cleaned and the cleaning area kept clear of plant material and contaminated dirt to prevent weed spread. The cleaning method shall be as approved.

CONSTRUCTION

637.03.01 General. For projects requiring procurement of a CGP, furnish, install, and maintain in proper working condition a minimum of one rain gauge for every 10 miles or portion thereof within the project limits to determine the precipitation total for storm events. Install the rain gauges at a location within the project limits to be determined by the Contractor and approved by the Engineer. The WPCM shall inspect each rain gauge prior to anticipated storm events to verify the condition and ensure proper operation. The WPCM shall inspect each rain gauge and record rain gauge totals following each storm event. Following storm events, the WPCM shall perform construction site stormwater inspections in accordance with CGP requirements.

Installed rain gauges shall remain in place as permanent monitoring devices or be removed as directed.

Be responsible throughout the duration of the project for installing, constructing, inspecting, maintaining, replacing, removing, and disposing of the BMPs specified in the SWPPP, Temporary Working in Waterways Permits, and any other applicable permit. Installed BMPs shall perpetuate natural flow patterns and conveyances such that flooding or ponding is not caused inside or outside of the right-of-way or that may pose a hazard to motorists, pedestrians, or any other user.

For projects requiring procurement of a CGP and SWPPP development, perform a stormwater inspection of the construction site prior to the commencement of earth disturbing activities to ensure construction site BMPs are installed in accordance with the current SWPPP and adhere to the Manual's minimum requirements for the selection

and implementation of construction site BMPs.

For projects requiring procurement of a CGP, perform and document stormwater inspections in accordance with the CGP requirements and as directed. The Contractor and Engineer shall perform simultaneous stormwater inspections when directed by the Engineer.

Repairs and/or placement of temporary erosion and sediment control measures, or correction of any CGP deficiency identified during a stormwater inspection, shall be conducted in accordance with the CGP requirements.

If failure to comply with CGP requirements results in a violation where fines, penalties, and/or any other monetary impacts are incurred by the Department or Contractor, penalties will be assessed in the amount of the incurred fines, penalties, and/or monetary impacts resulting from the violation in accordance with Subsection 107.01. The Department will deduct the amount of said penalties from any monies due.

Failure to comply with the temporary pollution control requirements contained herein may be considered a stormwater deficiency. Stormwater deficiencies will be assessed demerits according to the following schedule.

Stormwater Deficiency Category	Demerits
Failure to submit a copy of executed NOI documentation	1
Failure to make SWPPP easily accessible or make the SWPPP available upon request	1
Failure to properly submit the NOI to NDEP/EPA	1
Failure to contact NDOT before submitting NOI for CGP coverage	5
Failure to submit an active SWPPP document when requesting to transfer full CGP responsibilities to the Department	5
Failure to install and maintain a rain gauge (if applicable)	5
Failure to submit required pre- or post- construction photo documentation (included in SWPPP upon transferring to the Department)	10
Failure to perform a construction site stormwater inspection prior to the commencement of earth disturbing activities	10
Failure to provide a WPCM with current certification status	20
Failure to submit a copy of a separate NOI for areas outside of right-of-way	20
Failure to obtain CGP Coverage	50

Pursuant to NRS 408.441 through 408.451, the Director may issue an order for compliance, commence a civil action, request the Attorney General to commence a criminal action, or seek injunctive relief.

Liquidated damages will be assessed for non-compliance with temporary pollution control requirements contained herein in accordance with Subsection 109.02. Failure to achieve and maintain compliance with temporary pollution control requirements may result in the ceasing of all operations not related to achieving compliance or maintaining public safety. Working days will continue to be counted and liquidated damages will be assessed during such cessation.

The Contractor is solely liable for any suspension of work and/or enforcement actions resulting from CGP violations. CGP non-compliance may result in termination of this Contract in accordance with Subsection 108.10.

Do not remove BMPs addressing stormwater discharge from areas subjected to earth disturbing activities until final stabilization per the CGP has been achieved or as directed. This may require BMPs be left in-place following the completion of construction activities. Properly maintain such BMPs, as specified in the Manual, and as directed, until relief of maintenance is granted for the project.

Land disturbance areas beyond those depicted in the contract documents resulting from Contractor construction activities shall undergo final stabilization at the Contractor's expense. These include, but are not limited to, staging areas, turnaround areas, employee parking areas, and areas of ingress and egress. Submit final stabilization plans for review and approval.

637.03.02 Dust Control. Develop, obtain, and pay for all State and local entity permits and fully comply with the terms specified therein. Furnish and apply water or chemical dust palliative for controlling dust on the areas designated and according to permit conditions. Use equipment and obtain water as specified in Subsection 107.21.

Control dust originating from traffic, plant, or construction operations either inside or outside the right of way at all times according to EPA, State, and local laws, ordinances, and regulations.

Consult the Manual fact sheets for appropriate dust palliative product selection. The use of dust palliatives containing cationic treatment chemicals is prohibited.

Mix and apply dust palliative as recommended by the manufacturer. Prepare the soil for application of dust palliative according to manufacturer instructions. Apply additional applications of dust palliative to control dust or as required by air quality regulating authorities.

Maintain all disturbed areas in a condition to prevent wind erosion and particulate emissions 24 hours a day, 7 days a week until the construction site is completely stabilized as shown on the plans and as required.

For contracts in Washoe or Clark Counties, provide a copy of the applicable Air Quality Management "Dust Control Permit" for construction activity prior to beginning work. Provide a copy of the final inspection and release from the applicable Air Quality Management "Dust Control Permit" upon completion of construction activities.

The geology in the project area may support erionite minerals (a fibrous mineral with similar health risk to asbestos). The applicable Air Quality Management "Dust Control Permit" for construction activity application requires the development of a Dust Control Mitigation Plan (DCMP). The fact that there may be erionite in soil and rock material in the area must be considered during the development and implementation of the DCMP and during health and safety planning. If, based on the scope of the project, no "Dust Control Permit" is required, the contractor is still required to prepare and follow a DCMP for this project. The DCMP must be designed to prevent visible dust due to project activities.

Immediate notification will be given in writing for failure to maintain adequate dust control and may result in immediate suspension of construction operations. If failing to remedy unsatisfactory dust control within 1 hour after receipt of such notice, the Engineer may immediately proceed to take necessary action to maintain dust control and the entire cost of this maintenance will be deducted from money due or to become due.

637.03.03 Night Work Noise Abatement. A noise abatement plan shall be required for any night work to be performed near noise sensitive areas. Night work is defined as set forth by the local municipal noise control ordinance and/or regulation time frames. In jurisdictions without a noise ordinance, night work shall be defined as construction activities performed between the hours of 8:00 pm and 6:00 am.

The approved noise abatement plan shall be provided to all noise sensitive sites within 500 feet of any proposed night work. Noise sensitive sites are defined as picnic areas, recreational areas, parks, residential homes, apartments, hotels, schools, hospitals, churches, other inhabited areas, or areas otherwise listed in 23 CFR 772, Table 1 to Part 772 - Noise Abatement Criteria. If sound level abatement criteria are not stated in local ordinances, 23 CFR 772, Table 1 sound level abatement criteria for corresponding noise sensitive sites shall be used at each respective sound level minus 1 Leq(h) [e.g., 67 Leq(h) – 1 Leq(h) = 66 Leq(h)].

Noise Abatement Plan shall include, but is not limited to:

1. The type of work to be conducted, including proposed duration and location.

2. If temporary or portable acoustic barriers will be installed around stationary construction noise sources.

3. Valid manufacturer completed calibration certificates for all proposed noise meters and field calibration equipment to be used.

4. Certificates of completion of National Highway Institute (NHI) FHWA-NHI-142088, How to Measure Traffic Noise or FHWA-NHI-142092, How to Mitigate Construction Noise for all personnel conducting, recording, or documenting noise measurements.

5. Proposed advance notices to alert those in noise sensitive areas about night work. The notices shall include the name and contact information for the project's designated representative.

6. Sound level monitoring methodology to include, but not limited to, the following requirements:

    a. Baseline readings shall be conducted prior to and during night work for each noncontiguous noise sensitive area using sound level meters that measure peak and average levels in $dBA_{(Leq\text{-}1h)}$.

    b. Provide all sound level measurements and supporting documentation to the Engineer on a weekly basis unless otherwise approved.

c. Follow all best practices from applicable sections of the FHWA Noise Measurement Field Guide (FHWA-HEP-18-066).

d. Take measurements using an ANSI-rated Type 1 or Type 2 sound level meter on the A-weighted decibel setting by personnel who have completed NHI FHWA-NHI-142088 or FHWA-NHI-142092.

e. Report all monitoring related complaints to the Engineer within 24 hours of occurrence.

Submit the completed noise abatement plan for review a minimum of 14 working days prior to commencement of night work. Once submitted, any changes to the abatement plan must be reported to the Engineer at least 24 hours before changes are executed.

METHOD OF MEASUREMENT

637.04.01 Measurement. Temporary pollution control will be measured by the lump sum.

BASIS OF PAYMENT

637.05.01 Payment. The accepted quantities, measured as provided above, will be paid for at the contract price bid per unit of measurement for the pay items listed below that are shown in the proposal. Payment will be full compensation for the installation, ongoing maintenance, and removal of the work in accordance with stormwater requirements or as directed as prescribed in this Section.

Partial payments for temporary pollution control will be made as the work progresses. The Engineer will determine the reasonable payment percentage for each payment cycle. When requested, furnish invoices and receipts for actual costs. The amount paid on the next progress payment will be 50% of the amount determined.

A maximum amount of 5% of the contract amount will be paid for temporary pollution control during the progress of the work. Upon completion of all work on the project, payment of any amount bid for temporary pollution control in excess of 5% of the contract amount will be paid.

Payment will be made under:

Pay Item	**Pay Unit**
Temporary Pollution Control	Lump Sum

SECTION 640 - RETAINING WALLS

640.01.01 General. This work consists of sound barrier wall.

640.03.02 Sound Barrier Wall. Construct the sound barrier wall in conjunction with the drilled shafts constructed according to Section 509.

Use forms conforming to Subsection 212.03.10.

Construct sound barrier walls as shown on the plans.

Deflections in sound barrier wall panels are limited to 1/2 inch in both the horizontal and vertical planes. Replace panels with deflections greater than 1/2 inch, as directed.

The maximum relief of the wall panels shall be 1 inch on each side of the panel.

640.04.01 Measurement. Sound barrier wall will be measured by the square feet.

640.05.01 Payment. Payment will be made under:

Pay Item	**Pay Unit**
Sound Barrier Wall	Square Feet

SECTION 642 – MECHANICALLY STABILIZED EARTH WALLS

642.01.01 General. The first paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

This work consists of constructing mechanically stabilized earth (MSE) walls consisting of precast concrete panel or segmental blocks with metallic or geosynthetic reinforcements.

642.01.02 Design Requirements. The sixth paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

For geosynthetic reinforcement consisting of geogrid layers, provide a reinforcement coverage ratio of 1.0 according to Subsection 11.10.6.4 of the AASHTO LRFD Bridge Design Specifications.

For geosynthetic strap reinforcement, provide reinforcement coverage per manufacturer's recommendations, with a minimum coverage of 20.5 percent.

The maximum vertical spacing for all reinforcement types shall not exceed 32 inches.

The first sentence of the seventh paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Where concrete panel walls or wall section intersect with an enclosed angle of 130 degrees or less, provide a special vertical corner panel.

The second and third sentence of the eighth paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

The MSE wall system supplier is responsible for the internal design of the wall based on the wall requirements. The design shall include verification of external stability, internal stability, compound global stability, design of concrete wall panel, and corrosion analysis for metallic soil reinforcements based on the strength, index, and corrosion testing provided by the contractor.

642.02.01 General. The third paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Concrete shall be Class D Modified or Class DA Modified. Concrete shall have a minimum 28 day compressive strength of 4,500 psi or as otherwise shown on the plans.

642.02.02 Concrete Panel Wall. The second and third sentence of the first paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Ensure that bearing pads placed in horizontal joints between panels are Preformed Ethylene Propylene Diene Monomer (EPDM) or Preformed High Density Polyethylene (HDPE). Submit a manufacturer's certification that the EPDM rubber pads conform to ASTM D2000 Grade 2, Type A, Class A with a Durometer Hardness of 60±5 or HDPE pads with a minimum density of 0.946 grams per centimeter in accordance with ASTM D1505.

642.02.02 Concrete Panel Wall. The third paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Maximum area of individual panels shall be 50ft^2.

642.02.04 Mechanically Stabilized Earth Backfill. In the headers of the tables in this Subsection of the Standard Specifications, **Geogrid Reinforcement** is hereby deleted and **Geosynthetic Reinforcement** substituted therefore.

Add the following before the first sentence of the third paragraph of this Subsection of the Standard Specifications:

The contractor shall provide the wall supplier the unit weight and angle of internal friction of the soil based on 95 percent compaction of AASHTO T180 at optimum moisture content for use in design of the walls.

642.02.06 Geogrid Soil Reinforcement. This Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

642.02.06 Geosynthetic Reinforcement. Geosynthetic reinforcement shall be as previously approved on the QPL for either concrete panel or segmental block wall systems.

Submit a manufacturing quality control certificate and conformance testing results for geosynthetic reinforcement delivered to the site. Perform sampling and conformance testing according to ASTM D4354. Base geosynthetic reinforcement acceptance on ASTM D4759. For geosynthetic reinforcement, provide conformance testing of the ultimate tensile strength, T_{ult}. The quality control certificate shall include roll numbers and identification, sampling procedures, and results of the conformance testing with a description of the test methods used. Include a signed certificate that the geosynthetic reinforcement is in conformance with these specifications with the submitted quality control certificate.

642.03.01 General. The seventh sentence of the ninth paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

For metallic reinforcement, after the reinforcement is connected to the panel, the amount of slack shall not exceed 1/8 inch between the connector and the reinforcement during installation. Geosynthetic reinforcement shall be pretensioned to remove any slack in the reinforcement and in the connection to the facing unit. The tension shall be maintained by staking or by placing fill during tensioning.

SECTION 701 – PORTLAND CEMENT

701.01.01 Materials Covered. In the second sentence of this Subsection of the Standard Specifications, the words “or Type IL” are hereby added after “Type IP”.

701.03.01 Requirements. Type IL blended hydraulic cement shall conform to ASTM C595, except as follows:

(a) Sulfate resistance shall be moderate (MS) or high (HS).

(b) The cement used in the uniform blend shall meet the specification requirements outlined for Type II Portland cement.

SECTION 702 – CONCRETE CURING MATERIALS AND ADMIXTURES

702.03.04 Bridge Deck Curing Compound. Use curing compounds listed in the QPL.

702.03.05 Pozzolans. The first paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Pozzolanic admixtures shall be Class F or Class N conforming to ASTM C618, except the loss on ignition shall not exceed 5%.

SECTION 703 – BITUMINOUS MATERIALS

703.03.02 Asphalt Cements. The reference to “AASHTO T316” throughout this Subsection of the Standard Specifications is hereby deleted and “ASTM D4402” is substituted therefore.

The test procedure for solubility, AASHTO T44, is hereby amended to allow the use of n-propyl bromide.

703.03.03 Cutback Asphalts. The test procedure for solubility, AASHTO T44, is hereby amended to allow the use of n-propyl bromide.

703.03.04 Emulsified Asphalts. This Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

The test procedure for solubility, AASHTO T44, is hereby amended to allow the use of n-propyl bromide.

When tolerances are expressed in terms of percent, the allowable deviation is calculated as the indicated percentage at the upper or lower specification limit, whichever is applicable.

Tests will be performed within 14 days from the date sampled.

Emulsions may be required to be diluted with water to the percentages of 70 and 30, 60 and 40, or 50 and 50 by mass. The values are specified as %Emulsion and %Added Water of the diluted mixture.

CATIONIC EMULSIFIED ASPHALTS

TEST	TEST METHOD	Slow Setting		TOLERANCE
		CSS-1	CSS-1h	
Tests on Emulsion:				
Viscosity, Rotational Paddle @ 25 °C (77 °F), mPa·s	Nev. T762	45-220	45-220	None
Viscosity, Rotational Paddle @ 50 °C (122 °F), mPa·s	Nev. T762	—	—	None
Residue, %	Nev. T759	57 Min.	57 Min.	1.0
Storage Stability, 24 hr, %	Nev. T759	1 Max.	1 Max.	0.5
Sieve, %	Nev. T759	0.10 Max.	0.10 Max.	0.03
Cement Mixing, %	Nev. T759	2.0 Max.	2.0 Max.	0.2
Particle Charge	Nev. T759	Pass	Pass	None
pH	ASTM E70	—	—	None
Oil Distillate, % by volume	Nev. T759	—	—	None
Tests on Residue from Evaporation:				
Penetration @ 25 °C (77 °F), 100 g, 5 sec	Nev. T759	100-250	40-90	7.0%
Solubility, %	AASHTO T44	97.5 Min.	97.5 Min.	0.10
Ductility @ 25 °C (77 °F), 5 cm/min, cm	AASHTO T51	40 Min.	40 Min.	10%
Tests on Diluted Emulsion:				
Residue, %, 70% and 30%	Nev. T759	40 Min.	40 Min.	1.0
Residue, %, 60% and 40%	Nev. T759	34 Min.	34 Min.	1.0
Residue, %, 50% and 50%	Nev. T759	29 Min.	29 Min.	1.0

CATIONIC EMULSIFIED ASPHALTS

TEST	TEST METHOD	Medium Setting	TOLERANCE
		CMS-2s	
Tests on Emulsion:			
Viscosity, Rotational Paddle @ 25 °C (77 °F), mPa·s	Nev. T762	—	None
Viscosity, Rotational Paddle @ 50 °C (122 °F), mPa·s	Nev. T762	110-1020	None
Residue, %	Nev. T759	60 Min.	1.0
Storage Stability, 24 hr, %	Nev. T759	1 Max.	0.5
Sieve, %	Nev. T759	0.10 Max.	0.03
Cement Mixing, %	Nev. T759	—	0.2
Particle Charge	Nev. T759	—	None
pH	ASTM E70	2.0-5.0	None
Oil Distillate, % by volume	Nev. T759	5.0-15.0	None
Tests on Residue from Distillation:			
Penetration @ 25 °C (77 °F), 100 g, 5 sec	Nev. T759	100-250	7.0%
Solubility, %	AASHTO T44	97.5 Min.	0.10
Ductility @ 25 °C (77 °F), 5 cm/min, cm	AASHTO T51	—	10%
Tests on Diluted Emulsion:			
Residue, %, 70% and 30%	Nev. T759	—	1.0
Residue, %, 60% and 40%	Nev. T759	—	1.0
Residue, %, 50% and 50%	Nev. T759	30 Min.	1.0

CATIONIC EMULSIFIED ASPHALTS

TEST	TEST METHOD	Rapid Setting	Quick Setting		TOLERANCE
		CRS-2nv	CQS-1nv	CQS-1h	
Tests on Emulsion:					
Viscosity, Rotational Paddle @ 25 °C (77 °F), mPa·s	Nev. T762	—	45-220	45-220	None
Viscosity, Rotational Paddle @ 50 °C (122 °F), mPa·s	Nev. T762	425-1200	—	—	None
Residue, %	Nev. T759	65 Min.	57 Min.	57 Min.	1.0
Storage Stability, 24 hr, %	Nev. T759	1 Max.	—	—	0.5
Demulsibility, %	Nev. T759	40 Min.	—	—	5%

Sieve, %	Nev. T759	0.10 Max.	0.10 Max.	0.10 Max.	0.03
Cement Mixing, %	Nev. T759	—	25 Min. (a)	—	None
Particle Charge	Nev. T759	Pass	Pass	Pass	None
Oil Distillate, % by volume	Nev. T759	3 Max.	—	—	None
Tests on Residue from Evaporation:					
Penetration @ 25 °C (77 °F), 100 g, 5 sec	Nev. T759	60-100	40-90	40-90	7.0%
Solubility, %	AASHTO T44	97.5 Min.	97.5 Min.	97.5 Min.	0.10
Ductility @ 25 °C (77 °F), 5 cm/min, cm	AASHTO T51	40 Min.	40 Min.	40 Min.	10%
Tests on Diluted Emulsion:					
Residue, %, 70% and 30%	Nev. T759	—	40 Min.	40 Min.	1.0
Residue, %, 60% and 40%	Nev. T759	—	34 Min.	34 Min.	1.0
Residue, %, 50% and 50%	Nev. T759	—	29 Min.	29 Min.	1.0

(a) If the amount of breakage is significant enough to impede the flow of water through the testing screen, thus making it impossible to calculate a result, the test will be considered passing.

Cationic emulsified asphalts not conforming to the requirements specified herein will be assessed demerits according to the following schedule.

TEST	INCREMENT	DEMERITS
Viscosity, CSS-1, CSS-1h, CQS-1nv, CQS-1h	4.5 mPa·s above maximum or below minimum to 30 mPa·s	1
Viscosity, CSS-1, CSS-1h, CQS-1nv, CQS-1h	Below 30 mPa·s	10
Viscosity, CRS-2nv	5 mPa·s above maximum or below minimum	1
Viscosity, CMS-2s	4.5 mPa·s above maximum or below minimum to 30 mPa·s	1
Viscosity, CMS-2s	Below 30 mPa·s	21
Residue, %	1 % below minimum	2
Demulsilbility, %	1 % below minimum	2
Sieve, %	0.1 % above maximum	1
Cement Mixing, %, CSS-1, CSS-1h	0.5 % above maximum	1
Cement Mixing, %, CQS-1nv	Below minimum	21
Particle Charge	Fail	21
Oil Distillate, %	0.25 % above maximum or below minimum	2
Penetration	0.1 mm above maximum or below minimum	1
Solubility, %	0.01 % below minimum	1

ANIONIC EMULSIFIED ASPHALTS

TEST	TEST METHOD	SLOW SETTING		TOLERANCE
		SS-1	SS-1h	
Tests on Emulsion:				
Viscosity, Rotational Paddle @ 25 °C (77 °F), mPa·s	Nev. T762	45-220	45-220	None
Residue, %	Nev. T759	57 Min.	57 Min.	1.0
Storage Stability, 24 hr, %	Nev. T759	1 Max.	1 Max.	0.5
Sieve, %	Nev. T759	0.10 Max.	0.10 Max.	0.03
Cement Mixing, %	Nev. T759	2.0 Max.	2.0 Max.	0.2
Tests on Residue from Distillation:				
Penetration @ 25 °C (77 °F), 100 g, 5 sec	Nev. T759	100-200	40-90	7.0%
Solubility, %	AASHTO T44	97.5 Min.	97.5 Min.	0.10
Ductility @ 25 °C (77 °F), 5 cm/min, cm	AASHTO T51	40 Min.	40 Min.	10%
Tests on Diluted Emulsion:				
Residue, %, 70% and 30%	Nev. T759	40 Min.	40 Min.	1.0
Residue, %, 60% and 40%	Nev. T759	34 Min.	34 Min.	1.0
Residue, %, 50% and 50%	Nev. T759	29 Min.	29 Min.	1.0

Anionic emulsified asphalts not conforming to the requirements specified herein will be assessed demerits according to the following schedule.

TEST	INCREMENT	DEMERITS
Viscosity	4.5 mPa·s above maximum or below minimum to 30 mPa·s	1
Viscosity	Below 30 mPa·s	10
Residue, %	1 % below minimum	2
Sieve, %	0.1 % above maximum	1
Cement Mixing, %	0.5 % above maximum	1
Penetration	0.1 mm above maximum or below minimum	1
Solubility,%	0.01 % below minimum	1

LATEX MODIFIED RAPID SETTING EMULSIFIED ASPHALT

TEST	TEST METHOD	LMCRS-2h	TOLERANCE
Tests on Emulsion:			
Viscosity, Rotational Paddle @ 50 °C (122 °F), mPa·s	Nev. T762	425-1200	None
Residue, %	Nev. T759	65 Min.	1.0
Storage Stability, 24 hr, %	Nev. T759	1 Max.	0.5
Demulsibility, %	Nev. T759	40 Min.	5%
Sieve, %	Nev. T759	0.30 Max.	0.03
Particle Charge	Nev. T759	Pass	None
Tests on Residue from Evaporation:			
Penetration @ 25 °C (77 °F), 100 g, 5 sec	Nev. T759	40-90	7%
Torsional Recovery, %	Nev. T757	22 Min.	None
Ductility @ 25 °C (77 °F), 5 cm/min, cm	AASHTO T51	40 Min.	10%

Latex modified emulsified asphalt not conforming to the requirements specified herein will be assessed demerits according to the following schedule.

TEST	INCREMENT	DEMERITS
Viscosity	5 mPa·s above maximum or below minimum	1
Residue, %	1% below minimum	2
Demulsibility, %	1% below minimum	2
Sieve, %	0.1% above maximum	1
Particle Charge	Fail	21
Penetration	0.1 mm above maximum or below minimum	1
Torsional Recovery, %	1% below minimum	1

MICRO-SURFACING EMULSION

TEST	TEST METHOD	MSE	MSE-h	TOLERANCE
Tests on Emulsion:				
Viscosity, Rotational Paddle @ 25 °C (77 °F), mPa·s	Nev. T762	45-220	45-220	None
Residue, %	Nev. T759	64 Min.	64 Min.	1.0
Storage Stability, 24 hr, %	Nev. T759	1 Max.	1 Max.	0.5
Sieve, %	Nev. T759	0.30 Max.	0.30 Max.	0.03
Particle Charge	Nev. T759	Pass	Pass	None
Polymer Content, % by mass of residual asphalt	(a)	3.5 Min.	3.5 Min.	None
Tests on Residue from Evaporation:				
Penetration @ 25 °C (77 °F), 100g, 5 sec	Nev. T759	40-90	—	7%
Penetration @ 25 °C (77 °F), 100g, 5 sec	Nev. T759	—	35-55	None
Softening Point, °C (°F)	AASHTO T53	60 (140) Min.	60 (140) Min.	None
Torsional Recovery, %	Nev. T757	25 Min.	25 Min.	None
Ductility @ 25 °C (77 °F), 5 cm/min, cm	AASHTO T51	60 Min.	60 Min.	10%

(a) Certificates of compliance provided for the material shall certify that the minimum polymer content is present.

Micro-surfacing emulsion not conforming to the requirements specified herein will be assessed demerits according to the following schedule.

TEST	INCREMENT	DEMERITS
Viscosity	4.5 mPa·s above maximum or below minimum to 30 mPa·s	1
Viscosity	Below 30 mPa·s	10
Residue, %	1% below minimum	4
Sieve, %	0.1% above maximum	1
Particle Charge	Fail	21
Penetration	0.1 mm above maximum or below minimum	1
Softening Point	0.5 °C (1 °F) below minimum	2
Torsional Recovery, %	1% below minimum	2

POLYMER MODIFIED PAVEMENT SEALANT

TEST	TEST METHOD	PMPS-h	TOLERANCE
Tests on Emulsions:			
Viscosity, Rotational Paddle @ 50 °C (122 °F), mPa·s	Nev. T762	425-1200	None
Residue, %	Nev. T759	65 Min.	1.0
pH	ASTM E70	4.0 Max.	None
Sieve, %	Nev. T759	0.1 Max.	0.03
Oil Distillate, % (a)	Nev. T759	0.5 Max.	None
Tests on Residue from Evaporation:			
Penetration @ 4 °C (39.2 °F), 200 g, 60 sec	Nev. T759	20-70	7.0%
Elastic Recovery @ 25 °C (77 °F), %	AASHTO T301	60 Min.	None
Tests on Latex:			
Specific Gravity	ASTM D1475	1.08-1.15	None
Tensile Strength, die C dumbbell, psi (b)	ASTM D412	500 Min.	None
Change in mass in rejuvenating agent, %, 48 hour exposure @ 40°C (104°F)	Nev. T747	40% Max. intact film	None
Tests on Rejuvenator:			
Kinematic Viscosity @ 60 °C, mm^2/s (140 °F, cSt)	AASHTO T201	50-175 (50-175)	2%
Flash Point, °C (°F)	AASHTO T48	193 Min. (380 Min.)	8 °C (15 °F)
Saturate, %	ASTM D2007	30 Max.	None
Asphaltenes, %	ASTM D2007	1.0 Max.	None
Weight Change, %	AASHTO T240	6.5 Max.	None
Viscosity Ratio	AASHTO T240	3.0 Max.	None

(a) Reduce the temperature on the lower thermometer to 177 ± 5 °C (350 ± 10 °F) and maintain this temperature for 20 minutes.
(b) Samples for tensile strength in accordance with ASTM D412 shall be cut using a die dumbbell at a crosshead speed of 20 cm/min.

Polymer modified pavement sealant not conforming to the requirements specified herein will be assessed demerits according to the following schedule.

TEST	INCREMENT	DEMERITS
Viscosity	5 mPa·s above maximum or below minimum	1
Residue, %	1% below minimum	2
Sieve, %	0.1 above maximum	1
Oil Distillate, %	0.25% above maximum	2
Penetration	0.1 mm above maximum or below minimum	1
Elastic Recovery, %	1% below minimum	1

POLYMER MODIFIED REJUVENATING EMULSION

TEST	TEST METHOD	PMRE-h	TOLERANCE
Tests on Emulsion:			
Viscosity, Rotational Paddle @ 50°C (122°F), mPa·s	Nev. T762	425-1200	None
Residue, %	Nev. T759	65 Min.	1.0
pH	ASTM E70	4.0 Max.	None
Sieve, %	Nev. T759	0.1 Max.	0.03

Oil Distillate, % (a)	Nev. T759	0.5 Max.	None
Tests on Residue from Evaporation:			
Penetration @ 25 °C (77 °F), 100 g, 5 sec	Nev. T759	70-120	7.0%
Torsional Recovery, %	Nev. T757	30 Min.	None
Softening Point, °C (°F)	AASHTO T53	54.5 Min. (130 Min.)	1 °C (2 °F)
Tests on Rejuvenator:			
Kinematic Viscosity @ 60 °C, mm^2/s (140 °F, cSt)	AASHTO T201	50-175 (50-175)	2%
Flash Point, °C (°F)	AASHTO T48	193 Min. (380 Min.)	8 °C (15 °F)
Saturate, %	ASTM D2007	30 Max.	None
Asphaltenes, %	ASTM D2007	1.0 Max.	None
Weight Change, %	AASHTO T240	6.5 Max.	None
Viscosity Ratio	AASHTO T240	3.0 Max.	None

(a) Reduce the temperature on the lower thermometer to 177 ± 5°C (350 ± 10°F) and maintain this temperature for 20 minutes.

Polymer modified rejuvenating emulsion not conforming to the requirements specified herein will be assessed demerits according to the following schedule.

TEST	INCREMENT	DEMERITS
Viscosity	5 mPa·s above maximum or below minimum	1
Residue, %	1% below minimum	2
Sieve, %	0.1 above maximum	1
Oil Distillate, %	0.25% above maximum	2
Penetration	0.1 mm above maximum or below minimum	1
Torsional Recovery, %	1% below minimum	1
Softening Point	0.5°C (1°F) below minimum	1

CQS-TRnv EMULSIFIED ASPHALT

TEST	TEST METHOD	CQS-TRnv	TOLERANCE
Tests on Emulsion:			
Viscosity, Rotational Paddle @ 25°C (77°F), mPa·s	Nev. T762	45-220	None
Residue, % by mass	Nev. T759	57 Min.	1.0
Sieve, %	Nev. T759	0.10 Max.	0.03
Particle Charge	Nev. T759	Pass	None
Cement Mixing, %	Nev. T759	25.0 Min. (a)	None
Rubber Content, % by mass of residual asphalt	(b)	5.0 Min.	None
Tests on Residue from Evaporation:			
Penetration, 25°C (77°F), 100g, 5 sec	Nev. T759	40-90	7%
Ductility, 25°C (77°F), 5 cm/min, cm	AASHTO T51	40 Min.	10%
Solubility, %	AASHTO T44	97.5 Min.	0.10
Tests on Diluted Emulsion:			
Residue, % by mass, 70:30	Nev. T759	40 Min.	1.0
Residue, % by mass, 60:40	Nev. T759	34 Min.	1.0
Residue, % by mass, 50:50	Nev. T759	29 Min.	1.0

(a) If the amount of breakage is significant enough to impede the flow of water through the testing screen, thus making it impossible to calculate a result, the test will be considered passing.

(b) Certificates of compliance provided for the material shall certify that the minimum rubber content is present.

CQS-TRnv emulsified asphalt not conforming to the requirements specified herein will be assessed demerits according to the following schedule.

TEST	INCREMENT	DEMERITS
Viscosity	4.5 mPa·s above maximum or below minimum to 30 mPa·s	1
Viscosity	Below 30 mPa·s	10
Residue	1% below minimum	2

Sieve	0.1% above maximum	1
Cement Mixing	Below 25.0%	21
Particle Charge	Fail	21
Penetration	0.1 mm above maximum or below minimum	1
Solubility	0.01% below minimum	1

QUICK SETTING AND QUICK SETTING REJUVENATING EMULSIONS

TEST	TEST METHOD	QSE	QSRE	TOLERANCE
Tests on Emulsion:				
Viscosity, Rotational Paddle @ 25°C (77°F), mPa·s	Nev. T762	65-330	65-330	None
Residue, %	Nev. T759	65 Min.	65 Min.	1.0
Sieve, %	Nev. T759	0.10 Max.	0.10 Max.	0.03
pH	ASTM E70	4.0 Max.	4.0 Max.	None
Storage Stability, 24-h, %	Nev. T759	1.0 Max.	—	0.5
Oil Distillate, %	Nev. T759	0.5 Max	0.5 Max	None
Tests on Diluted Emulsion:				
Residue, %, 60% and 40%	Nev. T759	39 Min.	39 Min.	1.0
Residue, %, 50% and 50%	Nev. T759	33 Min.	33 Min.	1.0
Tests on Residue from Evaporation:				
Penetration @ 25°C (77°F), 100 g, 5 sec	Nev. T759	40 Max.	45 Max.	7.0 %
Softening Point, °C (°F)	AASHTO T53	57 Min. (135 Min.)	54.5 Min. (130 Min.)	1°C (2°F)
Asphaltenes, %	ASTM D2007	24 Min.	24 Min.	None
Tests on Rejuvenating Agent:				
Kinematic Viscosity @ 60 °C, mm^2/s (140 °F, cSt)	AASHTO T201	—	50-175 (50-175)	2%
Flash Point, °C (°F)	AASHTO T48	—	193 Min. (380 Min.)	8°C (15°F)
Saturate, %	ASTM D2007	—	30 Max.	None
Asphaltenes, %	ASTM D2007	—	1.0 Max.	None
Weight Change, %	AASHTO T240	—	6.5 Max.	None
Viscosity Ratio	AASHTO T240	—	3.0 Max.	None

QSE and QSRE emulsions not conforming to the requirements specified herein will be assessed demerits according to the following schedule.

TEST	INCREMENT	DEMERITS
Viscosity	4.5 mPa·s above maximum or below minimum to 30 mPa·s	1
Viscosity	Below 30 mPa·s	10
Residue, %	1% below minimum	2
Sieve, %	0.1% above maximum	1
Oil Distillate, %	0.25% above maximum	2
Penetration	0.1 mm above maximum	1
Softening Point	0.5°C (1°F) below minimum	1

PMCQS-1nv EMULSIFIED ASPHALT

TEST	TEST METHOD	PMCQS-1nv	TOLERANCE
Tests on Emulsion:			
Viscosity, Rotational Paddle @ 25°C (77°F), mPa·s	Nev. T762	45-220	None
Residue, % by mass	Nev. T759	64 Min.	1.0
Storage Stability, 24-hour, %	Nev. T759	1 Max.	0.5

Sieve, %	Nev. T759	0.30 Max.	0.03
Particle Charge	Nev. T759	Pass	None
Polymer Content, % by mass of residual asphalt	(a)	3.0 Min.	None
Tests on Residue from Evaporation:			
Penetration, 25°C (77°F), 100g, 5 sec	Nev. T759	40-90	7%
Softening Point, °C (°F)	AASHTO T53	60 (140) Min.	None
Torsional Recovery, %	Nev. T757	22 Min.	None
Ductility, 25°C (77°F), 5 cm/min, cm	AASHTO T51	40 Min.	10%

(a) Certificates of compliance provided for the material shall certify that the minimum polymer content is present.

PMCQS-1nv emulsified asphalt not conforming to the requirements specified herein will be assessed demerits according to the following schedule.

TEST	INCREMENT	DEMERITS
Viscosity	4.5 mPa·s above maximum or below minimum to 30 mPa·s	1
Viscosity	Below 30 mPa·s	10
Residue	1% below minimum	4
Sieve	0.1% above maximum	1
Particle Charge	Fail	21
Penetration	0.1 mm above maximum or below minimum	1
Softening Point	0.5°C (1°F) below minimum	2
Torsional Recovery	1% below minimum	2

SECTION 704 – BASE AGGREGATES

704.03.02 Type 1 Class A Aggregate Base. Add the following line to the gradation specification:

Sieve Size	Percent Passing by Mass
19 mm (3/4 in.)	70-95

704.03.03 Type 1 Class B Aggregate Base. Add the following line to the gradation specification:

Sieve Size	Percent Passing by Mass
19 mm (3/4 in.)	70-95

704.03.11 Granular Backfill. In the first paragraph of this Subsection of the Standard Specifications the requirement for **Percent Passing by Mass** for **Sieve Size** 600 µm (No. 30) of “20-100” is hereby deleted and “10-100” substituted therefore.

SECTION 706 – AGGREGATES FOR PORTLAND CEMENT PRODUCTS

706.03.01 Coarse Aggregate. The fifth row of the second table on page 532 of the Standard Specifications is hereby deleted and the following added to the third table on page 532:

Clay Lumps	AASHTO T112	0.3% Max.

706.03.02 Lightweight Aggregate. The third row of the second table on page 533 of the Standard Specifications is hereby deleted and the following added to the third table on page 533:

Clay Lumps	AASHTO T112	2% Max.

706.03.03 Fine Aggregate. The fourth row of the first table on page 534 of the Standard Specifications is hereby deleted and the following added to the second table on page 534:

Clay Lumps	AASHTO T112	1% Max.

SECTION 707 – JOINT MATERIAL

707.03.01 Joint Fillers. The first sentence of the first paragraph of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Preformed fillers for joints shall conform to the requirements of ASTM D1751, Fiber Type, or ASTM D8139.

707.03.04 Joint Sealer for Weakened Plane Joints in Portland Cement Concrete Pavements. Joint sealants shall conform to ASTM D5893 Type SL.

SECTION 712 – MISCELLANEOUS METAL

712.03.02 Gray Iron Castings. This Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

These castings shall conform to ASTM A48, Class 35B.

SECTION 718 – TIMBER MATERIAL

718.03.02 Grades. In paragraph 3 of this Subsection, the requirement for "No. 1 SR" is hereby deleted and "No. 1" substituted therefore.

718.03.03 Preservatives. This Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

The following preservatives listed in these specifications shall conform to the requirements of the referenced American Wood Protection Association (AWPA) Standards:

(a) Creosote shall conform to AWPA Standard P1/P13-16.

(b) Creosote Solution shall conform to AWPA Standard P2-16.

(c) Creosote-Petroleum Solution shall conform to AWPA Standard P3-14.

(d) Pentachlorophenol (PCP) shall conform to AWPA Standard P35-16.

(e) Ammoniacal Copper Zinc Arsenate (ACZA) shall conform to AWPA Standard P22-14.

(f) Chromated Copper Arsenate, Type C (CCA-C) shall conform to AWPA Standard P23-14.

(g) Copper Naphthenate (CuN) shall conform to the requirements of AWPA Standard P36-16.

Use a method of seasoning, conditioning, and treating conforming to AWPA Standards for each usage.

The minimum amount of preservative retained per cubic meter (cubic foot) of timber, lumber, or piling shall conform to the minimum specification requirements shown in Table I of this Subsection.

TABLE I
PRESERVATIVE TREATMENTS TO MEET AWPA STANDARD U1

Usage and Wood Species		Type of Preservative Treatment and Minimum Retention - kg/m³ (lb/ft³) of wood						AWPA Treatment Standard
		A	B	C	D	E	F (c)	
Sawn Posts and Blocks for Guardrail: Coastal Douglas Fir, Western Larch, Western Hemlock, and Southern Pine		160.0 (10.0)	160 (10.0)	8.0 (0.50)	9.6 (0.60)	9.6 (0.60)	(d) 1.2 (0.075)	UC4B
Posts and Braces for Fences: Coastal or Interior Douglas Fir (a), Western Larch, Southern Pine,	Round	160.0 (10.0)	160.0 (10.0)	8.0 (0.50)	8.0 (0.50)	8.0 (0.50)	(e) 1.1 (0.069)	UC4B
	Sawn Four	160.0 (10.0)	160.0 (10.0)	8.0 (0.50)	9.6 (0.60)	9.6 (0.60)	(d) 1.2	UC4B

and Lodgepole Pine	Sides						(0.075)	
Posts for Signs: Coastal or Interior Douglas Fir, Western Hemlock, and (b)		160.0 (10.0)	160.0 (10.0)	8.0 (0.50)	8.0 (0.50)	8.0 (0.50)	(d) 1.1 (0.069)	UC4B
Round Timber Piles: Southern Pine		192 (12.0)	192 (12.0)	9.6 (0.60)	12.8 (0.80)	12.8 (0.80)	1.6 (0.10)	UC4C
Round Timber Piles: Costal or Interior Douglas Fir, and Western Larch		272 (17.0)	272 (17.0)	13.6 (0.85)	16.0 (1.0)	—	2.2 (0.14)	UC4C

A = Creosote or Creosote-Petroleum Solution
B = Creosote Solution
C = PCP
D = ACZA
E = CCA-C
F = CuN

(a) Interior Douglas Fir is not allowed for round posts.
(b) Any other equivalent stress rated wood.
(c) As kg/m^3 (lb/ft^3) copper.
(d) Coastal Douglas Fir and Southern Pine only.
(e) Copper Naphthenate in AWPA P9 Hydrocarbon Solvent Type A and only for Douglas Fir, Southern Pine, or Lodgepole Pine.

The treating plant shall imprint legible symbols in the treated material indicating the name of the treating company and the type and year of treatment according to AWPA Standards.

Furnish inspection certifications from the supplier stating that the treated material complies with all the requirements of these specifications. Each certification shall include a listing of the material being supplied and have attached a certified test report as detailed in AWPA Standards from the plant inspector.

All materials and processes used in the manufacture of treated material may be subjected to inspection, acceptance, or rejection at the manufacturer's plant. Equip the plant with all the necessary gages, appliances and facilities to enable the inspector to satisfy himself that the requirements of the specifications have been fulfilled.

Care and handle pressure treated wood according to AWPA Standards.

SECTION 722 – WATER

722.03.01 Concrete Use. This Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Water shall be clean, clear, and potable. As an alternative to potable water, submit certified test results demonstrating the water meets the requirements of ASTM C1602, including Table 2.

SECTION 726 - ROADSIDE MATERIALS

726.02.01 Certificates and Samples. Subparagraph "(e) Seeds" of this Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

(e) Seeds. For all shrub species, a recognized testing laboratory shall test seed within 6 months prior to seeding unless otherwise directed. For other species, a recognized testing laboratory shall test seed within 12 months prior to seeding unless otherwise directed. Submit original laboratory seed tests by lot number for individual species for approval and acceptance 30 days before application. Submit material samples with labels, most recent test date, and rates or quantities of application for approval.

Furnish, to the Nevada State Department of Agriculture, duplicate copies of a statement signed by the vendor certifying that each lot of seed has been tested by a recognized seed testing laboratory. Forward a copy of the Nevada State Department of Agriculture's approval to the Engineer.

726.03.11 Seeds. Seeds shall conform with laws and regulations pertaining to the sale and shipment of seed

as required by the Nevada State Department of Agriculture and the Federal Seed Act. Report shipments of seed to the Nevada State Department of Agriculture for inspection. Deliver seed to the site tagged and labeled in accordance with the State Agricultural Code and acceptable to the County Agricultural Commissioner.

Species and/or varieties may be substituted upon written permission. Seed shall have a minimum Pure Live Seed (PLS) as specified. Seed mixes shall conform to the following:

Table 5-14 Seed Mix Requirements

Common Name	Botanical Name	PLS lb/acre
Achillea millefolium	Yarrow	0.05
Achnatherum hymenoides	Indian Ricegrass	3.50
Agropyron cristatum	Crested Wheatgrass	4.00
Agropyron fragile	Siberian Wheatgrass	2.50
Artemisia tridentate ssp. wyomingensis	Wyoming Big Sagebrush	0.50
Asclepias fascicularis	Narrow Leaf Milkweed	0.15
Cleome lutea	Yellow Beeplant	0.25
Elymus elymoides	Bottlebrush Squirreltail	2.6
Elymus lanceolatus	Thickspike Wheatgrass	2.00
Eriogonum umbellatum	Sulfur Buckwheat	0.15
Gailardia pulchella	Indian Blanket	0.15
Hedysarum boreale	Utah Sweetvetch	0.20
Leymus cinereus	Great Basin Wildrye	2.5
Linum lewisii	Lewis Blue Flax	0.10
Lolium multiflorum	Annual Ryegrass	4.00
Lupinus alpestris	Great Basin Lupine	0.20
Penstemon palmeri	Palmer Penstemon	0.25
Poa secunda	Big Bluegrass ‘Sherman’	2.00
Spaeralcea grossulariifolia	Gooseberry-Leaf Globemallow,	0.25
	Total	25.35

726.03.12 Soil Inoculants. Each endomycorrhizal inoculum shall carry a supplier’s guarantee of number of propagules per unit weight or volume of bulk material. Species shall include Glomus aggregatum, Glomus mosseae, and Glomus ineradices. Each species shall comprise approximately 33.3% of the mix.

726.03.18 Soil Amendments. Use one of the following biotic soil medium or approved equal:

ProGanics Biotic Soil Media
PROFILE Products LLC
750 Lake Cook Rd, Suite 440
Buffalo Grove, Illinois 60089
Erosion & Vegetative Solutions: (800) 508-8681
Corporate Office: (847) 215-1144

Biotic Earth Black™
Verdyol
Lauren Alaniz
Western USA Sales
Phone (720) 369-1317
Email: lauren@ecb.ca

SECTION 730 – TRAFFIC BEADS

730.02.01 Requirements. This Subsection of the Standard Specifications is hereby deleted and the following substituted therefore:

Provide certified independent laboratory test results, that are no more than one year old, verifying the glass

used for beads or reflective elements does not contain heavy metals in excess of 200 parts per million of arsenic or lead, determined in accordance with Environmental Protection Agency testing methods 3052, 6010B, or 6010C.

All glass beads shall have a refractive index of 1.50 minimum when tested in accordance with AASHTO T346.

The moisture content of all glass beads shall not exceed 0.01% by mass when tested at 105 °C (221 °F) for 3 hours.

Glass spheres shall be coated with an adhesion-promoting and water-repellant coating complying with paint manufacturer's instructions. Glass beads shall show no tendency to absorb moisture in proper storage based on manufacturer's recommendations and shall remain free of clusters and lumps. They shall flow freely from dispensing equipment at any time when surface and atmospheric conditions are satisfactory for marking operations. The moisture-resistance of the glass spheres shall be tested in accordance with AASHTO T346.

The glass spheres shall be colorless, clean, transparent, free from milkiness or excessive air bubbles, and essentially clean from scarring and scratching. The glass spheres shall be spherical in shape and when tested in accordance with AASHTO R98 the b/l value, tested on weighted average of the whole sample, shall be at least 80%.

The silica content of the glass spheres shall not be less than 60%.

(a) Glass Beads for Epoxy Paint and Polyurea Paint.

The glass spheres shall have the following gradation when tested according to ASTM D1214, or AASHTO R98:

Type I		Type II		Type III	
Sieve Size	**% Retained by Mass**	**Sieve Size**	**% Retained by Mass**	**Sieve Size**	**% Retained by Mass**
2.00 mm (No. 10)	0	850 µm (No. 20)	0-5	850 µm (No. 20)	0
1.70 mm (No. 12)	0-5	600 µm (No. 30)	5-20	600 µm (No. 30)	5-25
1.40 mm (No. 14)	5-20	300 µm (No. 50)	30-75	300 µm (No. 50)	40-80
1.18 mm (No. 16)	40-80	180 µm (No. 80)	9-32	150 µm (No. 100)	10-35
1.00 mm (No. 18)	10-40	Pan	0-10	Pan	0-5
850 µm (No. 20)	0-5				
Pan	0-2				

(b) Glass Beads for Waterborne Paint.

The glass sphere shall have the following gradation when tested according to ASTM D1214, or AASHTO R98:

Sieve Size	**% Retained by Mass**
850 µm (No. 20)	3-10
600 µm (No. 30)	20-40
450 µm (No. 40)	30-50
300 µm (No. 50)	15-35
180 µm (No. 80)	0-10
Pan	0-2

(c) Reflective Elements for Polyurea Paint. The bonded core elements shall be composed of a durable core having clear and/or yellow microcrystalline ceramic beads bonded to the core with a durable polymer coating.

Microcrystalline ceramic beads bonded to reflective elements shall have a minimum index of refraction of 1.8 when tested in accordance with AASHTO T346.

A sample of microcrystalline ceramic with embedded glass beads supplied by the manufacturer shall show resistance to corrosion of their surface after exposure to a 1% solution, by weight, of sulfuric acid.

The resistance to corrosion shall be determined according to Maryland Standard Method of Tests MSMT 211 having no more than 15% of beads show an opaque, white layer on their entire surface, or on the basis of the following test:

When sample has been exposed to 1% sulfuric acid solution for 24 hours, no more than 15% of the beads shall have a formation of a very distinct opaque white (corroded) layer on their entire surface.

SECTION 732 – PAVEMENT MARKING FILM

732.03.04 Thermoplastic. The first sentence of paragraph 14 of subparagraph (b) on page 602 of the Standard Specifications is hereby deleted and the following substituted therefore:

The preformed thermoplastic marking materials, for use as transverse or longitudinal markings as well as legends, arrows, and symbols shall be available in rolls or sheets.