PROJECT SPECIAL PROVISIONS

PART I – PROJECT NOTICE TO BIDDERS

1. NOTICE TO BIDDERS – CONTRACT COMPLETION DATE. This Contract shall be completed on or before May 31, 2024.

2. NOTICE TO BIDDERS – MEASURES TO MITIGATE POTENTIAL IMPACTS DUE TO THE COVID-19 PANDEMIC. The Contractor is hereby notified that they should anticipate the possibility of future temporary Contract shutdowns, delays, or suspensions as a result of the COVID-19 pandemic. The Contractor shall consider risks associated with the COVID–19 pandemic as the Contractor develops project schedules and advances the work. The Contractor shall schedule work in a manner that in the event of a temporary shutdown, delay, or suspension, the impacts to mobility will be minimized. The sequence and progression of the work will be solely the Contractor's responsibility. The Contractor is expected to communicate with the Agency regularly to discuss the risks to the project and proposed mitigation measures. VTrans will collaborate with the contractor to mitigate the risks to the project and adjust the sequence of work as necessary to ensure that mobility is not impaired unnecessarily.

   If a shutdown, suspension, or delay occurs due to the COVID-19 pandemic, the Contractor shall ensure the site is in a stable, safe, and maintainable condition by implementing mitigation measures. Such mitigation measures may include, but are not limited to, limiting the area of milled surfaces exposed at once, or limiting the number of work operations in progress at any one time. The Contractor is solely responsible for any additional maintenance activities or delays related to the sequence and progression of operations. The Agency has established a contract duration which may be longer than expected for the specified work to account for inefficiencies related to the COVID-19 pandemic. The Contractor should anticipate mobility, labor, employee protection measures and material supply issues related to the COVID-19 pandemic. The Contractor is also expected to comply with any Executive Orders.

3.. NOTICE TO BIDDERS – SITE CONDITION. Prior to any shutdown or suspension, the site condition shall be in a stable, safe, and maintainable condition for the travelling public. Stable, safe, and maintainable condition means that the Contractor shall establish necessary erosion and environmental controls; ensure that the full width of the roadway is fully paved with no milled sections; install all safety features including guardrail, traffic signs, and pavement markings as designed or restored to the existing condition to meet the existing geometry; and undertake any additional measures as needed based on site conditions. No lane reductions will be allowed through the winter months. Subsection 109.06 will not apply for work that is required to bring a project to a satisfactory shutdown condition. In the event of a project Suspension of Work Ordered by the Engineer, the Contractor will be reimbursed per Subsection 108.16.

4. NOTICE TO BIDDERS – SUBSECTION 108.16(b). Subsection 108.16(b) is hereby modified by adding the following language.

(4) The ownership costs for equipment with a current *Blue Book* value in excess of $200,000.00 on site of an active project at the time of a suspension caused by the COVID-19 pandemic will be paid per Subsection 109.06(c).

5. NOTICE TO BIDDERS – SUBSECTION 631.02(a)(5). Subsection 631.02(a)(5) is hereby modified by adding the following as the second paragraph.

The heating and cooling systems shall be fitted with HEPA air filters meeting the requirements of the most current version of *DOE-STD-3020*. New HEPA filters shall be installed upon initial erection of the Field Office. All HEPA filters shall be replaced with new filters every 12 months, or when airflow through the filter becomes restricted, or as recommended by the manufacturer, whichever is more frequent.

6. NOTICE TO BIDDERS – SUBSECTION 631.02(a)(6). Subsection 631.02(a)(6) is hereby modified by being deleted in its entirety and replaced with the following.

(6) Sanitary Facilities and Cleaning Supplies. Sanitary facilities consisting of a flush toilet, chemical toilet, or other approved type, shall be furnished by the Contractor, with proper sewage disposal as is necessary to comply with the requirements and regulations of the State and local Boards of Health and VOSHA. Sanitary facilities shall be cleaned and disinfected regularly, per the CDC guidance at: https://www.cdc.gov/coronavirus/2019-ncov/community/disinfecting-building-facility.html?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Fcoronavirus%2F2019-ncov%2Fcommunity%2Freopen-guidance.html. The frequency of cleaning shall be as outlined in the CDC guidance, or as directed by the Engineer. The degree of cleanliness shall be approved by the Engineer. Sanitary facilities shall be provided with either hot, running, potable water and soap, or an alcohol-based hand sanitizer containing at least 70% alcohol by volume, for use in washing hands.

A potable water system consisting of a sink with a faucet within the office, with a continuous supply of pressurized clean potable water, shall be supplied for the duration of the project. When clean potable water is not available, a commercial bottled drinking water system shall be installed in the Field Office complete with necessary disposable drinking cups (8 oz. size or larger), cup dispenser, and continuous water supply furnished for the duration of the project. The system shall supply both hot and cold water. The system and the bottled water shall be furnished by a commercial water service on a regular basis agreeable to the Engineer.

The Contractor shall supply the Field Office with hand sanitizer to be used for washing hands, and with a disinfectant for use in disinfecting surfaces. The hand sanitizer shall be alcohol based and shall contain at least 70% alcohol by volume. The disinfectant shall be one of the products identified on *EPA List N: Disinfectants for Use Against SARS-CoV-2 (COVID-19)*, and shall have a contact time of 5 minutes or less, as specified on *List N*. If the disinfectant supplied is of the liquid or spray-on type, the Contractor shall also supply the Field Office with disposable paper towels for use in applying the disinfectant.

7. NOTICE TO BIDDERS – SUBSECTION 635.03(a). Subsection 635.03(a) is hereby modified by being deleted it in its entirety and replaced with the following:

The first payment of 50% of the lump sum price for Mobilization/Demobilization, or 10% of the adjusted Contract price, whichever is less, will be made upon successful execution of the contract.

8. NOTICE TO BIDDERS – WORK REQUIREMENT (IWWR). The Contractor is hereby notified that there are In Water Work Restrictions (IWWR) on Lake Champlain in this region, please refer to the relevant permits for further information.

9. NOTICE TO BIDDERS – WORK REQUIREMENT (PAVEMENT). The bridge shall be open to two lanes of traffic for the winter season. The Contractor will be required to install membrane, pavement, and line striping prior to opening the bridge for the winter season. All pavement, membrane and line striping that cannot be installed within the temperature and seasonal restrictions of the 2018 Standard Specifications for Construction will be considered temporary and shall be removed and replaced at the contractor's sole expense. No transverse pavement joint will be permitted on the bridge.

If the Contractor has installed a temporary access road, then the approach roadway wearing course and line striping for the limits of the adjacent temporary access road cannot be completed until the temporary access road has been removed. These limits will not be considered part of the Stage 2 I/D Identified Work.

If Stage 2 Identified Work begins by August 14, 2023, then the full limits of the proposed membrane, paving and line striping shall be installed under Stage 2 I/D Identified Work after the longitudinal closure pour is completed. The Contractor shall take measures to protect the protruding scupper pans and finger joint plates installed under Stage 1 during Stage 2 using temporary pavement or other means approved by the Engineer. Similarly, placeholder material shall be installed at the plug joints in the Suspended Span prior to the final membrane and paving installation.

If the Contractor is not able to start the Stage 2 work by August 14, 2023, then they shall install membrane, pavement and line striping for the Stage 1 limits only to accommodate two-way traffic over the winter season.

The cost of any repairs or re-work due to the installation of the Stage 1 limits of proposed membrane, pavement, and line striping to accommodate two-way traffic over the winter season will be the responsibility of the Contractor. Any temporary line striping required for the existing portion of the roadway to be utilized for traffic over the winter season shall also be the responsibility of the Contractor.

10. NOTICE TO BIDDERS – BOUNDARY MARKERS. Pursuant to Vermont State Law, boundary markers shall be installed by a Professional Licenses Surveyor with a current license in the State of Vermont.

11. NOTICE TO BIDDERS – INCENTIVE/DISINCENTIVE (I/D). The Agency's intent is to complete the Identified Work as rapidly as possible. To encourage the Contractor to complete the Identified Work within the period defined below, the Agency is willing to pay an incentive.

(a) Dates. The allowable I/D work period for completion of Stage 1 construction shall start on April 17th, 2023 at 6:00 a.m and end no later than 8:00 p.m. on July 14, 2023. The time period between the start date and end date is defined as the Stage 1 I/D period.

The allowable I/D work period for completion of Stage 2 construction start date shall be determined by the Stage 1 I/D actual completion date by the Contractor. The Stage 2 I/D start date shall not begin later than August 14th, 2023, at 6:00 a.m. In no case shall the Stage 2 I/D work period end later than 5:00 p.m. on November 2, 2023. The time period between the start date and end date is defined as the Stage 2 I/D period.

The Contractor shall submit a letter to the Engineer for review and approval specifying the Begin Construction Date for each I/D Period. This letter shall be received by the Engineer a minimum of 14 Calendar Days prior to the Begin Construction Date specified in the letter.

During the I/D Period, the Contractor will be allowed to work on the Project 6 days per week, not including Sundays and holiday periods. Night work will not be allowed during the I/D Period.

The I/D Period as established above for this Contract is a fixed date and will not be changed for any reason whatsoever unless done so by the Chief Engineer, and then only under extreme conditions as determined by, and at the sole discretion of, the Chief Engineer.

If the Stage 1 Identified Work is not completed by the Contractor by July 14, 2023 at 8:00 p.m. per the Stage 1 I/D Period requirements, then the Contractor will not be allowed to commence Stage 2 Identified Work without the approval of the Engineer. The Contractor must submit a detailed recovery plan proving that they have the means and methods to still meet the Stage 2 I/D Period requirements, despite not meeting the Stage 1 I/D Period requirements. This detailed recovery plan shall be a CPM resource loaded schedule showing how the Contractor will reduce durations, including analysis of actual durations for similar activities performed during Phase 1. The detailed recovery schedule must be submitted to the Engineer seven (7) calendar days prior to the Contractor's proposed Stage 2 start date. Assessment of this narrative and the allowance of the Contractor to proceed with Stage 2 Identified Work is at the sole discretion of the Engineer. Under no circumstances will the Contractor be allowed to start Stage 2 Identified Work after August 14, 2023. If the Contractor does not start Stage 2 Identified Work by August 14, 2023, then Stage 2 construction shall begin on April 15, 2024.

(b) Meetings. There shall be pre-I/D period meetings held on site with the Contractor's Superintendent, Contractor's Project Manager, the Engineer, the Project Manager, the Town of North Hero, Town of Alburgh, Town of North Hero Fire Department, Town of Alburgh Fire Department, Vermont State Police, and the Northwest Regional Planning Commission to discuss durations of work, types of work, work sequencing, etc. The Contractor shall be responsible for setting this meeting up and making appropriate contacts. This meeting shall be held a minimum of 14 Calendar Days prior to the start of the I/D Period.

For this Project, there shall also be a public information meeting prior to the start of the Stage 1 I/D Period. The Contractor's Superintendent and Contractor's Project Manager shall be available to attend. The Contractor shall be prepared to discuss the construction schedule with the public. The Public Outreach Coordinator employed by the Agency shall be responsible for setting this meeting up and making appropriate contacts. This meeting shall be held a minimum of 21 Calendar Days prior to the start of the Stage 1 I/D Period.

Weekly meetings between the Contractor, Engineer, and other pertinent parties as determined by the Engineer shall be held during the I/D Period to discuss the Project progress and future construction activities, and current CPM progress schedules and narratives.

(c) Identified Work.

(1) All work identified below shall be completed before the end of the Stage 1 I/D Period:

a. Installation of Stage 1 temporary barrier, pavement markings and other traffic control measures;

b. Demolition of the Stage 1 limits of the existing structure;

c. Construction of the Stage 1 limits of the following: precast deck panel system and all associated hardware and grout, rapid set concrete pours cured to minimum required strength, proposed joints, permanent bridge railing, superstructure repairs, re-building of the abutment backwalls and wingwalls for the limits shown in the Plans, approach slabs, permanent end posts on moment slabs, permanent approach roadway grading and subbase, permanent approach pavement excluding the wearing surface, and permanent approach railing full limits;

d. Installation of Stage 2 temporary limited deflection traffic barrier and maintenance of traffic measures, including but not limited to signage, temporary lines, etc., and;

e. Shifting of the one lane alternating traffic to the Stage 1 proposed bridge and approach limits.

(2) All work identified below shall be completed in accordance with the Contract Plans and Specifications before the end of the Stage 2 I/D Period:

a. Demolition of the Stage 2 limits of the existing structure;

b. Construction of the Stage 2 limits of the following: precast deck panel system and all associated hardware, proposed joints, proposed bridge railing, superstructure repairs, partial re-building of the abutment backwalls and wingwalls, approach slabs, permanent end posts on moment slabs, permanent approach roadway grading and subbase, permanent approach pavement, and permanent approach railing full limits;

c. Completion and curing of the longitudinal closure pours between stages;

d. Removal of Stage 2 temporary traffic barrier and maintenance of traffic measures;

e. For the limits of the entire project, completion of the permanent paving and permanent line striping except within the limits of the temporary access road if installed, OR temporary pavement and temporary line striping (at Contractor’s expense), and;

f. Opening of the bridge to two lanes of traffic.

No daily lane closures for the full limits of the project and over the existing bridge will be allowed until 14 Calendar Days prior to the start of the I/D Period, except to progress work for EPSC and Traffic Control, including but not limited to temporary traffic signals, etc.

During the 14 Calendar Days prior to the Stage 1 I/D Period the contractor will be allowed to maintain a minimum of one-lane (10 foot lane and one 2 foot shoulders) alternating traffic during daytime hours in order to perform preparatory work. No night work will be allowed during this window, and two-lane, two-way traffic must be maintained on the existing alignment during nighttime hours.

All prefabricated concrete elements required to complete the Identified Work for each stage shall be authorized for shipment prior to the start of the respective I/D Periods (Stage 1 and Stage 2).

(d) Pay Schedule. The Contractor will receive a lump sum compensation of $133,448.80 for completing the Stage 1 Identified Work before the end of the Stage 1 I/D Period. The Contractor will receive a lump sum compensation of $133,448.80 for completing the Stage 2 Identified Work before the end of the Stage 2 I/D Period.

In addition to the lump sum payments, the Contractor will also be compensated at a rate of $65.42 per hour for each hour that the Stage 1 or Stage 2 Identified Work is completed prior to the end of the Stage 1 or Stage 2 I/D Period, up to a maximum total payment of $157,000 per stage. (including the lump sum payment). Only full hours where the Stage 1 or Stage 2 I/D Identified Work is completed before the end of the I/D period will count toward this extra incentive payment. No incentive payment will be made for hours during which the Contractor is not allowed to work.

For each hour after the end of the I/D Period that the Identified Work remains uncompleted, the Contractor will be assessed a disincentive at a rate of $65.42 per hour. The full hourly disincentive amount will be assessed for each hour during which the Identified Work for either Stage 1 or Stage 2 is not completed for any portion of the hour. There shall be no maximum on the disincentive amount. No disincentive will be charged for hours during which the Contractor is not allowed to work.

This assessed disincentive is separate from, and will be imposed in addition to, liquidated damages which may be imposed for failure to complete the Contract on time.

(e) Underruns and Overruns. The proposal indicates an estimated quantity for each Pay Item. The fact that the actual amounts used in the construction of this Project may vary from the estimate will not be a basis or cause for changing any of the conditions for I/D.

The Agency recognizes that additional work beyond the work indicated in the Plans, is always possible in any construction contract. The Agency is willing to pay for necessary additional work in accordance with the terms and requirements of the Contract and the Standard Specifications for Construction, however, the Contractor shall absorb any resulting construction time within the original Project and CPM Schedules, and there will be no adjustments or changes to the I/D dates or I/D conditions.

(f) Payment. Payment will be made under Item 900.615 Special Provision (Incentive/ Disincentive)(N.A.B.I.).

12. NOTICE TO BIDDERS – NIGHT WORK. The Contractor is hereby notified that no night work will be allowed on this Project. For the purposes of this Contract, "night" shall mean the period from sunset until sunrise of the following day for the location of the Project. The time of sunrise and sunset for any day of the year and any location can be determined using the following link: https://www.esrl.noaa.gov/gmd/grad/solcalc/.

13. NOTICE TO BIDDERS – ELECTRONIC DOCUMENT MANAGEMENT. The Contractor is hereby notified that the Contractor, their subcontractors, and suppliers shall create a Doc Express account and use the application for collection and management of electronic documents. Doc Express is a web based document management application which accepts electronic documents and provides security as appropriate for each submittal. All Contract required documents, such as Working Drawings as defined in Subsection 105.03 of the 2018 Standard Specifications for Construction, Progress Schedules, Mix Designs, Weld Procedures, Requests for Information and Erosion Control Plans shall be submitted at the following link: https://docexpress.com. The entire submittal and review process shall occur within Doc Express.

All costs associated with the use of Doc Express will be considered incidental to Item 635.11, Mobilization/Demobilization. The State will manage the Doc Express application including Contract setup upon Contract execution.

To create an account and for more information regarding the use of Doc Express see the information at the following link:

https://outside.vermont.gov/agency/vtrans/external/docs/construction/Contracting/DocExpressOverviewforContractors.docx

14. NOTICE TO BIDDERS – CONTACT WITH THE AGENCY. From the time of advertising until the actual bid opening for this Contract, all prospective Contractors, subcontractors, and suppliers shall direct all inquiries related to this project solely to the Agency's Office of Contract Administration AOT.ConstructionContractingInquiry@vermont.gov.

The deadline for submitting inquiries related to this project to the Office of Contract Administration is 4:30 p.m. Eastern Time on March 30th, 2022. No exceptions will be made to this requirement.

15. NOTICE TO BIDDERS – OTHER SPECIFICATIONS AND CONTRACT REQUIREMENTS.

Lakes and Ponds Permit
404 Corps of Engineers Permit
US Coast Guard
Impact Plans
PIF – AccelBridge Precast Deck System
Soil Management Plan
Required Contract Provisions for Federal-Aid Construction
Certification for Federal-Aid Contracts
U.S. Department of Labor Davis-Bacon Wage Rates
Disadvantaged Business Enterprise (DBE) Policy Contract Requirements
Bulletin 3.5 Attachment C: Standard State Provisions for Contracts and Grants
USDOT Standard Title VI/Non-Discrimination Assurances, Appendices A and E
Standard Federal EEO Specifications
Contractor's EEO Certification Form
Vermont Certificate of Compliance
Vermont Minimum Labor and Truck Rates
Commodity Index Prices
Schedule of Pay Items

16. NOTICE TO BIDDERS – DAVIS-BACON. U.S. Department of Labor Davis-Bacon wage rates are applicable to this Contract. Copies of the applicable rates are included in this proposal.

In the included wage rates, the requirements of Executive Order 13658 do not apply to this Contract.

17. NOTICE TO BIDDERS – GENERAL SPECIAL PROVISIONS. The Contractor is hereby notified that the most recent General Special Provisions in effect on the date of advertisement shall apply to this Contract. The General Special Provisions may be found at the following address: https://vtrans.vermont.gov/highway/construct-material/construct-services/pre-contractspecifications/active

18. NOTICE TO BIDDERS – VTRANS COVID-19 PANDEMIC TEMPORARY GUIDELINES FOR THE QUALITY ASSURANCE PROGRAM. The Contractor is hereby notified that VTrans COVID-19 Pandemic Temporary Guidelines for the Quality Assurance Program (QAP) dated May 18, 2020 and its latest revisions are hereby in full effect and shall be adhered to. The QAP is located at the following link: https://vtrans.vermont.gov/highway/construct-material/test-cert

19. NOTICE TO BIDDERS – STANDARD DRAWINGS. The Vermont Agency of Transportation Standard Drawings listed on the Index of Sheets are not included in the plan set, but may be found at the following address:
https://outside.vermont.gov/agency/vtrans/external/CADD/WebFiles/Downloads/Standards/VAOTconSTD_Owner.xml

20. NOTICE TO BIDDERS – RECORD PLANS. The Contractor is hereby notified that Record Plans for the existing bridge structure for this Contract are available on iCXWeb and the VTrans Bid Opportunities website. These plans are being provided during the bid solicitation period for informational purposes only.

21. NOTICE TO BIDDERS – GEOTECHNICAL REPORT. The Contractor is hereby notified that a Geotechnical Report for this Contract is available on iCXWeb and the VTrans Bid Opportunities website. This report is being provided during the bid solicitation period for informational purposes only.

22. NOTICE TO BIDDERS – BRIDGE PAINT SAMPLING RESULTS MEMORANDUM. The Contractor is hereby notified that a Bridge Paint Sampling Results Memorandum for this Contract is available on iCXWeb and the VTrans Bid Opportunities website. This memorandum is being provided during the bid solicitation period for informational purposes only.

23. NOTICE TO BIDDERS – ACCELBRIDGE INFORMATIONAL PACKAGE. The Contractor is hereby notified that an informational package on the AccelBridge precast deck panel system to be used on this Contract is available on iCXWeb and the VTrans Bid Opportunities website. This package is being provided during the bid solicitation period for informational purposes only.

24. NOTICE TO BIDDERS – TRAFFIC MANAGEMENT PLAN (TMP) CHECKLIST. The Contractor is hereby notified that one or more TMP checklists for this Contract are available on iCXWeb and the VTrans Bid Opportunities website. These checklists are being provided during the bid solicitation period for informational purposes only.

25. NOTICE TO BIDDERS – STAGING AND WASTE SITES. The Contractor is hereby notified that the Vermont Natural Resources Board has requested that VTrans contractors planning to use staging and waste sites governed by preexisting Act 250 permits notify District Coordinators prior to using these sites. Complying with preexisting Act 250 permits at these sites is the sole responsibility of the landowner and the Contractor, not the State.

26. NOTICE TO BIDDERS – ENVIRONMENTAL COMMITMENTS.

(a) Threatened, Endangered, and Rare Species.

(1) This project shall be subject to Avoidance and Minimization Measures to protect the habitat and hibernacula of the northern long-eared bat. It is anticipated that the Contractor will be required to cut trees ≥3" in diameter and/or conduct bridge related activities within the identified project limits as part of the work. An acoustic survey of the project area resulted in no detected presence of the species. Therefore, tree cutting, and bridge related activities, within the project limits may occur without any TOY restrictions.

The Contractor is hereby made aware of the potential for TOY restrictions related to proposed Waste, Borrow and Staging areas. Cutting trees ≥ 3" in diameter outside of the contract project limits shall require further review under Section 105.25 Control of Waste, Borrow, and Staging Areas.

(b) Emerald Ash Borer.

(1) As of 2018, emerald ash borer (EAB), Agrilus planipennis, has been confirmed within Vermont's borders. To provide an assurance of compliance with state and federal EAB laws the contractor shall adhere to the following:

Known EAB infestation areas are changing rapidly. Therefore the Contractor shall consult the online version of the EAB Infested Area Map (Located here: www.vtinvasives.org/land/emerald-ash-borer-vermont) on the same day cutting is to occur. If the project is located with an EAB infested area, ALL tree material, regardless of species, within the project area shall be handled in accordance with a document developed by the Vermont Department of Forests, Parks and Recreation and the Vermont Agency of Agriculture titled "Recommendations to SLOW THE SPREAD of Emerald Ash Borer When Moving Ash from the Infested Area", https://vtinvasives.org/sites/default/files/images/SlowSpreadWoodVT.pdf. Tree material shall not be moved out of state.

Alternatively, the Contractor may choose to hire a qualified professional (Arborist certified by the International Society of Arboriculture or Licensed Forester), at their own expense, to identify the presence of ash trees. Those identified ash trees would be subject to the above referenced recommendations, however other tree species would not.

The Contractor is also hereby made aware of the same potential restrictions as they relate to proposed Waste, Borrow and Staging areas under Section 105.25 Control of Waste, Borrow, and Staging Areas.

(c) Wildlife Habitat.

(1) Lake Champlain has a diverse fish community at this location and many species can be found like large and small mouth bass, rock bass, pumpkinseed sunfish, yellow perch, northern pike and chain pickerel. Some impacts are likely during any below ordinary high-water work. Much of the impact will be temporary in nature. Coordination with VT Fish and Wildlife Fisheries Biologist has occurred and below OHW work is not allowed from April 15th through July 15th.

(d) Archaeology per Memorandum of Agreement.

(1) Post Review Discoveries

If previously unidentified archaeological sites are discovered during project construction, that portion of the project will stop immediately. The Resident Engineer shall notify the VTrans Archaeology Officer. No further construction shall proceed until the requirements for 36 CFR 800 have been satisfied.

a. If human remains or ceremonial objects are discovered either during archaeological excavation or during construction, the project will stop immediately, and procedures described in the Vermont Statutes including B V.S.A. § 3761 , Unauthorized Removal of Human Remains, and 18 V.S.A. § 5212b, Unmarked Burial Sites Special Fund and reporting of Unmarked Burial Sites shall be followed. Coordination between VTrans and the SHPO shall follow the Advisory Council's Policy Statement on Treatment of Human Remains and Grave Goods, (1998). All excavation in the vicinity will cease immediately. Remains shall be left in place and protected and will follow the procedure below:

When an unmarked site is first discovered, the discovery shall be reported immediately to a law enforcement agency. If, after completion of an investigation pursuant to section 5205 of this title, a law enforcement agency determines that the burial site does not constitute evidence of a crime, the law enforcement agency shall immediately notify the state archaeologist who may authorize appropriate action regarding the unmarked burial site (18 VS.A. § 5212b(j)).

b. If the human remains are identified as Native American, then a treatment and reburial plan shall be developed in full consultation with the appropriate Native American group(s) in compliance with the requirements of the Native American Graves and Repatriation Act NAGPRA.

27. NOTICE TO BIDDERS – UTILITIES. Existing aerial facilities owned by Vermont Electric Cooperative will be adjusted, as necessary, by employees or agents of the above companies in accordance with the "Approximate Aerial Utility Relocation Route" shown on the project plans.

Existing aerial facilities owned by Comcast Communications, and Consolidated Communications of Vermont Company, LLC will not require adjustment. The Contractor is cautioned to protect these facilities from damage.

Utility Contact Information:

Vermont Electric Cooperative	Bill Johnson	(802) 832-2667
Comcast Communications	Marc Descoteaux	(802) 999-7504
Consolidated Communications	Bill Richardson	(802) 735-4854

There are areas of underground utilities that may require additional locating beyond normal dig safe measures. The Contractor is advised that exploratory excavation to locate existing underground facilities may be necessary to protect these facilities from damage. Where approved by the Engineer, these utilities shall be located and/or exposed by methods such as air/vacuum excavation and/or hand digging to determine their exact location. This exploratory work shall be classified as Trench Excavation of Earth, Exploratory and payment shall be through Pay Item 204.22, Trench Excavation of Earth, Exploratory (N.A.B.I.).

Employees or agents of the above listed companies are to be allowed free and full access within the project limits with the tools, materials, and equipment necessary to install, operate, maintain, place, replace, relocate, and remove their facilities.

There will be no extra compensation paid to the Contractor for any inconvenience caused by working around and with the companies, or their facilities.

Vermont Statutes Annotated, Title 30, Chapter 86 (“Dig Safe”) requires notice to Dig Safe before starting excavation activities. The Contractor must telephone Dig Safe at 811 at least 48 hours (excluding Saturdays, Sundays and legal holidays) before, but not more than 30 days before, starting excavation activities at any location. In addition, before excavation and/or pavement grinding in or on the state highway right-of-way, the Contractor must contact the Agency’s Signals Superintendent, Dan Ertel, to obtain/verify the location of Agency’s underground utility facilities or to confirm the absence of such facilities. Dan can be reached at (802) 343-2188.

The Contractor is advised that many towns are not members of Dig Safe. It is the Contractor’s responsibility to check with the towns prior to excavation and shall protect and restore utilities damaged within the project and as set forth in the Standard Specifications for Construction in Subsection 107.13 Protection and Restoration of Utilities and Services.

Should the Contractor desire additional adjustments of the utility facilities for his/her convenience, proper arrangements shall be made in conformance with Subsection 105.07 of the Standard Specifications for Construction.

All Contractors, subcontractors or material suppliers involved in any project-related activity shall comply with all applicable codes and regulations related to working around live electrical lines; including, but not limited to maintaining the required minimum clear distance from an electrical utility facility. The Contractor's Competent Safety Officer shall be well versed in OSHA and VOSHA regulations, and shall be capable of implementing a plan to conform to these regulations during prosecution of work.

28. NOTICE TO BIDDERS – CONCURRENT CONSTRUCTION. The Contractor is made aware of the following VTrans construction project(s) which are expected to be in progress within the area of this project during its construction.

TABLE 1 – CONCURRENT CONSTRUCTION PROJECTS

Project	Contractor	Anticipated Contract Completion Date
Colchester NH 28-1(31)	Engineers Construction, Inc.	October 2023
North Hero-Grand Isle BHF 028-1(26)	Cianbro Corporation	June 2023
South Hero STP HES 028-1(22)	Dirt Tech Company, LLC	September 2022
Colchester HES NH 5600(14) C/1 & C/2	TBD	Spring 2023 – Summer 2025

This list is not all-inclusive and it is possible there may be other VTrans, municipal, or private construction projects within the area of this project during its construction.

The Contractor shall coordinate construction schedules and traffic control with the work required for these projects.

There will be no extra compensation paid to the Contractor for any inconvenience caused by working around these or other projects.

29. NOTICE TO BIDDERS – SPECIAL CONSTRUCTION REQUIREMENTS.

(b) During construction it will be necessary for the Contractor to maintain one-lane traffic for extended periods of time. In no case shall the paved width for this one-lane traffic, including shoulders, be reduced to less than 12 feet. This paved width shall remain free of obstructions and obstacles at all times.

(c) The Contractor shall position Portable Changeable Message Signs at locations determined by the Engineer properly warning motorists of the roadway conditions ahead. As directed by the Engineer, these locations may change during construction as needs arise based on daily work activities. The message to be displayed shall be submitted to the Engineer in advance for approval. The displayed message should accurately reflect what motorists can expect to encounter through the project area. The cost of providing the Portable Changeable Message Signs shall be paid for under Contract item 641.15 or 641.17. The Contractor shall also install and maintain appropriate construction signing warning the traveling public of the expected roadway surface conditions.

(d) Prior to final acceptance of the project, all drop inlets and bridge joints within the project limits shall be cleaned and all material within the drop inlets and bridge joints shall be removed. All paved areas adjacent to curbs shall be swept and cleaned of all extraneous material. Costs for this work will not be paid for directly, but will be considered incidental to all Contract items.

(e) There are special events throughout the year that may require close communication and coordination between the Contractor and the municipality to reduce conflicts. The municipality will advise the Engineer and Contractor of the specifics of each event and the Engineer will direct the Contractor as to what actions, if any, will be necessary on the Contractor's part to minimize impacts to the event. Special events that may conflict with Contractor operations are not limited to those which may be listed in this Notice to Bidders. There will be no extra compensation paid to the Contractor for any inconvenience caused by working around any listed or unlisted special events.

For more information about area special events, contact the following:

North Hero: Corinn Julow
Town Clerk
Town of North Hero
6441 US Route 2
townclerk@northherovt.com
802-372-6926

Alburgh: Donna Bohannon
Town Clerk
Town of Alburgh
1 North Main Street
townofalburgh@fairpoint.net
802-796-3468

30. NOTICE TO BIDDERS – AFAD. The Contractor is hereby notified that Automated Flagger Assistance Devices (AFADs) are remotely operated devices that enable a certified flagger to be positioned out of the lane of traffic and are used to control motorists through work zones.

AFADs shall only be used in situations where there is no more than one lane of approaching traffic that needs to be controlled. Additionally, since AFADs are not traffic control signals, they shall not be used to replace traffic signals or other continuously operating traffic control devices.

These devices may be used as a safety enhancement to flaggers on an hour-for-hour basis. AFADs shall meet the following requirements:

(a) All AFAD applications shall meet the requirements of the applicable sections of the current edition of the *Manual on Uniform Traffic Control Devices* (*MUTCD*).

(b) All AFAD applications shall be in accordance with *NCHRP Report 350* or the *MASH* for the applicable test level and device weight. Documentation of the crashworthiness of the device shall be submitted to the Engineer for approval prior to use on the project.

(c) AFAD applications shall always be controlled by a flagger who has been trained in the operation of the AFAD and who meets the requirements of Section 630. The flagger shall not flag traffic and operate an AFAD at the same time.

(d) Should an AFAD malfunction or otherwise not function as intended they shall be replaced by another AFAD or flagger(s) or work shall cease and the roadway shall be opened to unrestricted traffic flow immediately.

(e) Each AFAD will be considered equivalent to one flagger and will be measured and paid for on an hourly basis under Item 630.15 Flaggers. One hour of AFAD use shall be paid for as one hour of flagging.

(f) Flaggers will only be measured for payment when actually performing flagging duties. Flaggers controlling AFADs but not actually flagging will not be measured for payment, but will be considered incidental to the Contract lump sum price for Item 641.10 Traffic Control, or Item 641.11 Traffic Control, All-Inclusive, as applicable.

(g) The use of AFADs may be suspended at the discretion of the Engineer.

31. NOTICE TO BIDDERS – WINTER WORK. There will be certain activities that the Contractor can perform during the winter season that are listed below:

(a) Installation of temporary shielding and overhang system below the existing structure

(b) Installation of temporary maintenance of traffic signals and signage

(c) Clean up of temporary access road or bulkhead area installed previously

(d) Removal of temporary access road or bulkhead

Other work activities may be submitted for review by the Engineer. The Contractor shall submit a plan of the work to be performed during the winter season (12/2 through 4/14) to the Engineer for review 14 calendar days prior to the proposed start date. Winter work shall be performed using daily temporary lane and shoulder closures only.

Allowance of work outside the defined construction season does not relax or waive permit requirements, or specification or material requirements for workmanship or temperature of any item of work. Cold weather concrete or earthwork plans shall be submitted and approved prior to commencement of applicable items. At the sole discretion of the Engineer, work may be suspended until such time as revisions to any previously approved cold weather plan are provide and approved. Any requests for modifications to permit requirements shall eb the sole responsibility of the Contractor, and any such requests shall be submitted directly to the appreciate regulatory agency. Any modified or amended permits shall be submitted to the Engineer, in writing, prior to the state of work. Any costs for modifying permit requirements shall be borne solely by the Contractor.

PART II – SECTION 900 SPECIAL PROVISION ITEMS

HIGH PERFORMANCE CONCRETE, RAPID SET

1. DESCRIPTION. This work shall consist of designing, furnishing, and placing a high early strength, high performance, Portland cement concrete at the locations indicated in the Plans and asdirected by the Engineer.

   The work under this Section shall be performed in accordance with these provisions, the Plans, and Section 501 of the Standard Specifications.

2. MATERIALS. Materials shall meet the requirements of Subsection 501.02 and the following:

   High Early Strength Portland Cement 701.04

3. MIX DESIGN SUBMISSION CRITERIA. Concrete shall meet the following requirements:

   (a) Mix Type. The mix shall be classified as conventional or self-consolidating concrete (SCC)mix. If the intended slump is greater than 9" then it shall be classified as an SCC mix.

   (b) Compressive Strength. 28 day compressive strength - 5000 psi

   (c) Surface Resistivity. The surface resistivity of the test mix shall be measured at 56 calendar days based on the requirements of AASHTO T 358. Results shall be categorized as Low, Very Low, or Negligible in accordance with AASHTO T 358, Table 1. The surface resistivity may be accepted prior to 56 calendar days if the results meet these requirements. 56 calendar day test results shall be completed and submitted regardless of the results of earlier tests.

   (d) Air Content. 7 ± 1.5%.

   (e) Slump/Spread. The mix shall not exhibit segregation at the slump/spread being used.

      (1) For SCC mix the Visual Stability Index (VSI) shall be equal to or less than 1.

      (2) Spread range will be established for the initial submittal of mix for approval. The J-Ring Test will be conducted per ASTM C1621. The upper and lower ranges of the spread shall not have a difference of greater than 2 inches between the J-Ring and spread test or VSI greater than 1. Spread test, ASTM C1611, will be done for the production mix only, unless the Engineer requests J-Ring testing to be done.

(f) Alkali-Silica Reactivity (ASR). Test shall be performed in accordance with Subsections510.04(a)(6)g and 510.04(a)(7).

(g) Shrinkage Compensating Admixtures. The mix may contain shrinkage–compensating admixture such that there will be no separation of concrete from adjacent precast units. TheContractor shall include results for the unrestrained shrinkage test method, ASTM C 157 by procedure 11.1.2 and readings for a minimum of 28 days after the curing period is complete. The maximum shrinkage allowed shall be 0.04%. Testing shall be performed byan independent lab that is CCRL accredited in AASHTO T 30 or ASTM C 1260.

(h) Proprietary Mix Design. A proprietary concrete mix design meeting the same performancerequirements may also be considered for use.

4. SUBMITTALS. A minimum of fourteen (14) calendar days prior to placement (or prior to the pre-placement meeting, if one is required), the Contractor shall submit the mix design for approval. The mix design shall be submitted to the Agency's Materials Laboratory, attention Structural Concrete Engineer. Concrete under this provision shall not be placed until the mix design has beenapproved.

(a) Trial Batch. Twenty-one (21) to seven (7) calendar days prior to the first placement, the Contractor shall produce and place a 2 cubic yard trial batch, at a location agreed upon bythe Contractor and the Engineer. The purpose of this trial batch is to demonstrate that themix is capable of producing the wet test results within the specified ranges. The Engineer shall be given a minimum notice of seven (7) calendar days prior to the trial batch pour. The trial batch shall be poured in the presence of the Engineer and the Structural Concrete Engineer. The trial batch shall be produced and poured in the same manner, estimated concrete temperature, and time frames that will occur during construction. The slump/spread shall be within +/- 2 inches for conventional mix or +/- 3 inches for SCC, but still be within the established range limits for conventional or SCC. J-Ring test will bedone for SCC mix with the difference between the J-Ring and spread test not greater than2 inches. The Contractor shall provide qualified personnel to test spread, air content, and temperature of the trial batch. A trial batch will be required for each mix design used on the project.

If SCC will be used in work with a sloped finished surface, the Contractor shall produce amock-up during the trial batch to demonstrate that the mix can be finished with the slopedsurface.

(b) Mix Acceptance Criteria. The placed concrete will be tested for all mix design criteria as specified herein, with the exception of permeability, shrinkage, and ASR. The Contractor may test the load in accordance with Subsection 501.06(b)(2) for initial QC in order to make any needed adjustments. The sample shall be taken in accordance with AASHTO R-60 or ASTM C172. If the test results fall outside of the specified ranges for the tested criteria, the mix shall be subject to rejection.

5. CURING CONCRETE. The method of wet curing used shall meet the requirements of Subsection 501.17. Concrete shall be wet cured until it has reached the minimum compressive strength as specified under Section 3(b) in this special provisions, verified by testing of field cylinders.

6. LOADING OF CONCRETE. After the concrete has been placed and the finishing operations concluded, it shall not be walked on or disturbed in any manner, including the removal of forms, until curing is complete as specified in the contract documents.

A portable compression testing machine calibrated in accordance with Section 5 of ASTM C 39 shall be provided by the Contractor and available on-site for cylinder testing of field-cured cylinders for construction progress. There shall also be a hand held grinding stone included with the compression testing machine. The hand held grinding stone will be used to grind the top of thecylinders to relieve any sharp projections on the cylinder surface. All testing and equipment shallconform to ASTM C 39. Testing shall be performed, and equipment operated by, a qualified Agency project individual(s). The individual(s) shall be trained in the operation of the machine bythe owner or representative of the machine who is proficient in the operations and functions of themachine.

If an independent lab is proposed to be used to test the field-cured cylinders instead of a portable compression testing machine, the Contractor shall submit documentation providing verification for the following:

(a) Calibration of the compression machine in accordance with Section 5 of ASTM C 39.

(b) Compression machine meets the requirements of ASTM C 39.

(c) Proficiency of the technician who will be performing the test methods.

The State at any time reserves the right to perform an independent proficiency of the technician for the test methods used and review of the testing facility.

7. METHOD OF MEASUREMENT. The quantity of Special Provision (High Performance Concrete, Rapid Set) to be measured for payment will be the number of cubic yards of concrete placed in the complete and accepted work, as determined by the prismoidal method using dimensions shown on the Plans or as directed by the Engineer, including the volume of precast concrete stay-in-place forms, but excluding the volume of steel or other stay-in-place forms and form filling materials. No deductions will be made for the volume of concrete displaced by steel reinforcement, structural steel, expansion joint material, scuppers, weep holes, conduits, tops of piles, scoring, chamfers or corners, inset panels of 1-1/2 inches or less in depth, or any pipe less than 8 inches in diameter.

8. BASIS OF PAYMENT. The accepted quantity of Special Provision (High Performance Concrete,Rapid Set) will be paid for at the Contract unit price per cubic yard. Payment will be full compensation for performing the work specified, including designing the mix, satisfactory finishing and curing, and for furnishing all forms, materials, including joint filler and bond breaker, labor, tools, admixtures, equipment, including automatic temperature recording units, trial batches,and incidentals necessary to complete the work.

The cost of heating materials and protecting the concrete against cold weather, and any additionalcost for cement, will not be paid for separately but will be considered incidental to Special Provision (High Performance Concrete, Rapid Set).
The cost of furnishing testing facilities and supplies at the batch plant and the setting of inserts, bench marks, and bridge plaques furnished by the Agency will not be paid for separately but willbe considered incidental to Special Provision (High Performance Concrete, Rapid Set).

Costs for all materials, labor, and incidentals for steel or other stay-in-place forms and form fillingmaterials will not be paid for separately, but will be considered incidental to Special Provision (High Performance Concrete, Rapid Set).

Payment will be made under:

Pay Item	Pay Unit
900.608 Special Provision (High Performance Concrete, Rapid Set)	Cubic Yard

HIGH PERFORMANCE CONCRETE

1. DESCRIPTION. This work shall consist of designing, furnishing and placing high performance Portland cement concrete for structures and incidental construction.

   The Portland cement concrete may consist of a homogeneous mixture of cement, fine aggregate, coarse aggregate, water, admixtures, and pozzolans, proportioned and mixed according to these specifications.

2. MATERIALS. Materials shall meet the requirements of the following subsections:

Portland Cement	701.02
Portland-Pozzolan Cement	701.05
Portland-Limestone Cement	701.06
Portland Blast-Furnace Slag Cement	701.07
Ternary Blended Cement	701.08
Fine Aggregate for Concrete	704.01
Coarse Aggregate for Concrete	704.02
Lightweight Coarse Aggregate for Structural Concrete	704.14
Preformed Joint Filler, Cork, and Asphalt-Treated Felt	707.08
Polyvinyl Chloride (PVC) Waterstop	707.10
Concrete Bonding Systems	707.16
Stay-in-Place Corrugated Metal Forms for Superstructure Slabs	715.05
Epoxy Bonding Systems	719.02
Concrete Curing Materials	725.01
Air-Entraining Admixtures	725.02(b)
Retarding Admixtures	725.02(c)
Water-Reducing Admixtures	725.02(e)
Water-Reducing and Retarding Admixtures	725.02(f)
Water-Reducing, High Range Admixtures	725.02(g)
Water-Reducing, High Range, and Retarding Admixtures	725.02(h)
Accelerating Admixtures	725.02(i)
Water-Reducing and Accelerating Admixtures	725.02(j)
Specific Performance Admixtures	725.02(k)
Mineral Admixtures	725.03
Silica Fume	725.03(b)
Ground Granulated Blast-Furnace Slag (GGBFS)	725.03(c)
Polystyrene Insulation Board	735.01
Blanket Insulation Material	735.02
Pipe Insulation	740.08
Water	745.01

The coarse aggregate for superstructure shall be conditioned so that the total moisture percentage shall be the absorption percentage plus, at a minimum, 0.25% free moisture for the aggregate. All hardened concrete surfaces to have plastic concrete placed against it will be saturated with water, and excess water shall be removed just prior to plastic concrete contacting it.

3. CLASSIFICATION AND PROPORTIONING. The following classes of concrete are included in these specifications and shall be used as shown on the Plans.

TABLE 1 – CLASSIFICATION AND PROPORTIONING

HP Class	Required Cem. Mat. (lbs/yd^3) [1]	Maximum W/CM Ratio	Max. Slump (in.) [2]	Air Content (%)	Coarse Aggr. Gradation Table	28 Day Comp. Strength (psi) [3]	28 Day Modulus of Rupture (psi) [3]
AA	705	0.40	---	7.0 ± 1.5	704.02A	4000	650
A	611	0.44	---	7.0 ± 1.5	704.02B	4000	650
B	564	0.49	---	7.0 ± 1.5	704.02C	3500	650

[1] See additional tables below for required cementitious materials.

[2] The mix shall not exhibit segregation at the slump/spread used at placement. If the Engineer suspects there is segregation, the Engineer will require a slump/spread test be performed by the Contractor to visually observe the characteristics of the mix. If in the opinion of the Engineer the mix does exhibit segregation, the load will be rejected and subsequent load(s) shall be tested, at a minimum of 3 loads or until the problem is corrected.

[3] The listed 28-day compressive strength or modulus of rupture will serve as the basis of designing or approving the concrete mix.

TABLE 2 – REQUIRED CEMENTITIOUS MATERIALS

HPC Class	Cement (lbs/cy)		Fly Ash (lbs/cy)		Silica Fume Admixture (lbs/cy)		Cementitious Materials(lbs/cy)
AA	524	+	141	+	40	=	705
A	449	+	122	+	40	=	611
B	412	+	113	+	40	=	565

OR

HPC Class	Cement (lbs/cy)		GGBFS (lbs/cy)		Silica Fume Admixture(lbs/cy)		Cementitious Materials(lbs/cy)
AA	489	+	176	+	40	=	705
A	418	+	153	+	40	=	611
B	384	+	141	+	40	=	565

OR

HPC Class	Blended Silica Fume Cement (8.0%)(lbs/cy)		Fly Ash (lbs/cy)		Cementitious Materials(lbs/cy)
AA	564	+	141	=	705
A	489	+	122	=	611
B	452	+	113	=	565

OR

HPC Class	Blended Silica Fume Cement (8.0%)(lbs/cy)		GGBFS (lbs/cy)		Cementitious Materials(lbs/cy)
AA	529	+	176	=	705
A	458	+	153	=	611
B	424	+	141	=	565

If bagged silica fume is being used, the total number of bags for the batch shall be the least number of whole bags required – round the fractional numbers of bags required down to the next whole number. The maximum amount of silica fume used shall be 40 lbs/cy. The total batch weight of silica fume ignored shall be substituted with Portland cement. Exceptions: For a one cubic yard batch, use 50 lbs of silica fume.

If the blended silica fume cement contains silica fume at a rate other than that required for the approved design mix, the Contractor shall provide additional silica fume or cement, as required, to provide concrete meeting the mix design requirements. The additional cement or silica fume provided shall be of the same brand and type as contained in the silica fume cement blend.

Type A Water-Reducing, or Type D Water-Reducing and Retarding, or Type F Water-Reducing, High Range, or Type G Water-Reducing, High Range, and Retarding Admixture shall be required to produce a workable mixture. The use of an accelerating or water-reducing-accelerating admixture to alter the setting characteristics of concrete mixtures shall be employed only with the approval of the Engineer. The use of chlorides or admixtures containing chlorides is prohibited. All admixtures will be considered incidental to the work and included in the Contract unit price of the concrete.

The Contractor, following mix design criteria and procedures outlined by the Agency, shall submit the mix design, required data, and test results to the Structural Concrete Engineer for review and approval. For initial submittals, a minimum of two weeks shall be allowed for evaluation of the submitted mix design, test results and required data. No production of concrete for the project shall commence until the Structural Concrete Engineer has reviewed and approved the concrete mix design.

The concrete materials shall be proportioned using the absolute volumes method in accordance with the requirements for each class as specified in Table 1 or a reviewed and approved alternate mix design. The volumetric proportioning method such as that outlined in *ACI Standard 211.1*, or other approved volumetric proportioning methods shall be employed in the mix design.

Production activities shall operate so that no intentional deviations are made from the reviewed and approved mix design. If test results indicate a failure to obtain the 28-day compressive strength as specified in Table 1 as tested in accordance with *AASHTO T 22* or *AASHTO T 97*, changes to the mix design shall be made with no extra payment. Changes may include, but are not limited to, using additional cementitious materials, changing the sources of cementitious materials or aggregates, using a high range water-reducer or other additives, or, if necessary obtaining concrete from another supplier.

(a) In lieu of the high performance concrete mix specifications provided herein, the Contractor may submit (for the Structural Concrete Engineer's and Engineer's review and acceptance) a high performance Portland cement concrete mix, provided the following requirements are met:

A minimum of 30 calendar days – 37 calendar days, if the first time the mix is being submitted – prior to placement (or prior to the pre-placement meeting, if one is required), the Contractor shall submit (for approval) the mix design for the class of concrete specified. The mix design(s) shall be submitted to the Agency's Materials Laboratory, 2178 Airport Road Unit B, Berlin, Vermont 05641, attention Structural Concrete Engineer. No class of concrete shall be placed on a project until the mix design is approved.

(1) The mix design must contain the following (including name and source of materials):

a. Saturated Surface Dry or Dry Weights

b. Compressive Strength

c. Cement Content in lbs/cubic yard

d. Mineral Admixture Content (each) in lbs/cubic yard

e. Air Content

f. Water/Cementitious Material Ratio

g. Chemical Admixtures (types, brand names, dosages)

h. Laboratory Test Results (strength, air content, water/cement ratio, slump) Alkali-Silica Reactivity (ASR) *AASHTO T 303* modified. The modification shall be run using the proposed job cementitious material proportioning with the aggregate found to have the highest ASR potential. The expansion shall be below 0.10%.

The first time a mix design is submitted, the Contractor shall include surface resistivity test results for a minimum of three 4 inch diameter x 8 inch high test cylinders, made and cured in accordance with *AASHTO T 22*. The information shall include the individual results from testing 3 specimens, but no specimen shall exceed the maximum specified. Testing shall be performed by a Cement and Concrete Reference Laboratory (CCRL) qualified laboratory. The surface resistivity of the test mix shall be measured at 28 and 56 calendar days based on the requirements of *AASHTO T 358*. Results shall be categorized as Low, Very Low, or Negligible in accordance with *AASHTO T 358*, Table 1.

The first time a mix design is submitted, the Contractor shall include alkali-silica reactivity test data for both fine and coarse aggregates. The alkali-silica reactivity (ASR) of each type of aggregate shall be measured separately based on the requirements of *AASHTO T 303*. If one or more of the aggregates exceeds 0.10% expansion, then the aggregate shall be tested again according to the requirements of *ASTM C 1567*.

The Contractor may elect to go directly to *ASTM C 1567* testing if they suspect that the aggregate may exceed the 0.10% expansion if tested by *AASHTO T 303*. Testing shall be performed by an independent Laboratory accredited in the specific test method. The maximum allowable mortar bar expansion when tested per *AASHTO T 303* or *ASTM C 1567* shall be 0.10%.

(2) The cylinder test results shall be submitted with the following data regarding fabrication of the specimens:

a. Size of Batch

b. Type of Mixer

c. Mixing Time

d. Type of Cure

e. Age Upon Delivery

After the materials to be furnished by the Contractor have been reviewed and accepted, no proposed change in the source, proportions, or characteristics of the materials shall be made without the review and acceptance of the Engineer. No new materials shall be used until such materials and their proportions have been reviewed and accepted by the Engineer. In no case shall concrete from more than one batch plant be permitted on the same structure without prior written approval of the Engineer.

The Engineer may order concrete production and delivery suspended and a new mix or altered mix design submitted if components or final product material characteristics are determined to be out of tolerances, unsatisfactory, or if proposed changes in the source, proportions, or characteristics of the materials are proposed. No production of concrete for the project shall resume until the Structural Concrete Engineer has reviewed and accepted the new or altered mix design. For evaluation, new mix design submittals shall be considered as initial mix design submittals.

The various classes of concrete shall have air content by volume as specified. The entrained air shall be obtained by the use of an approved admixture.

Strict adherence to the requirements herein is required when using concrete with mineral admixtures. The setting time may be retarded in cool weather. The Engineer, after consultation with the Structural Concrete Engineer, may require that the curing period, as designated in Table 5, be extended.

4. BATCHING. Measuring and batching of materials shall be done at an approved batch plant. Batch plants shall have an inspection completed prior to the first concrete placement on an Agency project if it has been longer than 12 calendar months from the last inspection. Request for inspection and required documentation must be received by the Materials Testing and Certification Section a minimum of 21 calendar days prior to the date of the requested inspection.

All deficiencies shall be corrected and verified a minimum of 5 calendar days prior to the first concrete placement for any Agency project. The batch plant shall meet the requirements of *AASHTO M 157*, except as modified in these specifications, and shall always be maintained in good repair. The batch plant shall be subject to periodic inspections by authorized representatives of the Agency. The batch plant shall have approved methods of storing, measuring, and dispensing approved mineral admixtures.

All concrete batch plants offered for Agency approval shall be equipped for semi-automatic batching and proportioning of all cementitious material, aggregates, water, and for the automatic insertion of admixtures. The plants shall be equipped to automatically and accurately record, report, and print batch weight tickets in English units the quantity of all aggregates, cementitious material, and the water incorporated into each batch and shall identify and record the addition of the required admixtures. All materials added to the concrete batch after initial batching shall be added to the printed batch weight ticket prior to delivery.

Proper facilities shall be provided for the Engineer to inspect ingredients and processes used in the batching and delivery of the concrete. The Contractor shall, without charge, afford the Engineer all reasonable facilities for securing samples to determine whether the concrete is being furnished in accordance with these specifications. In the batch room area, the producer shall provide the Inspector with a 24 inch × 18 inch horizontal working surface, at a sufficient working height, with a seat and an adequate view of the batching controls, display, and power supply.

The Contractor shall give the Engineer 24-hour notice of intent to place concrete so that arrangements can be made for laboratory inspection and control. Failure to give notice which causes postponement of placing operations shall not be reason for determining extension of Contract time per the requirements of Subsection 108.11.

(a) Semiautomatic Batch Plants. When actuated by a starting mechanism, the semiautomatic batch controller shall start the weighing operation of the materials and stop the flow automatically when the designated weight has been reached. It shall be interlocked to ensure that the discharge mechanism cannot be opened until the weight is within the tolerance specified in Part 4(d) of this specification.

Water and admixtures may be batched in a weigh batcher or by volume in a volumetric device. When actuated, volumetric controls shall start the measuring operation and stop the flow automatically when the designated volume has been reached.

(b) Testing Laboratory. The Contractor shall provide a weatherproof building or room at the plant site for the use of Agency personnel as a testing laboratory. The Contractor shall attain and maintain a qualified laboratory status in accordance with the current edition of the Agency's Qualified Laboratory Program. Failure to comply with this program may result in suspension or revocation of acceptance testing at the facility.

The testing laboratory shall have a minimum gross internal area of 150 square feet with a layout providing a minimum internal width of 7 feet, in which to house and use the equipment specified. Should the Contractor elect to provide additional equipment relevant to testing of Portland cement concrete and materials, the gross inside floor area of the laboratory shall be increased in proportion to the area required to house and operate the additional equipment. If the additional equipment is to be operated on a bench, the length of bench sections shall also be proportionally increased.

Adequate ventilation, lighting, heating, and any necessary electrical or gas connections shall be provided. Proper sanitary toilet facilities with a lavatory shall be available for use by Agency personnel at the plant site. Dedicated private telephone and internet services shall be provided to the laboratory. The internet connection shall have a minimum download capacity of 3 Mbps (megabits per second) without utilizing compression algorithms and the bandwidth speed shall be verified using an online speed test.

The laboratory shall be equipped with the following items and equipment:

1 Standard office desk, with lockable drawers or a separate lockable two-drawer file cabinet and chair

1 VTrans Qualified Laboratory Binder with producer equipment calibration data

1 Set of bench sections at least 2 feet wide providing a minimum of 28 square feet of working area with under-counter shelving

1 Standard laboratory stool

1 Fully automatic electronic calculator with eight digit capacity

1 Standard laboratory sink and faucet provided with an adequate supply of water meeting the requirements of Subsection 745.01. The sink shall drain to the outside of the laboratory

1 Bench brush

1 Floor brush

1 Motorized 8-inch sieve shaker with an adjustable timer. The shaker's operation shall be conducted by means of lateral and vertical motion of the sieve accompanied by jarring action with the following 8-inch diameter sieves: 3/8 inch (9.50 mm), No. 4 (4.75 mm), No. 8 (2.36 mm), No. 16 (1.18 mm), No. 30 (0.600 mm), No. 50 (0.300 mm), No. 100 (0.150 mm), plus pan and cover.

1 Mechanical aggregate shaker with an adjustable timer, a 1 cubic foot capacity, together with the following screens: 1-3/4 inch (43.0 mm), 1-1/2 inch (37.5 mm), 1 inch (25. 0 mm), 3/4 inch (19.0 mm), 1/2 inch (12.5 mm), 3/8 inch (9.50 mm), 1/4 inch (6.30 mm), No. 4 (4.75 mm), No. 8 (2.36 mm), No. 16 (1.18 mm), and pan. The aggregate shaker may be placed in a separate enclosed area, or be shielded for dust and sound control. When the aggregate shaker is placed in a separate enclosed area, there shall be a minimum of 5 feet of clear space measured from the front frame of the aggregate shaker outward, as well as a bench section measuring approximately 36 inches high, 24 inches deep, and 50 inches long located adjacent to the aggregate shaker. The area shall be well lit and ventilated.

1 Square pointed shovel

5 Five gallon plastic buckets, with handles

1 Electronic balance with a minimum capacity of 50 pounds and accurate to 0.0002 pounds. If separate fine and coarse aggregate scales are to be used, the fine aggregate scale shall meet the requirements of *AASHTO M 231* Table 2, Class G2 with a minimum capacity of 1.75 pounds and readable to 0.0002 pounds. The coarse aggregate scale shall meet the requirements of *AASHTO M 231* Table 2, Class G5 with a minimum capacity of 50 pounds and readable to 0.002 pounds.

1 Set of standard masses (weights) to use for verifying the accuracy of the electronic balance

2 Double-burner hot plates with variable temperature controls

3 Metal pans with a nominal size of 9 inches × 9 inches × 2 inches

5 Metal pans with a nominal size of 9 inches × 13 inches × 2 inches

1 Sample splitter with a 2-1/2-inch chute

1 10-inch blunted trowel

1 4 foot × 4 foot minimum heavy canvas for quartering samples

1 Brass wire-bristle brush

1 Pair of heat-resistant gloves (500°F, short-contact)

2 1-1/2 inch soft bristle paint brushes

Acceptable substitutes for these items and equipment may be made with the approval of the Structural Concrete Engineer.

Batching operations shall not begin until the testing laboratory has been approved as being in compliance with these specifications and all equipment and equipment calibration requirements of the current VTrans Quality Assurance Program and Qualified Laboratory Program documents. Removal of any equipment, except with written request and written approval of the Structural Concrete Engineer, will revoke any prior approvals and/or qualifications and require the termination of batching operations.

The building or room designated as a testing laboratory shall be maintained in a clean condition by the producer and kept free of all articles not necessary for the testing of materials. Cleaning supplies shall be furnished by the Contractor.

(c) Bins and Scales. The batch plant shall include bins, weighing hoppers, and scales with adequate separate compartments for fine aggregate and for each required separate size of coarse aggregate. If cement is used in bulk, a bin, hopper, and scale for cement shall be included. Each compartment shall be designed to discharge efficiently and freely into the weighing hopper or hoppers. Means of control shall be provided so that when required, the material may be added slowly in minute quantities and shut off with precision.

Hoppers shall be constructed to eliminate accumulations of tare materials and to discharge fully without jarring the scales. Partitions between compartments shall be configured to prevent spilling under any working condition. All batch plant structures shall be properly leveled and maintained in that condition within the tolerance required by the design of the weighing mechanism.

The scales for determining the mass (weight) of aggregate, water and cementitious material shall be comprised of a suitable system of levers or load cells. The levers or load cells will determine the mass (weight) consistently within 0.5% under operating conditions, with loads indicated either by means of a beam with balance indicator, a full-reading dial, or a digital read-out or display.

Adequate means for checking the accuracy of the scales shall be provided by the Contractor either using 50 pound weights or by other methods approved by the Structural Concrete Engineer. Weights shall be certified annually by the Division of Weights and Measures of the Vermont Agency of Agriculture, Food, and Markets. All exposed fulcrums, clevises, and similar working parts of scales shall be kept clean.

When beam-type scales are used, provision shall be made for indicating to the operator that the required load in the weighing hopper is being approached. Poises shall be designed to be locked in any position to prevent unauthorized change of position. All measuring and weighing indicating devices shall be in full view of the operator while charging the hopper and the operator shall have convenient access to all controls.

The scales shall be serviced and their accuracy verified annually by a hopper-scale service person licensed by the Division of Weights and Measures. For Vermont plants, an Inspector representing the Division of Weights and Measures shall witness all testing conducted by the service person and will attach a seal to each hopper scale, provided it meets the current specifications, tolerances, and regulations adopted by the Division of Weights and Measures. Standard test weights used to determine the accuracy of hopper scales shall be certified yearly by the Division of Weights and Measures in accordance with their established standards.

The ready-mixed concrete producer shall hire a licensed hopper scale service person for annual checking and service of scales. In addition, Vermont producers shall schedule an inspection with the Division of Weights and Measures between February 15th and April 30th of each year. After April 30th, Vermont plants without current seals affixed to the hopper scales will not be permitted to supply concrete to Agency projects, unless otherwise directed by the Engineer or until the seals are affixed.

Out-of-state concrete producers shall observe all annual hopper scale weighing and seal requirements of their respective states.

(d) Production Tolerances for Batching. For weighed ingredients, the accuracy of batching is determined by a comparison between the desired weight and the actual scale reading. For volumetric measurement of water and admixtures, accuracy is determined by checking the quantity either by weight on a scale or by volume in a calibrated container.

Admixture-dispensing systems shall, at a minimum, be annually calibrated by an admixture distributor representative. The admixture distributor representative shall check at least two volumes, with a check done at approximately 15% of the minimum and at 15% of the maximum manufacturer's recommended dosage range, or other targets as approved by the Structural Concrete Engineer.

Batching shall be conducted to accurately measure the desired quantities of materials within the tolerances specified in Table 3.

TABLE 3 – CONCRETE PRODUCTION TOLERANCES FOR BATCHING

Material	Tolerance (%)
Cement	± 1
Water	± 1
Aggregates	± 2
Chemical admixtures	± 3
Mineral admixtures	+ 10, - 1

(e) Storage and Proportioning of Materials.

(1) Portland Cement. Either sacked or bulk cement may be used. No fraction of a sack of cement shall be used in a batch of concrete unless the cement is weighed.

All bulk cement shall be weighed on an approved weighing device. The bulk cement weighing hopper shall be properly sealed and vented to preclude dusting during operation. Facilities shall be provided for the sampling of cement at the batch plant, either from the storage silo or from the weighing hopper. The sampling device shall provide a sample that represents the true nature of the material being used. This device shall be a permanent installation located to allow for safe and easy access.

(2) Water. Water may be measured either by volume or by weight. When measurement is by meter, the water meter shall be so located that the measurements will not be affected by variable pressures and temperatures in the water supply line.

Measuring tanks shall be equipped with an outside tap and valve to provide for checking the setting, unless other means are provided for readily and accurately determining the amount of water in the tanks.

All water metering methods shall be verified and calibrated on an annual basis or at any time there is a question of accuracy. All water added to the concrete at any point shall be through an approved metering method.

(3) Aggregates. Aggregate stockpiles shall be formed on hard, well-drained areas that prevent contamination from underlying material and accumulation of excessive moisture.

Aggregates from different sources or of different gradations shall not be stockpiled together. Only rubber-tired equipment shall be permitted to operate on aggregate stockpiles.

Stockpiles shall be constructed as follows:

a. If the stockpile is to be made using mechanical equipment (front end loader, clam bucket, rock ladder, radial stacker, or other approved equipment), the stockpile shall be made in such a manner that segregation is kept to a minimum.

b. If the stockpile is to be made by dumping from trucks in multiple layers, each layer shall be approximately 4 feet in depth. Each layer shall be completely in place before commencing the next layer. Care shall be taken that successive layers do not “cone” down over the previous layer.

c. No equipment shall be used to haul aggregate over the stockpiled material except to deposit the material for the layer being placed. It shall be the responsibility of the Contractor to ensure that the aggregate is kept free from deleterious material or degradation.

Stockpiles shall be maintained in such a manner that twice the anticipated aggregate requirement for any Agency project placements will be on hand and available for sampling and testing at least 48 hours before mixing operations for the placements are scheduled to begin. The Engineer may modify this requirement when special aggregates are required.

Aggregates shall be handled from stockpiles or other sources to the batch plant in such a manner as to secure a uniform grading of the material. Aggregates that have become segregated or mixed with earth or foreign material shall not be used. All aggregates, except lightweight coarse aggregate, produced or handled by hydraulic methods, and washed aggregates, shall be stockpiled or binned for draining at least 12 hours before being batched. In case the aggregates have a high or non-uniform moisture content, a storage or stockpile period longer than 12 hours may be required by the Engineer.

Stockpiles being watered per the specifications or allowed through producer QC procedures shall be watered for a sufficient time to ensure consistent moisture throughout the stockpile. Aggregate stockpiles being watered shall be loaded in the bin within 1 hour of being batched.

The Contractor shall conduct moisture content tests within 1.5 hours of the anticipated concrete batching time. If there is a visual difference in aggregate moisture appearance, aggregate moisture content will be tested again and new moisture test results shall be obtained and used as soon as possible. Material that has been stored in a storage bin for more than 10 hours shall be retested for moisture content. A minimum of one cubic yard of aggregate will be removed from the bottom of the storage bin. A minimum of one cubic yard of aggregate will then be removed and a moisture content sample taken.

Plants that employ moisture probes shall have them calibrated and verified a minimum of 24 hours prior to batching or as directed by the Structural Concrete Engineer. The procedure for checking the meter will be to run aggregate over the probe and then collecting a portion of the aggregate on which to perform a moisture content test. If the difference between the meter and the tested moisture content is greater than 0.5%, then the meter must be calibrated.

d. Lightweight coarse aggregate stockpiles shall be presoaked for a minimum period of time to ensure that the aggregate is completely saturated surface dry or greater immediately prior to use as indicated by moisture testing. Soaking shall be accomplished by continuous sprinkling or other suitable means that will provide a uniform moisture content throughout the stockpile. The stockpile shall be allowed to drain for 12 to 15 hours immediately prior to use.

(4) Admixtures. The Contractor shall follow an approved procedure for adding the necessary amounts of admixtures to each batch. Admixtures shall be dispensed in such a manner that will ensure uniform distribution of the material throughout the batch within the required mixing period. Except as specified herein, all admixtures shall be added to the batch at the plant, unless otherwise authorized by the Structural Concrete Engineer.

Chemical admixture containers, metering equipment, and scales shall be calibrated annually by a qualified admixture distributor representative. Admixture calibration and verification shall be done at 15% of the high, at approximately the middle, and at 15% of the low recommended ranges for the admixture being dispensed by the system. The calibration and verification shall be done in the presence of an Agency representative when requested by the Agency.

All dispensers shall include visual inspection aids such as graduated transparent cylinders. A separate dispenser shall be provided for each liquid admixture. If the dispensing system does not provide visual inspection aids, then periodic verification tests shall be done at a frequency satisfactory to the Structural Concrete Engineer. Calibration and verification records shall be kept at the production facility for a minimum of one year. The producer shall do the calibration and verification of the metering systems when requested.

Storage and dispensing systems for liquid admixtures shall be equipped to allow thorough circulation and/or agitation of all liquid in the system. This shall be required prior to the first batching of concrete for Agency projects in any calendar year and periodically thereafter at intervals not to exceed 60 calendar days for the duration of the period the plant is supplying concrete for Agency projects.

If the plant has received a delivery of at least 25% of the volume of the storage container, this will be considered as a method of circulation or agitation. If the circulation method is used, the admixture shall be circulated until a complete exchange of admixture is achieved. If an agitation method is used, the method shall be subject to approval by the Structural Concrete Engineer. If an admixture does not need agitation, then the admixture manufacturer shall submit in writing stating this annually.

Storage and dispensing systems for liquid admixtures shall be maintained within the manufacturer's stated temperature and environmental conditions.

It shall be the responsibility of the Contractor to use the quantity of Agency-approved admixtures needed to obtain concrete meeting the requirements of the Contract. All admixtures will be approved by the Structural Concrete Engineer prior to incorporation into the mix.

a. Air-Entraining Admixture. Air-entraining admixture shall be used as required to obtain the specified air content.

b. Water-Reducing, Retarding, and Water-Reducing and Retarding Admixtures, Accelerators and Specialty Admixtures. Dosages shall be in the recommended range as stated by the Manufacturer, unless otherwise approved by the Manufacturer.

(5) Fly Ash or GGBFS. Fly Ash or Ground Granulated Blast-Furnace Slag (GGBFS) shall be stored at the batch plant in separate storage or holding bins or other approved holding containers and shall be protected from rain and moisture.

5. MIXING AND DELIVERY.

(a) General. Concrete may be mixed at the site of construction, at a central point, or wholly or in part in transit mixers. The production of concrete shall meet the requirements of *AASHTO M 157* with the following additional requirements:

(1) All concrete shall reach its final position in the forms no more than 1.5 hours after the cement has been added to the water. When the ambient air temperature is 60°F or above, the elapsed time may be reduced as necessary as directed by the Engineer or in accordance with the requirements of Part 7(a) of this specification .

If, in the opinion of the Engineer, the concrete visual characteristics appear to be noticeably different from the last acceptance test or previous concrete for that pour, the Engineer may direct the Contractor to perform QC tests to confirm the concrete conforms with the specifications.

(2) Authorization by field inspection personnel must be obtained prior to the addition of water or admixtures at the project site. If water is added in excess of the specified maximum W/CM ratio, the concrete shall not be used.

(3) Each load of concrete delivered at the job site shall be accompanied by a State of Vermont Batch Slip signed by the authorized Agency representative, if present, at the plant. If an Agency representative is not present at the time of batching, a batch weight ticket meeting the requirements of Part 4 of this specification shall accompany the delivery vehicle.

(4) The Contractor shall provide direct communication service from the site of the work to the batch plant that shall always be available to the Engineer during concrete operations. The cost of this service will be considered incidental to the work.

(5) When use of a Water-Reducing, High Range Admixture or Water-Reducing, High Range, and Retarding Admixture is specified for deck concrete, the Contractor shall submit, for the Engineer's approval, information about the admixture manufacturer, the admixture addition rate, and when the admixture is to be added to the mixture (i.e., at the plant, on project, or a combination thereof).

To obtain the required concrete characteristics, a representative from the concrete producer is required on the project to determine the final admixture dosage and water addition for each load of concrete. The dosage shall be applied by means of a dispenser, or by other means of accurately measuring volume as approved by the Engineer. The Contractor shall provide QC concrete testing personnel, with current ACI Concrete Field Testing Technician Grade I Certification, to confirm the concrete is within specifications for the required work.

(6) All concrete shall be discharged into the forms before 300 revolutions of the drum or blades, not including initial mixing revolutions. The total allowed number of revolutions may be increased as directed by the Engineer.

Mortar shall be mixed in an approved mixer at the site of placement or in transit mixers when approved by the Engineer. The Engineer will withdraw approval for use of transit mixers, if necessary, to ensure a quality product or if the rate of delivery cannot be coordinated with finishing requirements.

(b) Stationary Mixers. When a stationary mixer is used for the complete mixing of the concrete, the mixing time for mixers that have a capacity of 10 cubic yards or less shall be not less than 90 seconds. For mixers that have a capacity of more than 10 cubic yards, the mixing time shall be determined by the concrete producer.

The time is valid provided that mixer efficiency tests prove the concrete is satisfactory for uniformity and strength. The plant shall be equipped with a timing device that will not permit the batch to be discharged before the predetermined mixing time has elapsed.

Vehicles used in hauling shall comply with the requirements of Part 5(c) of this specification.

(c) Transit Mixers. Transit mixers and agitators shall be subject to periodic inspections by an authorized representative of the Agency. Such equipment shall bear a currently dated inspection sticker supplied by the Agency indicating that the transit mixer or agitator conforms to the Agency's requirements.

Transit mixers shall be equipped with a water-measuring tank with a visible sight gauge for use when the water for the batch is supplied from the transit mixer tank. The gauge shall be clean and legibly graduated. Measuring tanks shall be provided with outside drain valves or other means to check their calibration. These should be easily opened for checking at any time.

No transit mixer or agitator shall be charged with the ingredients of the concrete unless an authorized Agency representative is present and authorizes it. This requirement may be waived by the Engineer if a batch weight slip, as specified in Part 5(a)(3) of this specification, accompanies the delivery vehicle to the site.

Electrically-actuated revolution counters shall be required on all transit mixers except on mixers charged at central mix plants and utilized as agitator trucks only.

If bagged mineral admixtures are being used, the transit mixer maximum load size shall be limited to 80% of the manufacturer's rated mixing capacity. Also, legal vehicle load restrictions shall not be exceeded. The mixer shall be capable of combining the ingredients of the concrete into a thoroughly mixed and uniform mass and of discharging the concrete with a satisfactory degree of uniformity.

If bagged mineral admixtures are being used, agitators, when loaded, shall also not exceed 80% of the manufacturer's rated mixing capacity or legal load restrictions and shall be capable of maintaining the mixed concrete in a thoroughly mixed and uniform mass, and of discharging the concrete with a satisfactory degree of uniformity.

The Engineer may require the Contractor to perform uniformity tests on a transit mixer or agitator. Two samples shall be taken. The first sample shall be taken after 15% of the load volume has been discharged, and the second prior to 85% of the load volume being discharged.

Slump and air content tests shall be performed on each sample. The maximum difference in air content between the two samples shall be 1%. For concretes with a specified slump of 4 inches or less, the maximum difference between the two samples shall be 1 inch. For concretes with a specified slump greater than 4 inches, the maximum difference shall be 1-1/2 inches. If both conditions are not met, then the Contractor will be required to either modify the mixing procedure and/or batching sequence, or that transit mixer or agitator will not be allowed to deliver concrete to the project. The Contractor will be required to perform uniformity tests to confirm the changes have satisfactory results.

All mechanical details of the mixer or agitator such as water measuring and discharge apparatus, condition of the blades, speed of rotation of the drum, general mechanical condition of the unit and clearance of the drum shall be checked before a further attempt to use the unit will be permitted.

Mixers and agitators shall be kept free from accumulation of hardened concrete or mortar. The mixing blades shall be rebuilt or replaced when any part or section is worn 3/4 inch or more below the original height of the manufacturer's design. A copy of the manufacturer's design, showing the dimensions and arrangements of blades shall be available to the Engineer at the plant at all times.

The mixing of concrete containing silica fume is very important and shall be mixed in accordance with the appropriate situation:

(1) When silica fume is added to the batch by bags or in bulk from a silo, each batch of concrete shall be mixed for not less than 125 revolutions of the drum or blades at the rate of rotation designated by the manufacturer of the equipment as the mixing speed. The mixing and agitating speeds shall be found on the metal plate on the mixer.

(2) When silica fume is blended with cement or a combination of cement and mineral admixture at the cement plant prior to being delivered to the concrete plant, each batch of concrete shall be mixed for not less than 70 nor more than 100 revolutions of the drum or blades at the rate of rotation designated by the manufacturer of the equipment as the mixing speed. The mixing and agitating speeds shall be found on the metal plate on the mixer. If inconsistent test results are obtained, or the batch of concrete appears not to be completely mixed, the mixing revolutions shall be extended as necessary.

When a transit mixer or agitator is used for transporting concrete, mixing during transport shall be continuous and at two to six rotations per minute or as designated by the manufacturer of the equipment as agitating speed. Failure to do so is cause for rejection of the concrete.

Transit mixers and agitators assigned to a project shall not be used for other purposes until the desired work is completed at the site, and shall arrive at the project within the cycle that anticipated placement conditions dictate. The interval between loads shall be controlled in order that concrete in place shall not become partially hardened prior to placing succeeding batches. The plant capacity and transportation facilities shall be sufficient to ensure continuous delivery at the rate required.

Before discharging transit mix from a transit mixer that has been operating at agitating speed, the drum or blades shall be rotated approximately one minute at mixing speed. The same procedure shall apply to agitators if admixtures, water, or other ingredients are added to the mix in the field.

If additional mixing water is required to maintain the specified slump and is added with the permission of the Engineer, a minimum of 20 revolutions of the transit mixer drum at mixing speed shall be required before discharge of any concrete. At no time shall the total water introduced into any mix exceed the maximum W/CM ratio specified in Table 1.

Upon discharge of the concrete from the drum, a sufficient amount of water shall be charged into the drum to properly cleanse the drum. This water shall not be used as a part of the next succeeding batch but shall be discharged from the drum prior to the charging of the drum with the concrete ingredients. The drum shall be completely emptied before receiving materials for the succeeding batch. Re-tempering of concrete or mortar that has partially hardened, by remixing with or without additional materials, shall not be permitted.

6. FIELD TESTS. The Contractor shall provide assistance, equipment, materials, and curing for field sampling and testing as required by the Engineer. All costs shall be included in the Contract unit prices under Section 631. The Engineer shall perform all acceptance sampling and testing in accordance with the Agency's Quality Assurance Program. All testing performed shall be in accordance with the requirements given in the current edition of the VTrans *Materials Sampling Manual* for the HPC Structural Concrete section. For bridge deck pours, and other pours as required by the Engineer, the Contractor shall perform all on-site Quality Control (QC) sampling and testing. The person performing the QC sampling and testing shall have, as a minimum, current ACI Concrete Field Testing Technician Grade I Certification.

(a) Trial Pour. When concrete will be used for a deck or overlay, or when deemed necessary by the Engineer, the Contractor shall construct a slab to be used for the trial pour. The purpose of the trial pour is to ensure that the mix can be placed and finished in accordance with these specifications. The slab shall be a minimum of 10 feet × 10 feet × 9 inches thick.

If the concrete is intended to be placed by pump, the trial pour concrete shall be placed by pump. The pump will be setup in the configuration that best represents the most difficult pumping condition. The wet concrete properties will be checked at the point of placement. The Contractor will demonstrate that they can provide an acceptable finish to the concrete for the element to be completed. The Contractor will need to bull float a minimum of 50% of the surface area of the slab and hand finish the curb areas in the same manner as anticipated during the production pour.

The Contractor may elect to construct the slab so that the same screed equipment and same finishing method can be used as anticipated for the production pour. In this case the Contractor will not be required to bull float a minimum percentage of surface area unless that will be included in their process for finishing the concrete deck surface during the deck pour. The test slab will become the property of the Contractor and removed from the project after completion of the trial pour.

Concrete production activities shall be closely monitored to ensure that no deviations are made from the approved mix design. If test results indicate a failure to obtain the characteristics as specified in Table 1, the Engineer may reject the material. The Contractor will be responsible for proposing solutions which could include changes to the mix design. The modified mix design shall not be used until successful test results are obtained during a trial pour that is representative of the anticipated pour conditions.

(b) Sampling. Sampling for tests shall be taken in accordance with the requirements of *AASHTO R 60* or other procedures approved by the Agency. Sampling will be done at point of placement or as close to it as practical.

(1) Changes. Any time that there is a change in admixture dosage outside of the allowable tolerances, whether modified at the batch plant or at the site, additional QC sampling and testing shall be performed on the modified load prior to incorporating the concrete into the work.

(2) Beginning of Load Sampling. Beginning of Load Sampling is sampling for QC testing purposes that is taken before 15% of the load has been discharged. Beginning of Load Sampling shall be performed as required by the Engineer, or as needed to ensure that the Concrete meets the Contract requirements at the point of placement. The QC personnel shall monitor the placement operation and adjust the mix accordingly to ensure that the material being incorporated into the work meets Contract requirements.

(c) Air Content Tests. Air content tests shall be made in accordance with the pressure method specified in *AASHTO T 152*, for acceptance or rejection.

(d) Compressive Strength Tests.

(1) General. The number of compressive strength tests performed shall be in accordance with the guidance given in the current edition of the VTrans *Materials Sampling Manual*. The Engineer may order additional tests as deemed necessary.

Compressive test cylinders shall be made in accordance with the requirements of *AASHTO T 23*, and tested for compressive strength in accordance with the requirements of *AASHTO T 22*.

(2) Categories of Testing.

a. Acceptance Testing. Acceptance testing utilizes specimens to determine the compliance with requirements for the project. All test cylinders used for quality acceptance testing shall be stored in an approved curing box until they are shipped to the Agency's Materials Section Central Laboratory.

b. Job Control Testing. Job control testing utilizes specimens to determine whether adequate curing procedures are being followed and for early form removal or early loading of structure. All job control specimens shall be stored on the structure and shall receive the same curing and protection from the elements as the concrete that they represent up until 24 hours before anticipated testing of specimens.

c. Specimen Curing Requirements. Specimen curing requirements shall be as stated in the specifications or as directed by the Engineer. If not specifically stated, the curing shall be as specified in Table 4.

TABLE 4 – CONCRETE SPECIMEN CURING REQUIREMENTS

Testing Category	Number of Specimens	Curing Location
Acceptance	2	Curing box
Job control – applicable curing period	2	On structure

(e) Concrete Temperature. Concrete temperature tests shall be made in accordance with the requirements of *ASTM C 1064/C 1064 M*.

7. WEATHER AND TEMPERATURE LIMITATIONS – PROTECTION OF CONCRETE. The temperature of the concrete just prior to placement in the forms shall not be less than 50°F nor more than 85°F. Aggregates and water shall be heated or cooled as necessary to produce concrete within these temperature limits.

Placement and curing procedures shall be approved by the Engineer prior to actual placement.

(a) Hot Weather Concrete. Placement of concrete during hot weather may be limited by the Engineer based on an assessment of temperature, humidity, wind velocity, and sun radiation conditions. No concrete shall be placed when the ambient air temperature is, or is expected to be, above 90°F.

(b) Cold Weather Concrete.

(1) General. Cold weather concrete will be any concrete placed or cured when the ambient air temperature is expected to be below freezing at any point or below 40°F for a continuous 8-hour period. No concrete shall be placed when the ambient air temperature is lower than 10°F except by written permission of the Engineer. A cold weather concrete plan shall be submitted to the Engineer for their review and acceptance before any cold weather concrete is placed.

When placing cold weather concrete, the Contractor shall have adequate equipment for heating and protecting the materials and freshly-placed concrete meeting the approval of the Engineer. This equipment shall be on the job and ready to deploy prior to the commencement of concrete placing operations.

No concrete shall be placed in any superstructure or thin section under cold weather conditions.

(2) Heating of Materials. The heating equipment deployed for cold weather concrete placement shall be capable of heating the materials uniformly. Aggregates shall not be heated to a temperature exceeding 150°F. If water is heated to a temperature exceeding 140°F, the water shall be mixed with the aggregate before the cementitious material is added.

The materials shall be heated in such a manner, for such a period of time, and in such quantity, as to produce concrete having a uniform temperature within the specified temperature range at the time of placement. Materials containing frost or frozen lumps shall not be used.

Stockpiled aggregates may be heated using dry heat or steam. Aggregates shall not be heated directly by gas or oil flame or on sheet metal over fire. When aggregates are heated in bins, steam-coil or water-coil heating, or other methods that will not be detrimental to the aggregates, may be used.

(3) Antifreeze Compounds. Salts, chemicals, or other foreign materials shall not be used in the mix to lower the freezing point of the concrete.

(4) Preparation of Forms. Before placing concrete; any ice, snow, or frost shall be completely removed from the forms.

Concrete shall not be placed on any surface or in any forms that are frozen, have surface temperatures below 32°F, or that contain frozen materials. The frozen surface or forms shall be completely thawed the day before the placement of the concrete and shall be kept continuously thawed until the concrete is poured. The temperature difference between forms or substrate and the plastic concrete shall not exceed 40°F.

(5) Housing. The Contractor shall furnish sufficient canvas with a supporting framework or other suitable type of housing to fully enclose and protect the structure when placing and curing cold weather concrete. The sidewalls and roofing of the protective housing shall be completely built before the placing of any concrete. The sidewalls for decks shall extend below and fully enclose the entire superstructure.

The protective housing shall be constructed independently of the forms and bracing and with adequate space to allow for form removal and the initial finishing of the concrete as required during the heating period. Joists shall be located to suitably support the housing roof with no sagging. The protective enclosure shall be heated to the proper temperature before placing any concrete.

When the temperature readings taken on or in the concrete indicate the temperature of the concrete may fall below 50°F, the Contractor shall, without exposing the concrete, immediately build the necessary enclosures around the area involved and supply heat to ensure curing conditions as specified in Part 16 of this specification. The enclosure shall be removed when directed by the Engineer.

(6) Heating the Enclosure. The enclosure shall be heated in such a manner that the temperature of the concrete and the enclosed air shall be kept above 50°F, and not more than 20°F above the concrete temperature, for the designated curing period. During this time, the concrete shall be kept continuously wet to provide proper curing. After the curing period, the temperature shall be gradually lowered to that of the surrounding atmosphere, taking at least 48 hours for the transition but at no time exceeding a 1°F change per hour.

When dry heat is used, a means of maintaining atmospheric moisture shall be supplied. The Contractor shall also maintain adequate fire protection and shall provide personnel to keep the heating units in continuous operation. When concrete placement operations are in locations where water levels may fluctuate, the supports for heating equipment shall be built so that the heating equipment can be raised and steam lines shall be placed above the probable high water level.

When using direct-fired or indirect-fired heaters, the enclosure shall be well-ventilated to avoid accumulation of carbon dioxide and carbon monoxide.

When using a hydronic heating system with heat-transfer fluid that circulates through a series of hoses, the heat-transfer hoses shall be laid on top of the vapor barrier, usually plastic sheeting, then covered with approved insulating materials or by other approved methods for retaining heat.

(7) Temperature Records. The Contractor shall provide an automatic temperature recorder to continuously record concrete curing temperatures and ambient air temperatures for the entire curing period. Recording thermometers shall be capable of measuring and recording temperatures within the range of 0°F to 200°F with maximum graduations of 5°F.

Temperature sensors shall be carefully placed within the curing enclosure or in the concrete to ensure that temperatures are measured at typical locations. The recorder's accuracy shall be certified once every 12 months, with the certificate displayed with each recorder. The Engineer may make random checks of each recorder.

On each recorder chart, the Engineer shall indicate the location of the representative concrete, the placement date, and start and finish times of the temperature record. At the completion of the curing period, the recorder charts shall be submitted to the Engineer.

A thermometer shall be provided that is capable of displaying the current ambient temperature with a maximum gradation of 1°F. The Inspector will use the thermometer to take periodic temperature measurements of the enclosure at varying locations.

The Contractor shall provide a hand-held infrared thermometer capable of taking no-contact measurements that is accurate within plus or minus 2% of the reading. The thermometer's accuracy shall be certified once every 12 months, with the certificate provided with each thermometer.

When the Contractor places concrete at more than one location within the specified curing period or if the Engineer determines that monitoring of a single pour is necessary in multiple locations, additional monitoring and recording equipment shall be furnished to provide temperature records at each location.

8. FORMS. The Contractor shall be responsible for, and shall make good, any injury arising from inadequate forms. The Engineer shall inspect and accept all forms prior to concrete placement.

Unless the Plans specifically allow for the use of stay-in-place forms, such forms shall not be used in the construction of any superstructure or bridge deck. Stay-in-place forms will only be allowed in the construction of substructure elements in locations where the Engineer agrees that removable formwork is impossible to employ.

(a) Falsework. In general, falsework that cannot be founded upon a solid footing shall be supported by falsework piling. The Engineer may require the Contractor to employ screw jacks or hardwood wedges to correct any deflections or settlement, however slight, occurring in the falsework.

(b) Construction. Forms shall be mortar-tight and sufficiently rigid to prevent distortion due to the pressure of the concrete and other loads incidental to the construction operations, including vibration. Forms shall be constructed and maintained to prevent the opening of joints due to shrinkage of the lumber. Sealers and caulking as approved by the Engineer shall be used where forms abut structural steel members, such as top flanges of beams and girders, etc.

To ensure their easy removal, forms shall be filleted and chamfered at all sharp corners, unless otherwise shown on the Plans or directed by the Engineer, and shall be given a bevel or draft in the case of all projections, such as girders and copings.

Falsework and forms for slabs, beams, and girders shall be constructed to provide the camber shown on the Plans or ordered by the Engineer.

(c) Form Lumber. All face form lumber for exposed surfaces shall be concrete form exterior grade plywood, not less than five ply and with a minimum thickness of 3/4 inch. In computing stud spacing, plywood shall be considered 1 inch lumber, provided that the grain of three of the plies runs perpendicular to the studs.

Form lumber for unexposed surfaces may be dressed tongue-and-groove, dressed shiplap, or square-edge surfaced four sides of uniform width and thickness, with a minimum thickness, after finishing, of 3/4 inch.

All form lumber shall be sound and free from loose or rotten knots, knotholes, checks, splits, or wanes showing on the surface that will be in contact with the concrete. Used face form lumber, having defects or patches which may produce work inferior to that resulting from new material, shall not be used.

Other form materials may be used with the permission of the Engineer.

(d) Form Ties. Metal ties or anchorages within the forms shall be constructed to permit their removal to a depth of at least 1 inch from the face without injury to the concrete. Wire ties shall be used only in locations where they will not extend through surfaces exposed in the finished work and then only when authorized.

The cavities shall be filled with cement mortar in accordance with the requirements of Part 15 of this specification.

(e) Surface Treatment. All forms shall be treated with commercial form oil prior to placing reinforcement and wood forms shall be saturated with water immediately before placing the concrete. Any material that will adhere to or discolor the concrete shall not be used.

(f) Metal Forms. The specifications for wood forms regarding design, mortar-tightness, filleted and chamfered corners, beveled projections, bracing, alignment, removal, reuse, and oiling also apply to metal forms. The metal used for forms shall be of such thickness that the forms will remain true to shape throughout the concrete placement operations.

All bolt and rivet heads shall be countersunk. Clamps, pins, or other connecting devices shall be designed to hold the forms rigidly together and to allow removal without injury to the concrete. Metal forms that do not present a smooth surface or do not line up properly shall not be used. Care shall be exercised to keep metal forms free from rust, grease, or other foreign matter.

(g) Removal of Forms.

(1) Deck Superstructure. The forms, or their supports, for any portion of a structure shall not be removed before the end of the 10-day cure period for the deck. Forms under beams or floor slabs may be removed upon approval of the Engineer after the concrete attains 85% of the minimum compressive strength as specified in Table 1, but not prior to the end of the 10-day cure period.

(2) Substructure. The forms, or their supports, for any portion of a substructure shall not be removed without the approval of the Engineer. Forms under arches, pier caps, or other special design conditions may be removed upon approval of the Engineer after the concrete attains 85% of the minimum compressive strength as specified in Table 1.

The removal of forms and supports may begin when the concrete is found to have the required strength. In no case shall the number of curing days be less than specified in Table 5.

Methods of form removal likely to cause overstressing of the concrete shall not be used. Forms and their supports shall not be removed without approval. Supports shall be removed in such a manner as to permit the concrete to uniformly and gradually take up the stresses due to its own dead load.

(h) Stay-in-Place Corrugated Metal Forms (SIPCMF) for Superstructure Deck Slabs.

(1) General. Use of SIPCMF for superstructure deck slab construction shall be subject to the following requirements:

a. Fascia overhangs shall be formed with removable forms that leave the resulting concrete with a flat-surfaced finish.

b. Bays that are constructed in stages such that a longitudinal joint is required shall be made with removable forms.

(2) Design Requirements. The following requirements shall govern the design of SIPCMF:

a. The design span shall be the clear span of the form plus 2 inches, measured parallel to the form flute (also referred to as the form valley).

b. The design load shall be the sum of the weight of forms, bar reinforcement, plastic concrete, and 55 pounds per square foot for construction loads.

c. The unit working stress shall not exceed 75% of the specified minimum yield strength of the material.

d. The dead load deflection shall not exceed 1/180 times the form span length or 1/2 inch, whichever is less.

e. Physical design properties shall be computed with the requirements of the latest edition of the *American Iron and Steel Institute Specifications for the Design of Cold-Formed Steel Structural Members*.

(3) Construction Requirements. The following construction requirements shall apply to the use of SIPCMF:

a. Construction Drawings. The Contractor shall submit construction drawings for SIPCMF in accordance with the requirements of Subsection 105.03. These drawings shall contain the following information as a minimum:

1. The name of the SIPCMF supplier.

2. A layout showing the compression and tension region of each beam/girder.

3. The method of SIPCMF attachment for the compression and tension regions.

4. The geometric properties of each type of panel being used.

5. The number, location, and type of panels being used within each girder bay.

6. Panel laps, considering the direction of concrete pours.

7. The specifications for the material used to fill the flutes.

8. Any other material data, erection information, or miscellaneous notes that may be required.

b. Handling and Installation. Care and protection shall be given the metal form sheets, supports, and accessory items during handling, shipping, and storage. During loading, hoisting, and unloading operations, extra precaution and care shall be taken to prevent damage to ends, corners, and edges of form sheets, supports, and accessory items.

If the form units and accessories are to be stored prior to installation, they shall not be placed in contact with the ground and shall be adequately covered or protected to keep them dry.

Form supports shall be placed in direct contact with the flange of beam/girder/stringer or floor beam. All attachments shall be made by permissible welds, bolts, clips, or other approved means. The welding of form supports to steel not considered weldable or to portions of flanges subject to tensile stresses shall not be permitted. Welds and welding shall be in accordance with the requirements of Subsection 506.10, with the exception that a 1/8-inch fillet weld will be permitted.

Form sheets shall not be permitted to rest directly on the flanges. They shall be securely fastened to form supports by self-tapping screws and shall have a minimum bearing length of 1 inch at each end. Transverse construction joints shall be located at the bottom of a valley. A 1/4 inch diameter weep hole shall be drilled at the lower end of each flute or valley.

Screed and pouring runway supports shall not be located directly on the form sheets, form supports, or reinforcing steel. No loose sheets or miscellaneous hardware shall be left on the structural slab at the end of the working day.

The corrugated metal sheets shall be fabricated for the placement sequence used, with the joints between sections of sheets overlapped or securely fastened to eliminate differential deflections. Any exposed form metal where galvanizing has been damaged shall be cleaned and repaired to the satisfaction of the Engineer.

(4) Inspection Procedures. The following three-step inspection procedure will be used to check the soundness of the concrete deck against the SIPCMF.

a. Step 1. Not less than two days after completion of a concrete structural slab pour, but prior to the next slab pour, one panel of the SIPCMF shall be removed from the most recently completed pour of each span, at a location selected by the Engineer, to provide visual evidence that the concrete mix or the construction procedures are obtaining the desired results.

If the concrete mix or the construction procedures are varied significantly within a pour, such as a change in the extent of vibration or change in the workability of the mix, another section of forming shall be removed to verify that the new procedures are yielding desirable results.

b. Step 2. After the concrete has attained 85% of the specified design strength, the Engineer will spot-check the underside areas of the steel forms by sounding with a suitable weight hammer. If honeycomb or voided areas are detected, the SIPCMF at that location shall be removed for a visual inspection.

c. Step 3. A minimum of 2% of the total SIPCMF area shall be removed for visual inspection of the concrete surface. The amount of sounding and form removal may be moderated, at the Engineer's discretion, after a substantial amount of the slab has been constructed and inspected, if the Contractor's methods of construction and results of the inspections as outlined above indicate that sound concrete is being obtained throughout the slab.

If, after removing a section of form, the concrete is found to be defective, additional panels shall be removed as directed by the Engineer. All defective concrete shall be repaired to match the adjacent concrete in section and color to the satisfaction of the Engineer.

The Contractor shall provide all facilities required for the safe, suitable, and convenient means of access to the forms for the Engineer's inspection procedures.

The form sections shall be removed by a metal saw or air-carbon-arc gouging with minimum damage to the concrete. Cuts shall only be sufficiently deep to sever the form. Any other method of removal shall be submitted to the Structures Engineer for approval. Cuts parallel to the corrugations in the forms shall be located on the sloping surface midway between a crest and valley. Cuts parallel to the supporting beams/girders shall be made through the supporting angles taking care not to damage the structural steel beams/girders.

The Contractor will not be required to replace the forms which have been removed.

9. PLACING CONCRETE.

(a) Workforce. The Contractor shall always have sufficient skilled personnel during the concreting operations to properly place, consolidate, and finish the concrete. If, in the opinion of the Engineer, the Contractor does not have sufficient skilled personnel to handle the concrete properly, the Engineer may postpone the start of the concreting operations until the Contractor has remedied this situation.

(b) Pre-Placement Meeting. For deck pours, or as required by the Engineer, a pre-placement meeting shall be scheduled by the Contractor to take place at least 7 calendar days before concrete placement, and prior to the Trial Pour, if required. Attendees at the pre-placement meeting shall include, but not be limited to, the Contractor's Project Superintendent, the Engineer, the Agency's Structural Concrete Engineer, and the concrete producer.

The Contractor shall provide a placement plan that addresses, but is not limited to, the following topics:

(1) Time of concrete placement and amount

(2) Batch plant testing

(3) Delivery of concrete

(4) Method of concrete placement on the deck

(5) Consolidation and finishing of concrete

(6) QC testing of the plastic concrete

(7) Protection of the concrete from evaporation

(8) Curing of the concrete

(9) How to avoid long delays for balance loads

(10) Screed, work bridge, and rail set-up

(11) Dry run schedule

(12) Contingency plans for long delays, break downs, weather events and other potential problems

(13) Crew size and responsibilities

(14) Available equipment

(15) Project layout including locations for all pumps, cranes, testing, cleanouts, staging, etc.

(c) Placement Limitations. All concrete shall be placed in daylight, unless otherwise authorized in writing by the Engineer. Authorization to place concrete at any other time shall not be given unless an adequate lighting system is provided prior to beginning the concrete placement operations.

Concrete shall not be placed under adverse environmental conditions that the Engineer determines will interfere with acceptable placement and/or finishing operations.

Concrete shall not be placed until the depth and character of the foundation, the apparent adequacy of the forms and falsework, and the placing of the reinforcing steel have been approved by the Engineer. The interior of the forms shall be clean of all debris before concrete is placed.

The Contractor shall submit to the Engineer a schedule of batching, delivery, and placement prior to the beginning of the concreting operations. The Contractor shall comply with the requirements of Part 5 of this specification.

Equipment and tools necessary for handling materials and performing all parts of the work shall meet the approval of the Engineer as to design, capacity, and mechanical condition and must be on the site before the work is started. Any equipment, in the judgment of the Engineer, that proves inadequate to obtain results prescribed shall be improved or new equipment substituted or added.

The Engineer may suspend the pour or reject the pour if the Contractor deviates from the accepted pour plan which will also include unacceptable delivery rates. The Contractor will not be allowed compensation due to the pour being suspended or rejected due to the Contractor deviating from the accepted pour plan or uncontrolled delivery rates.

For simple spans, concrete should be deposited by beginning at the lower end of the span and working toward the upper end. For continuous spans, where required by design considerations, the concrete placing sequence shall be as shown on the Plans.

Concrete shall not be deposited in the forms more than 4 feet from its final position.

The dropping of unconfined concrete more than 5 feet will not be permitted.

Concrete shall not be deposited in running water.

The rate of placing the concrete shall be so regulated that no excessive stresses are placed on the forms. Concrete in all decks shall be placed in one continuous operation, unless otherwise specified.

Concrete shall be placed in continuous horizontal layers, the thickness of which shall not exceed 18 inches, unless otherwise directed by the Engineer. Each succeeding layer shall be placed before the underlying layer has taken initial set and shall be consolidated in a manner that will eliminate any line of separation between the layers. When it is necessary, due to any emergency, to place less than a complete horizontal layer at one operation, such layer shall terminate in a vertical bulkhead.

After the concrete has taken its initial set, care shall be exercised to avoid jarring the forms or straining the ends of projecting reinforcing bars.

(d) Placement of Overlays. For a period of at least 12 hours before the placement of overlay material, the prepared surface shall be flooded with water. After removal of all free water, the overlay material shall be deposited on the damp surface and manipulated to coat the horizontal and vertical surfaces to be covered. The rate of progress shall be controlled to prevent the drying of previously deposited materials.

(e) Use of Chutes. Chutes, troughs, and pipes used in placing concrete shall be arranged to avoid segregation of the materials and the displacement of the reinforcement and shall be approved by the Engineer. Aluminum chutes, troughs, or pipes will not be permitted.

All chutes, troughs, and pipes shall be kept clean and free of hardened concrete by thoroughly flushing with water after each run. Open troughs or chutes shall be either of metal or metal-lined and shall extend as nearly as possible to the point of deposit. When the discharge must be intermittent, a hopper or other device for regulating the discharge shall be provided.

Dropping of unconfined concrete more than 5 feet or depositing a large quantity at any point and running or working it along the forms will not be permitted.

(f) Use of Vibrators. Unless otherwise specified, the concrete shall be consolidated with mechanical vibrators, of an approved type and design, operating within the concrete. When required, vibrating may be supplemented by hand-spading with suitable tools to ensure proper and adequate consolidation.

Vibrators shall be manipulated to work the concrete thoroughly around the reinforcement and imbedded fixtures and into corners and angles of the forms to produce surfaces free of imperfections. Vibrators shall not be used to cause concrete to flow or run into position in lieu of placing. The vibration at any point shall be of sufficient duration to accomplish consolidation but shall not be prolonged to the point where segregation occurs.

Vibrators shall have non-metallic or rubber-coated heads. Vibrating machines shall at no time be left running unattended in the concrete.

When it is necessary due to an emergency to discontinue the placing of a monolithic section, the use of vibrators shall cease. Vibrators shall not again be used until a sufficient depth of fresh concrete is placed to prevent any possibility of the effect of vibration on the concrete already in place and in no case shall this depth be less than 2 feet.

The number of vibrators used shall be ample to consolidate the incoming concrete immediately after it is deposited in the form. The Contractor shall have at least one spare vibrator in serviceable condition at the site of the structure in which more than 25 cubic yards of concrete are to be placed.

The vibrators shall be capable of transmitting vibration to the concrete at frequencies of not less than 4,500 impulses per minute under load. The vibration shall be of sufficient intensity and duration to cause plasticity, settlement, and complete consolidation of the concrete without causing segregation. The vibrator shall visibly affect a mass of concrete of 2-inch slump over a radius of at least 18 inches.

(g) Blasting Operations. All blasting operations within 200 feet of any concrete work shall be completed prior to the placement of the concrete. Regardless of the above limitation on blasting operations, the Contractor shall be responsible for any damage resulting from blasting operations.

10. DEPOSITING CONCRETE UNDER WATER.

(a) General. Concrete shall not be deposited under water except as specified by the Contract or upon approval of the Engineer and shall be subject to the following specifications.

(b) Placement. When placing concrete underwater, the Contractor shall use a tremie or an alternate method of conveyance, approved by the Engineer, which minimizes the mixing of fresh concrete and water. A tremie shall have a hopper at the top that empties into a watertight tube at least 10 inches in diameter.

The discharge end of the tube on the tremie shall include a device to seal out water while the tube is first filled with concrete. An inflatable ball will not be permitted. The device shall keep its shape and float without danger of deflation.

The placement shall be continuous to the elevations shown on the Plans and the resulting concrete shall be monolithic and homogeneous.

Concrete shall not be deposited in water that has a temperature of 35°F or below. When the water temperature is between 35°F and 40°F, the mixing water, the aggregates, or both shall be heated as specified in Part 7(b) of this specification.

A tremie shall be constructed of heavy-gauge steel pipe and consist of watertight joints between the tremie sections with a diameter of not less than 10 inches. The tremie hopper shall have a capacity of at least 1/2 cubic yard. When a batch is dumped into the hopper, the flow of the concrete shall be induced by slightly raising the discharge tube, always keeping it in the concrete.

Tubes shall be kept continuously submerged in concrete during discharge. The depth that the tube is submerged in concrete and the height of the concrete in the tube shall be sufficient to prevent water from entering the tube. The Contractor shall continuously monitor the difference in elevation between the top of the concrete and the end of the discharge tube.

Horizontal movement of discharge tubes through the concrete will not be allowed.

For minor quantities, at the sole discretion of the Engineer, a direct pumping method may be approved. If a direct pumping method is to be implemented, the pipe discharging the concrete shall consist of heavy-gauge steel sections. The Contractor shall demonstrate the ability to pump the concrete without the pump line surging or otherwise moving in the water as concrete is being pumped.

Cylinders cured as field cure shall be cured at the same temperature as the water covering the concrete.

11. PUMPING. Where concrete is conveyed and placed by mechanically-applied pressure, the equipment shall be suitable in kind and adequate in capacity for the work. The pump shall be capable of pumping concrete within the specified slump limits. The use of aluminum pipe as a conveyance for the concrete will not be permitted.

The operation of the pump shall be such that a continuous stream of concrete without air pockets is produced. When pumping is completed, the concrete remaining in the pipeline, if it is to be used, shall be ejected in such a manner that there will be no contamination of the concrete or separation of the ingredients. The equipment shall be arranged so that no resulting vibrations may damage freshly placed concrete.

12. CONSTRUCTION JOINTS.

(a) Construction Joint Locations. Joints shall be formed at the location shown on the Plans. Any variation or new location of joints shall require written permission of the Engineer. Feather edges at construction joints will not be permitted. Joints shall be formed with inset formwork so that each layer of concrete will have a thickness of not less than 6 inches.

(b) Joining Fresh Concrete to Previously Set Concrete. When joining fresh concrete to concrete that has hardened, the surface of the set concrete shall be roughened in such a manner that will not leave loosened particles or damaged concrete at the surface and shall be thoroughly cleaned of all laitance, loose, and foreign material. Immediately prior to the placing of the new concrete, the surface shall be saturated with water.

When shown on the Plans or ordered by the Engineer, the surface shall be thoroughly coated with a very thin coating of mortar, neat cement grout, or epoxy bonding system and all forms drawn tight against the face of the concrete. This coating shall not be allowed to dry out before being covered with fresh concrete.

(c) Filled Construction Joints. Filled construction joints shall contain a pre-formed cork joint filler or other pre-formed joint filler that may be shown in the Contract. Joint filler shall be cut to fit exactly and shall completely fill the space that is shown on the Plans. Where a pour grade or caulking grade filler is indicated to be used in the joints, that portion of the joint to be filled shall be formed with a separate material (other than the pre-formed joint filler) that can easily be removed prior to placement of the above indicated filler.

(d) Water Stops. Approved water stops shall be placed at locations shown on the Plans. They shall form continuous watertight joints.

(e) Bond Breakers. Bond breakers shall be asphalt-treated felt or pipe insulation, as shown on the Plans.

13. EXPANSION JOINTS. All expansion joints shall be constructed according to details shown on the Plans.

(a) Filled Compression and Expansion Joints. Filled compression and expansion joints shall be made with a pre-formed self-expanding cork joint filler or other pre-formed joint filler that may be shown in the Contract. Joint filler shall be cut to fit exactly and shall completely fill the space that is shown on the Plans. Where a pour grade or caulking grade filler is indicated to be used in the joint, that portion of the joint to be filled shall be formed with a separate material (other than the expansion joint filler) that can easily be removed prior to placement of the above indicated filler.

(b) Special Types of Expansion Joints. Special types of expansion joints may be used when shown on the Plans or ordered by the Engineer.

14. CONCRETE FINISHING.

(a) Finishing Bridge Decks and Overlays.

(1) General. The Contractor shall follow the procedures and details for placing the deck in accordance with the pre-placement meeting. The procedure shall provide for adequate labor, equipment, and material supply to complete placement of concrete on the entire deck, or specified portion thereof.

If, during the placement, unforeseen circumstances delay the progression of the pour to a point where the concrete begins to lose plasticity, the Contractor shall be prepared to place a bulkhead, as directed by the Engineer.

If at any time the screed machine does not advance in a 15-minute period due to delayed concrete delivery, mechanical breakdown or other problem, the Contractor shall immediately cover concrete that is under the screed machine past the leading edge of the concrete with wet burlap. Just before concrete placement is to begin, the burlap shall be removed, the screed machine will be moved back, fresh concrete will be added to the area that was directly under the screed to the leading edge, and the area will be vibrated again. The screed machine may then be advanced forward to continue the placement.

Approval of their methods and equipment does not relieve the Contractor of full responsibility for obtaining the required surface finish.

Prior to texturing, the finished concrete surface shall be examined by the Contractor. Surface irregularities greater than 1/8 inch in 10 feet in either the longitudinal or the transverse direction shall be corrected in a manner acceptable to the Engineer. When a bituminous concrete surface is to be placed on a bridge deck, the deviation shall not be greater than 1/4 inch. When a sheet membrane is being applied, sharp ridges shall not be allowed. Thin mortar or laitance, which may have accumulated ahead of the finishing machine screed, shall be removed from the work site. These materials shall not be used to fill depressions.

If the bridge deck concrete does not meet the above smoothness requirements, the Contractor shall remove high spots up to 1/2-inch high by means of grinding. Any other corrections shall be made only with the written approval of the Engineer. The use of bush hammers will not be allowed. No concrete shall be removed that will result in a concrete slab thickness less than that shown on the Plans.

Any deck that cannot be corrected by a method satisfactory to the Engineer shall be removed and replaced at the Contractor’s expense.

Sidewalks shall receive their final finish with a fine bristled broom.

(2) Turf Drag. When specified on the Plans, the surface shall be given a suitable texture with an artificial turf drag made of molded polyethylene or other material or method that will provide an acceptable finish. The selection of turf drag or other method should be capable of producing a surface texture with a horizontal peak-to-peak distance ranging from 0.02 inch to less than or equal to 0.25 inch and having a peak-to-peak amplitude of 0.005 inch to 0.8 inch. A turf drag material or other acceptable method that will minimize tearing and rolling of coarse aggregate from the surface shall be used.

The Contractor shall apply the finish texture in a transverse direction using hand methods. Other directions may be allowed with the approval of the Engineer. All texturing shall be performed from a work bridge immediately following the finishing operations and prior to curing operations. A second work bridge will be required for curing purposes unless a method using a single work bridge has been approved by the Engineer.

One pass of the turf drag over the finished area is desired. The drag shall leave a seamless strip between passes. The finish texture resulting from the drag shall stop within 15 inches of the curb face, rail anchor bolts, or edge of deck. Any buildup of concrete at the beginning or end of the pass shall be hand troweled to provide an even transition.

The drag should produce a transverse, skid-resistant micro-texture acceptable to the Engineer, but should not tear the surface. If the drag is not producing an acceptable micro-texture, the Contractor shall adjust the means and methods until an acceptable micro-texture is achieved.

The Contractor shall check the drag material before the deck pour and from time-to-time during finishing for tears, worn surface, or hardened concrete. The Contractor shall clean or replace the drag as often as necessary to maintain a well-defined micro-texture.

The turf drag or other acceptable methods should not be applied when the surface is so wet or plastic that the ridges formed flow back into the valleys when the drag has passed, nor should dragging be delayed until the concrete is so hard that sharp ridges cannot be formed by the drag. Fogging or similar methods shall be deployed to ensure that the surface does not dry prematurely.

If the 10-minute maximum, as specified in Part 16(c) of this specification, for applying the wet cure cannot be met, then fogging of the area shall be performed in a manner that keeps the relative humidity above the evaporation rate of the concrete surface, but not so excessive that water begins to collect on the surface prior to texturing or other surface manipulating procedures.

(3) Finishing Machine Rail Supports. Finishing machine rail supports shall be of substantial construction and accurately set so that the finished deck surface will conform to the profile and transverse sections shown in the Plans. Finishing machine rail supports shall be placed and adjusted to properly provide for the deflection of forms, falsework, and structural supporting members which will occur during the placement of the concrete.

The finishing machine rail supports shall be spaced at a maximum of 2 feet on center and of sufficient design as to secure the rail to prevent it from falling off the support. The screed rails shall be configured to allow the screed machine and work bridges to be fully functional over the entire deck area.

Sufficient screed rails shall be provided so that all rails necessary for any one continuous pour may be preset and graded before the start of concreting operations. The removal of screed rails and exposed chairs shall be accomplished without walking in the fresh concrete and while the concrete is still plastic.

The Contractor shall furnish a work bridge or bridges of an approved type, capable of spanning the entire width of the deck without deflection to the concrete slab surface.

(4) Finishing. After the concrete has been placed, it shall be struck off by a finishing machine and the operation shall be repeated as necessary to produce a uniformly consolidated, dense, smooth surface. The final passage of the finishing machine shall result in a uniform surface at the required grade and slope over its entire area.

Finishing machines shall be kept in true adjustment. Machines shall not be used until the proper adjustments have been made and the adjustments have been checked and approved by the Engineer.

Sufficient time shall be provided prior to beginning concreting operations for the finishing machine to be operated over the full length of the bridge deck segment to be placed. This test run shall be made with the screed adjusted to its finishing position. While operating the finishing machine in this test, the screed rails shall be checked for deflection and proper adjustment, the cover on slab reinforcement shall be measured, and the controlling dimensions of slab reinforcement and forms shall be checked.

After the concrete is placed, it shall be struck off by one of the following methods:

a. A self-propelled concrete finishing machine may be deployed, supported on suitable rails, and equipped with adjustable strike-off and finishing roller screeds capable of producing the required finish surface for the full width of the bridge from face-to-face of curbs.

b. An approved mechanical vibrating screed may be deployed, capable of exerting a force of at least 12 pounds per linear foot, and generating at least 6,500 vibrations per minute when checked by a vibration reed-type tester. The vibrating screed shall provide a uniform finish throughout its entire length and shall be properly adjusted so as not to drive the aggregate more than 1/4 inch below the surface.

In areas that are inaccessible to finishing machines, an approved manual vibratory-equipped power screed with an approved grade-control method may be used with approval from the Engineer. Smoothness shall be checked as specified in Part 15(a)(1) of this specification to ensure a smooth ride and seamless transition to the finishing machine's finished area.

If manual vibratory-equipped power screeds are used, then initial vibration of the concrete for consolidation in those areas shall be of the minimal duration possible to avoid over-vibration and loss of air entraining of the surface concrete in these areas.

Hand finishing shall be allowed only in areas inaccessible to finishing machines or manually driven vibratory-equipped power screeds. Hand screeds or bull floats shall be magnesium and at least 10 inches in width. Care shall be taken not to overwork the concrete surface during any finishing operation. Smoothness shall be checked as specified in Part 15(a)(1) of this specification to ensure a smooth ride and seamless transition to the finishing machine's finished area.

15. CURING CONCRETE.

(a) General. Water for use in curing concrete shall conform to the requirements of Subsection 745.01. The effective cure time shall be only the time that the concrete has been maintained in a wet condition with the concrete surface temperature above 50°F. If the concrete is not maintained in a wet condition and/or the concrete surface temperature drops below 50°F, it shall not be counted as effective cure time. The cure period will be extended 4 hours for every 1 hour the concrete is below 50°F, beginning when the concrete temperature is raised to or exceeds the minimum curing temperature.

Regardless of the curing medium specified, the entire surface of the newly placed concrete shall be kept damp. This shall be achieved by applying water with a nozzle that atomizes the flow so that a mist and not a spray is formed. The moisture shall not be applied under

pressure directly upon the concrete and shall not be allowed to accumulate in a quantity sufficient to cause a flow or washing of the surface.

The atomized flow shall be applied continuously until the surfaces can be covered by the specified curing mediums. For bridge barriers, curbs, and sidewalks the curing method shall be applied within 15 minutes of the completion of the finishing process.

Concrete components shall be cured for the times specified in Table 5.

TABLE 5 – CURING TIMES FOR CONCRETE COMPONENTS

Type of Construction	Curing Methods (Parts)	Effective Cure Time (Days)
Substructure	16(b)(1), (2), (3), (5), (7), (8)	7
Superstructure	16(b)(2), (8)	10 [1]
Retaining walls	16(b)(1), (2), (5), (6), (8)	7
Headwalls	16(b)(1), (2), (5), (6), (8)	7
Sidewalks, curbs, and gutters	16(b)(2), (8)	7

[1] There shall be no activity on the superstructure during the cure period.

(b) Curing Methods. All exposed surfaces of newly placed concrete shall be cured by one of the following specified methods:

(1) Water Curing. Curing with water shall be by continuously sprinkling or flooding of all exposed surfaces for the entire required curing period.

(2) Burlap Curing. The entire exposed surface of the concrete shall be covered with two layers of approved burlap that has been pre-soaked with water. The burlap shall then be covered with a lapped layer of white polyethylene sheeting. Once the concrete superstructure has hardened sufficiently, a stream of water, applied with a soaker hose or similar device, shall be run continuously under the polyethylene sheeting until the cure period is complete.

(3) Sand Cover. The entire exposed surface of the concrete shall be covered with at least 3 inches of approved sand that shall be kept wet for the entire curing period.

(4) White Polyethylene Sheeting. The entire exposed surface of the concrete shall be covered with a blanket of white polyethylene sheeting, maintained and fastened to provide a nearly airtight condition in contact with the surface where possible. If, in the opinion of the Engineer, this cover is not adequately provided or maintained to ensure the proper conditions for the concrete cure, then the white polyethylene sheeting cure shall be terminated and another method substituted.

(5) White Burlap-Polyethylene Sheeting. The entire exposed surface of the concrete shall be covered with a blanket of white burlap-polyethylene sheeting. The burlap shall be thoroughly dampened prior to placing and shall be placed next to the concrete. All joints shall be lapped a minimum of 18 inches. The burlap shall be kept damp throughout the curing period.

(6) Membrane-Forming Curing Compounds. White-pigmented or fugitive-dye membrane-forming curing compounds may be used for curing concrete in minor drainage structures. All other uses of curing compounds shall be approved in writing by the Engineer. Only membrane-forming curing compounds approved by the Agency's Materials Section may be used.

When membrane curing is used, the exposed concrete shall be thoroughly sealed immediately after the free water has left the surface. The concrete inside the forms shall be sealed immediately after the forms are removed and necessary finishing has been done.

The solution shall be applied in one or two separate applications. If the solution is applied in two increments, the second application shall follow the first application within 30 minutes. Satisfactory equipment shall be provided, together with means to properly control and ensure the direct application of the curing solution to the concrete surface to result in a uniform coverage of the surface area at the rate of 1 gallon of solution for each 150 square feet.

If rain falls on the newly-coated concrete before the film has dried sufficiently to resist damage, or if the film is damaged in any other manner, a new coat of the solution shall be applied to the affected portions equal in curing value to that specified above.

Should the surface be subject to continuous injury or the use of curing compound results in a streaked or blotchy appearance, the method shall be stopped and water curing applied.

(7) White Polyethylene Sheeting with Sand Cover. This method may be used only when approved by the Engineer and shall conform to the requirements of Part 16(b)(4) of this specification. The airtight condition shall be obtained by the addition of a uniform sand cover with a minimum depth of 2 inches.

(8) Pre-Dampened Cotton Mats. The entire exposed surface of the concrete shall be covered with a blanket of cotton mats that has been pre-dampened with water. The mats shall be maintained in a damp condition until the curing period is complete.

If, in the opinion of the Engineer, the Contractor's curing procedure is not producing an adequate cure, the Engineer may direct a change in the cure method at no additional cost to the Agency.

(c) Bridge Decks. For bridge decks, the curing method shall promptly follow the screed machine, within a maximum lag time of 10 minutes and without interruption. If this lag time cannot be met, then fogging of the area shall be performed in a manner that keeps the relative humidity above the evaporation rate of the concrete surface, but not so excessive that water begins to collect on the surface prior to texturing or other surface manipulating procedures.

16. LOADING OF CONCRETE. After the concrete has been placed and the finishing operations concluded, it shall not be walked on or disturbed in any manner, including removal of forms, for a minimum period of 18 hours. If retarder is used as an admixture, this minimum period may be extended as directed by the Engineer.

(a) Substructure. No backfill material shall be placed against a newly completed structure unless the concrete cure is maintained in accordance with Table 5, and until the field cured test cylinders have attained 85% of the compressive strength specified in Table 1. However, the Contractor may erect forms for subsequent concrete placement on footings after 18 hours have elapsed from the time that the footing placement was completed, provided the concrete has sufficient strength to allow it to be worked on without damage, and proper cure is maintained.

Static loads, such as forms, reinforcing steel, or other materials necessary for construction, may be placed on any concrete after it has been in place 72 hours, or a compressive strength of 1,800 pounds per square inch has been obtained, provided proper curing is maintained. Superimposed loads from subsequent concrete pours will not be allowed on any substructure unit or section in place until the field cured test cylinders have attained 85% of the compressive strength specified by Table 1, and provided curing of the supporting section is maintained in accordance with Table 5.

(b) Superstructure. Static loads, such as forms, granite curbing, cast-in-place concrete curb, and other materials necessary for deck construction, shall not be placed on deck concrete until the effective cure time specified in Table 5 is complete and the field-cured test cylinders for this concrete have attained 85% of the compressive strength specified in Table 1.

The Contractor shall keep bridge floors free of all motor vehicles, transit mixers, and heavy construction equipment until the curing period is satisfactorily completed, the field-cured test cylinders for the bridge floor concrete have attained the compressive strength specified in Table 1, and the field-cured test cylinders for the curb concrete or bridge rail concrete, as applicable, have attained 85% of the compressive strength specified in Table 1.

(c) Vertical Joints. Concrete shall not be placed against a vertical construction joint until the previously placed concrete has been in place a minimum of 72 hours.

17. METHOD OF MEASUREMENT. The quantity of Special Provision (Concrete, High Performance) of the class specified to be measured for payment will be the number of cubic yards of the class of concrete specified in the complete and accepted work, as determined by the prismoidal method using dimensions shown on the Plans or as directed by the Engineer.

The quantity of concrete shall exclude the volume of stay-in-place corrugated metal forms and form filling materials. No deductions will be made for the volume of concrete displaced by steel reinforcement, structural steel, expansion joint material, scuppers, weep holes, conduits, tops of piles, scoring, chamfers or corners, inset panels of 1-1/2 inches or less in depth, or any pipe less than 8 inches in diameter.

18. BASIS OF PAYMENT. The accepted quantity of Special Provision (Concrete, High Performance) of the class specified will be paid for at the Contract unit price per cubic yard. Payment will be full compensation for performing the work specified, including designing the mix, performance of trial pours, and satisfactory finishing and curing. Payment will also be full compensation for furnishing all forms, materials, including joint filler and bond breaker, labor, tools, admixtures, and equipment, including automatic temperature recording units, trial batches, and incidentals necessary to complete the work.

The cost of heating materials and protecting the concrete against cold weather, and any additional cost for cement, will not be paid for separately but will be considered incidental to the Contract unit prices for the applicable Special Provision (Concrete, High Performance) pay items.

The cost of furnishing testing facilities and supplies at the batch plant and the setting of inserts, bench marks, and bridge plaques furnished by the Agency will not be paid for separately but will be considered incidental to the Contract unit prices for Special Provision (Concrete, High Performance).

Costs for all materials, labor, and incidentals for stay-in-place corrugated metal forms and form filling materials will not be paid for separately, but will be considered incidental to the Contract unit prices for Special Provision (Concrete, High Performance).

Payment will be made under:

Pay Item	Pay Unit
900.608 Special Provision (Concrete, High Performance Class B)	Cubic Yard

INCENTIVE/DISINCENTIVE (I/D)

1. INCENTIVE/DISINCENTIVE (I/D). To provide a common proposal for all bidders and expedite the incentive payment process, the Agency has entered an amount of $314,000 in the proposal to become part of the Contractor's total bid. The dollar amount entered by the Agency is the maximum amount payable under the incentive clause, but the actual payment/deduction will be computed and paid/deducted per this Special Provision and the stipulations of Notice to Bidders No 11.

   The payment of monies for performance under the Incentive/Disincentive (I/D) specifications contained in these Special Provisions shall be as follows:

   (a) The quantity of incentive to be paid will be the accepted quantity of incentive computed per the provisions of Notice to Bidders No 11. For the incentive payment as described in part (d) of Notice to Bidders No. 11, the Contractor will be paid in the next biweekly estimate in which the Contractor has satisfactorily met the requirements of I/D.

   (b) The quantity of disincentive to be deducted will be the quantity of disincentive computed per the provisions of Notice to Bidders No 11. For the assessed disincentive as described in part (d) of Notice to Bidders No. 11, the Engineer will deduct the amount due the Agency from the monies due the Contractor on the next biweekly estimate.

   Payment will be made under:

Pay Item	Pay Unit
900.615 Special Provision (Incentive/Disincentive)(N.A.B.I.)	Dollar

MANAGEMENT OF CONTAMINATED SOIL

1. DESCRIPTION. This work shall consist of excavating and properly disposing, reusing, or capping of contaminated soils from roadways in conformity with the lines, grades, and typical cross sections shown on the Plans and in the Soil Management Plan. The work shall include proper identification, classification, excavation, removal, treatment, transportation, disposal and final placement of the contaminated soils by the Contractor. All management of contaminated soils will be completed in accordance with the Soil Management Plan – Mother's Bridge Deck Replacement Project approved by the Vermont Department of Environmental Conservation (VT DEC) Waste Management and Prevention Division, included in the contract documents by reference.

2. CLASSIFICATION. The work shall be classified as follows:

   (a) Contaminated Soils. Soils have been characterized within the project area as reported in the SMP.

   The Contractor shall manage the soils in the project area in accordance with the SMP.

   The Contractor shall also have designated and competent personnel to manage, monitor, and document implementation of the SMP. During excavation activities, observations and field screening shall be monitored by an Environmental Professional ("EP"), retained by VTrans. The VTrans EP may perform the field functions themselves or designate responsibilities to a qualified person. Observations and field screening will include visual observations, olfactory observations, and soil headspace readings using a calibrated photo ionization detector ("PID"). The VTrans EP will aid the contractor in determining if soils do not comply with the findings of the SMP, and if other handling and disposal activities are warranted.

   The Contractor shall provide written notice a minimum of 48 hours in advance of any day where earth disturbance will take place within category 2 or 3 soils. There shall be no earth disturbance, or transportation of contaminated soils without VTrans' EP monitoring.

3. GENERAL CONSTRUCTION REQUIREMENTS. Complete copies of the details of the Plans and site-specific SMP will be provided to the Contractor. The Contractor shall either follow the site-specific SMP or submit an alternate plan which must be approved by the VT DEC Waste Management and Prevention Division and VTrans in conjunction with the Engineer and the VTrans EP, prior to implementation.

For contaminated soils not reused onsite, it is the responsibility of the Contractor to enter into an agreement with a certified solid waste disposal facility for the purpose of disposing of the contaminated soils. No additional compensation or allowance for additional Contract time will be made for any delays incurred waiting for an agreement(s) to be executed, for failure to make an agreement(s).

A VTrans representative will sign the required waste slips prior to shipment off-site. Contractor shall supply VTrans with copies of all records and receipts from trucking and waste disposal.

The Contractor shall develop and follow their own Health & Safety Plan and shall ensure that all personnel working in direct contact with soil, groundwater and other contaminated media are notified of the contamination in accordance with OSHA standards.

4. METHOD OF MEASUREMENT. The quantity of Special Provision (Disposal Fees for Contaminated Soil) to be measured for payment will be the dollar value for disposal of contaminated soils (Category-2 and -3) at a qualified facility, as determined by vehicle loads and waste manifests. Load tickets and waste manifests shall be furnished to the Engineer for each load delivered to a qualified facility. Final dollar value shall not reflect any costs associated with transporting, hauling, decontamination of equipment, and other incidentals necessary to transport the material. Disposal fees for material that is excavated and removed at the convenience of the Contractor will not be measured for payment.

   The quantity of Special Provision (Management of Contaminated Soil) to be measured for payment will be the lump sum value for management of contaminated soils. This item shall reflect any costs associated with transporting, hauling, decontamination of equipment, and other incidentals necessary to transport the material, other than the disposal fees to the qualified facility. Material requiring more than one handling prior to final placement will not be measured for payment for the additional handling unless specifically called for in the Contract Documents.

5. BASIS OF PAYMENT. The accepted quantity of Special Provision (Disposal Fees for Contaminated Soil), will be paid for at the Contract unit price per dollar for contaminated soils (Category-2 and -3) disposed of at a qualified facility, as appropriate. Disposal costs for contaminated soil will be only for the direct reimbursement of landfill tipping fees and district solid waste fees. Payment shall be full compensation for performing the work specified, including research; monitoring; and developing and complying with the Health and Safety Plan; satisfactorily storing materials and for providing all materials, labor, tools, equipment, and incidentals necessary to complete the work and all other incidentals necessary to comply with the SMP, except for transport and disposal of Category-2 and -3 soils at a qualified facility.

The accepted quantity of Special Provision (Management of Contaminated Soil), will be paid for at the Contract lump sum price. Payment shall be full compensation for performing the work specified, including research; monitoring; and developing and complying with the Health and Safety Plan; satisfactorily storing, and transporting of materials and for providing all materials, labor, tools, equipment, and incidentals necessary to complete the work and all other incidentals necessary to comply with the SMP. This payment item shall not include the disposal fees from the qualified facility.

All costs associated with management and disposal of contaminated soil excavated for the convenience of the Contractor shall be the sole responsibility of the Contractor to manage and dispose in accordance with the Soil Management Plan.

Payment will be made under:

Pay Item	Pay Unit
900.615 Special Provision (Disposal Fees for Contaminated Soil)	Dollar
900.645 Special Provision (Management of Contaminated Soil)	Lump Sum

STEEL BEAM GUARDRAIL, GALVANIZED, 35 FOOT RADIUS

1. DESCRIPTION. This work shall consist of the furnishing, assembling, and installing guardrail on a 35-foot radius.

   The work under this Section shall be performed in accordance with these provisions, the Plans, HSD 621.05, and Section 621 of the Standard Specifications.

2. MATERIALS. Materials shall meet the requirements of the following Subsections:

   Post and Post Accessories.....728.01
   Rail Elements.....728.02
   Hardware.....728.03
   Delineation Devices.....750.08

3. CONSTRUCTION. Posts, rail, offset blocks, hardware, and delineators shall be in accordance with HSD 621.05, Section 728 and 750 of the Standard Specifications, and as shown in the Plans.

4. METHOD OF MEASUREMENT. The quantity of Special Provision (Steel Beam Guardrail, Galvanized, 35 Foot Radius) to be measured for payment will be the number of installations in the complete and accepted work.

5. BASIS OF PAYMENT. The accepted quantity of Special Provision (Steel Beam Guardrail, Galvanized, 35 Foot Radius) will be paid for at the Contract unit price per each.

   Payment will be full compensation for furnishing, transporting, handling and placing the materials specified; and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

   Payment will be made under:

Pay Item	Pay Unit
900.620 Special Provision (Steel Beam Guardrail, Galvanized, 35 Foot Radius)	Each

TRANSITION TO BRIDGE RAIL

1. DESCRIPTION. This work shall consist of furnishing and erecting guardrail transition sections to S3-TL4 bridge railing as shown in the Plans and as directed by the Engineer.

   The work under this Section shall be performed in accordance with these provisions, the Plans, and Section 621 of the Standard Specifications.

2. SUBMITTALS. Fabrication Drawings shall be submitted to the Structures Engineer for approval in accordance with Subsection 105.03.

3. METHOD OF MEASUREMENT. The quantity of Special Provision (Transition to Bridge Rail) to be measured for payment will be the number of installations in the complete and accepted work, measured within the pay limits shown on the Plans.

4. BASIS OF PAYMENT. The accepted quantity of Special Provision (Transition to Bridge Rail) will be paid for at the Contract unit price per each. Payment will be full compensation for furnishing, transporting, handling, and placing the materials specified, including thrie-beam transition panel, nested thrie-beam panel, and thrie-beam terminal connector, and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

   Payment will be made under:

Pay Item	Pay Unit
900.620 Special Provision (Transition to Bridge Rail)	Each

BRIDGE SCUPPER COMPONENTS

1. DESCRIPTION. This work shall consist of furnishing and installing the hot dipped galvanized scupper components in accordance with the Plans and as directed by the Engineer. These components include the scupper grating, downspout extension, downspout supports, and all associated hardware.

   The work under this Section shall be performed in accordance with these provisions, the Plans, and Section 525 of the Standard Specifications.

2. MATERIALS. Materials shall meet the requirements specified in the Plans.

3. CONSTRUCTION REQUIREMENTS. Scupper components shall be provided and erected to the configuration shown in the Plans.

4. METHOD OF MEASUREMENT. The quantity of Special Provision (Bridge Scupper Components) of the type specified will be measured per each scupper location, and the per each measurement will include all components associated with that scupper location which is not considered incidental to the precast deck panel. All scupper components that are installed in the precast deck panel at the fabricator shall be measured under Special Provision (AccelBridge Precast Deck Panel System).

5. BASIS OF PAYMENT. The accepted quantity of Special Provision (Bridge Scupper Components) of the type specified will be paid for at the Contract unit price per each. Payment will be full compensation for detailing, furnishing, handling, installing, galvanizing, and painting the materials specified and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

   Payment will be made under:

Pay Item	Pay Unit
900.620 Special Provision (Bridge Scupper Components)	Each

BRIDGE RAILING, S3-TL4 STEEL TUBE WITH SAFETY CURB

1. DESCRIPTION. This work shall consist of furnishing and erecting galvanized and powder coated bridge railing in accordance with the Plans and as directed by the Engineer.

   The work under this Section shall be performed in accordance with these provisions, the Plans, and Section 525 of the Standard Specifications.

2. MATERIALS. Materials shall meet the requirements specified in the Plans.

3. CONSTRUCTION REQUIREMENTS. Bridge railing shall be provided and erected to the configuration shown in the Plans.

4. METHOD OF MEASUREMENT. The quantity of Special Provision (Bridge Railing, S3-TL4 Steel Tube Railing with Safety Curb) of the type specified to be measured for payment will be the number of linear feet of railing constructed in the complete and accepted work. Measurement will be made along the face of the railing between the pay limits specified. No deductions or additions will be made for joints.

5. BASIS OF PAYMENT. The accepted quantity of Special Provision (Bridge Railing, S3-TL4 Steel Tube Railing with Safety Curb) of the type specified will be paid for at the Contract unit price per linear foot. Payment will be full compensation for detailing, furnishing, handling, installing, and galvanizing the materials specified and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

   Payment will be made under:

Pay Item	Pay Unit
900.640 Special Provision (Bridge Railing, S3-TL4 Steel Tube with Safety Curb)	Linear Feet

TEMPORARY LIMITED DEFLECTION BARRIER

1. DESCRIPTION. This work shall consist of furnishing and installing a temporary traffic barrier on the bridge to protect traffic from the adjacent drop off during the stage deck replacement as shown on the Plans and as directed by the Engineer.

   The work under this Section shall be performed in accordance with these provisions, the Plans, and Section 621 of the Standard Specifications.

2. GENERAL CONSTRUCTION REQUIREMENTS. Limited deflection barrier system shall be placed to the configuration shown in the Plans.

   The proposed limited deflection barrier system shall not have a barrier base width plus dynamic deflection value that exceeds 36" total. For example, the stiffened barrier system shown on the plans has a 24" wide barrier base plus minimum 12" for dynamic deflection behind the barrier. The dynamic deflection value shall be based on FHWA crash testing criteria per NCHRP Report 350 or MASH, or as accepted by VTrans per their temporary barrier standards. Additionally, the proposed barrier system shall not require anchorages into the existing or proposed deck more than pinning of the barrier every 200-feet. The stiffened barrier system shown graphically in the plans meets the previously stated requirements. If the Contractor would like to propose a different barrier system, it must be submitted and reviewed by the Engineer for approval.

   Per the Suggested Sequence of Construction, the Temporary Limited Deflection Barrier cannot be removed and reset without creating an unsafe interim condition; therefore, the total length of barrier required shall be measured per that interim condition where it is needed on both the existing deck and proposed deck simultaneously. Subsequently, no item for removing and resetting of this barrier type is included in the contract.

3. METHOD OF MEASUREMENT. The quantity of Special Provision (Temporary Limited Deflection Barrier) to be measured for payment will be the number of linear feet of barrier placed as temporary protection for traffic in the complete and accepted work, measured from end to end of each installation, including terminals.

4. BASIS OF PAYMENT. The accepted quantity of Special Provision (Temporary Limited Deflection Barrier) will be paid for at the Contract unit price per linear foot.

   Payment will be full compensation for providing temporary limited deflection barrier on the bridge to accommodate staged construction as specified in the Contract Documents, and for furnishing all materials, labor, tools, equipment, and incidentals necessary to complete the work.

   This item does not include other temporary traffic measures required for the staged construction approach, only the temporary barrier per the limits shown on the Plans.

Payment will be made under:

Pay Item	Pay Unit
900.640 Special Provision (Temporary Limited Deflection Barrier)	Linear Foot

ACCELBRIDGE PRECAST DECK PANEL SYSTEM

1. DESCRIPTION. This work shall consist of furnishing and installing a precast concrete deck panel system for a bridge deck replacement, in accordance with the Contract Documents, and as directed by the Engineer and the representatives of AccelBridge. This shall also include all attachment hardware, support components for the precast deck panel system, cast-in-place concrete for closure pours, jacking gaps and joint headers, the panel installation system as shown on the contract plans or as designed by the Contractor, and all fees for the partnership with AccelBridge for the application of their proprietary system.

   This work shall also consist of providing a non-shrink, non-corrosive, non-metallic cementitious structural grout for precast bridge construction. The structural grout work under this Section shall be performed in accordance with these provisions, the Plans, and Section 540 of the Standard Specifications for Construction

   Construction shall be in accordance with the Plans and the Vermont Agency of Transportation's 2018 Standard Specifications for Construction. Unless otherwise specified in the Plans, the Contractor shall acquire all applicable system licensing agreements and/or documentation prior to the start of construction.

2. MATERIALS.

   (a) Concrete Precast. 5 ksi at 28 days. Per VTrans Standard Specifications Section 540, 541, and as detailed in the Plans.

   (b) Cast-in-place Concrete. See High Performance Concrete, Rapid Set special provision.

   (c) Reinforcement. Grade 60 Epoxy Coated. Per VTrans Standard Specifications Section 507 and as detailed in the Plans.

   (d) Structural Grout. Grouting material shall meet the requirements of Subsection 707.03 or the following requirements:

      (1) ASTM C-1107 and the properties described in this special provision. Grout having metallic formulations or chlorides will not be allowed. No additives shall be added to prepackaged grout. Extension of a grout mix with pea gravel will be allowed only if recommended by the manufacturer. The Contractor shall submit manufacturer literature demonstrating compliance with this specification for approval by the Engineer. Commercial grouts known to conform include Degussa Masterflow 928, Sika Grout 212, and Euclid Hi-Flow Grout.

      (2) Minimum compressive strength of ASTM C-109 2" cubes:

         a. 2,500 psi at 1 day

b. 4,000 psi at 3 days

c. 5,000 psi at 7 days

d. 5,800 psi at 28 days

(3) Compatibility:

a. Expansion: ASTM C-1107 Grade B or C.

b. Modulus of Elasticity: 2.8 to 5.0 x 10^6 psi per ASTM C-469

c. Coefficient of Thermal Expansion: 3.0 to 10.0 x 10^6 /deg F per ASTM C-531

(4) Constructability:

a. Flowability: 20 to 30 second fluid consistency efflux time per ASTM C-939 and CRD-C-611 Flow Cone.

b. Set Time: 2.5 to 5.0 hours Initial Set, and 4.0 to 8.0 hours Final Set.

(5) Durability:

a. Freeze Thaw: 3,000 cycles, RDF 90% per ASTM C-666.

b. Sulfate Resistance: Expansion at 26 weeks < 0.1% per ASTM C-1012.

(e) Epoxy. Epoxy used to bond match-cast joints between precast panels shall be thermosetting 100% solid compositions that do not contain solvent or any non-reactive organic ingredient except for pigment required for coloring and meet the requirements of ASTM C881, Type VI Grade 3. Use epoxy bonding agents composed of two components, a resin and a hardener, with each component distinctly pigmented so that mixing produces a third color similar to the concrete in the panels.

Epoxy bonding agents must be insensitive to damp conditions during application and, after curing, must exhibit high bonding strength to cured concrete, good water resistivity, low creep characteristics and tensile strength greater than the concrete.

In its workable state, or open time, the epoxy bonding agent must function as a lubricant for jointing the panels. In its hardened state, the epoxy bonding agent must provide a watertight seal between the precast concrete panels. The hardened epoxy bonding agent must provide intimate contact for stress transfer by completely filling all interstitial space between the match cast panel faces.

The minimum compressive yield strength of the epoxy-bonding agent shall be: 2,000 psi at 2 days, 6,000 psi at 7 days.

(f) PT Bar. The 1-3/4" diameter steel PT Bar shall be grade 150 ksi steel and galvanized in the shop in accordance with Sections 506 and 726.08 of the VTrans Standard Specifications. Couplers for the PT Bar segments shall be designed and installed following the recommendations of the fabricator, especially requirements for increased tensile strength of the couplers relative to the PT bar. PT bar couplers shall be galvanized. Shall comply with the relevant components of VTrans Standard Specifications Section 506 and 507.

(g) Other. Shims, if used as panel support, shall be from non-metallic, hard and durable materials, such as concrete, mortar, HDPE (or a combination of the above). Any steel hardware or components for erection that are cast into the panels shall be galvanized and shall comply with the relevant components of VTrans Standard Specifications Section 506.

(h) Scuppers. Proposed scupper inlet and anchorages shown on the Plans which are cast into the precast panels themselves. All other components, no cast into the panel, are not included under this item. Shall comply with the relevant components of VTrans Standard Specifications Section 506.

Haunch forming shall meet requirements of VTrans Standard Specifications.

All above material specifications shall be submitted to the Engineer before commencing of fabrication and erection.

3. CONSTRUCTION REQUIREMENTS.

(a) Submittals. No panel fabrication and erection shall be allowed before approval of submittals specified in this section.

(b) Construction Method Statement. Before commencing fabrication and erection operations, the contractor shall submit proposals for all panel fabrication and erection operations to the Engineer for approval. This submittal must be in the form of "Construction Method Statement" and include but not necessarily be limited to:

(1) Overall erection sequence

(2) List of equipment to be used

(3) Casting methods (short or long line)

(4) Panel support layout during lifting, storage and transportation

(5) Method to apply temporary compression to close the joint

(6) Haunch forming and panel support details

(7) Method to conduct stringer/beam top as-built survey, and method to establish panel vertical support elevation

(8) Jacking details for approach spans such as jack, jacking access, PT bar extension, jacking chair or jacking frame if necessary.

(9) Jacking record sheet (including expected gap opening increment for each steps).

(10) Panel hold-down details and layout, if required.

(c) Geometry Control Plan. The Contractor shall submit, to the Engineer, a geometry control plan that indicates the proposed means and methods to achieve the specified deck orientation and elevations. The geometry control plan shall cover both precasting at the plant and on-site erection. The contractor must coordinate with the precaster to provide survey marks when panels are being cast so that the panels can be installed accurately on site.

The accurate alignment of the first panel within a match cast unit (a match cast unit is defined as a group of panels which are connected with match cast joints) is most critical. The misalignment of the first panel will be amplified as panel erection progresses and can potentially result in large transverse offset. Means shall be provided so that the panel position and alignment are secured such that subsequent panel erection will not cause previously installed panels to shift. To minimize the accumulated projecting error, start the panel erection in the middle of a match-cast unit.

It is very important to leave permanent survey marks in the panels during the precast operation to aid the field erection. If the long line casting method is used, run a longitudinal string line at the control line over all the panels within the bed before the panels are separated. To improve erection accuracy, cross lines (in the transverse direction of the bridge) shall be provided for every 3 or 4 panels. At a minimum, cross line must be provided on the first panel being erected within a match cast unit.

If short line casting method is used, longitudinal survey line and cross survey line shall be provided for each panel. During precast operations, the precaster shall check the position of the new cast and match cast panels, after casting and before bond breaking to separate the panels. If positions are not as desired, make corrections in the next panel.

(d) Precast Panel Shop Drawings. In addition to typical information required for panel fabrication, shop drawings shall show lifting and erection details, including lifting hardware and adjustment procedures. Where lifting locations deviate from those shown on the plans, submit plans and design calculations to the Bridge Engineer for review and acceptance prior to fabricating the panels. The plans and calculations shall be signed and sealed by a registered Civil Engineer in the State of Vermont.

If the lifting device is used for providing temporary pre-compression force over the joint, each lifting insert shall have a capacity to resist a 10 kips longitudinal pulling force (service load) at deck top surface. Contractor will be responsible for employing the appropriate product and details for lifting devices. Lifting devices shall be removable below the top surface of the panel at the final stage meeting top concrete cover requirement. Contractor shall also develop the method to ensure the temporary pre-compression is maintained as panels are erected and detail the lifting device accordingly. This is typically accomplished by using two sets of come-along in a leap-frog manner. Voids left by lifting device shall be filled with a non-shrink grout. Filling material and procedure will be proposed by the contractor and be approved by the Engineer during shop drawing review stages.

Scupper plates, anchorages, assembly, and galvanizing for the components cast directly into the panels as shown on the Contract Drawings shall be included in the panel shop drawings or have their own submittal for review.

(d) Jacking Closure Shop Drawings. Based on the actual equipment and method for jacking operation, the contractor shall produce a set of shop drawing regarding the jacking closure pour:

(1) Dimensions of stage 1 and stage 2 pours

(2) Rebar and embedment details for stage 1 and stage 2.

(3) Layout details for jacks, bearing plates and shims

(4) Means to secure jacks

(5) Hold-down device

(e) Structural Grout. Mix and place grout in accordance with the manufacturer recommendations and as described below:

(1) Trial Batching: A trial grouting of a simple mockup connection will be required a minimum of 2 weeks in advance of the deck panel installation.

4. FABRICATION. Precast concrete deck panel fabrication shall comply with all requirements of Section 540. All cast-in-place concrete shall comply with the requirements of Section 541. Fabricate the precast panels in accordance with the approved shop drawings. Unless specified in the approved shop drawings, reinforcing steel shall not be cut and/or removed to permit proper alignment of other embedded hardware.

Each panel shall be marked with a unique identification number to indicate its location, orientation and order in the erection sequence. Match mark abutting edges of adjacent panels.

(a) Forms and Casting Beds. Forms and casting beds used for casting concrete panels shall meet the following requirements:

(1) Structurally adequate to support the panels without settlement or distortion.

(2) Producing panels within the tolerances specified in this special provision.

(3) Accommodating block outs, openings and protrusions.

(4) Stripping without damage to the concrete.

Cast panels in forms with sealed joints or seams to minimize bleeding. Maintain outside surfaces of forms in reasonably clean condition, free of concrete build-up. Ensure that all joints in the forms and contact points with bulkheads and existing panels have good fitting seals to prevent loss of fine material and cement grout.

Deck panels shall be match-cast, by either a short or long line casting method. Panels can be cast in a flat profile along the longitudinal direction of the bridge without adjustment to the longitudinal profile of the bridge.

Cover the abutting surface of the match cast panel with a thin film of a bond breaker consisting of flax soap and talc, or other material approved by the Engineer. Use a soap and talc mixture consisting of five parts flax soap to one part talc.

Chamfer all exposed edges to ¾", with the following exceptions:

(5) Match-cast faces and edges adjacent to closure pours

(6) Face of shear pockets and top of deck intersection

(7) Any face that will be bonded to other elements where chamfer causes delamination

(b) Concrete Surface Finishes. Refer to Subsection 501.16 of the Specifications.

(c) Tolerance. Fabrication tolerances shall not exceed the following:

(1) Length (Transverse direction of the bridge): 1/4 in.

(2) Width of individual panel, not cumulative (Longitudinal direction of the bridge): ±1/4 in.

(3) Width, cumulative (Longitudinal direction of the bridge): ± 1/2 in.

(4) Depth (overall): ± 1/8 in.

(5) Grade of form edge and fascia: ± 1/8 in. in 10 ft.

(6) Shear pocket, jacking blockout location: ± 1/4 in.

(7) Scupper pan offsets: ± 1/8 in

(8) Curb bolts (if used): ± 1/4 in

(d) Panel Handling, Storage, Cleaning and Shipment. Handle, store, transport and erect panels without damaging. Maintain panels in a horizontal position at all times and do not store, lift and/or move in a manner that will induce twist and other undue stress.

Thoroughly clean the faces of all joints of laitance, bond breaking compound and any other foreign material by light sand blasting prior to shipment. Care shall be taken to ensure the matching surface will not be damaged by cleaning. Blasting may be supplemented by detergent washing as necessary.

Make no repairs of minor spalls or chipped areas on the matching joint surfaces until after erection of the panel. Any repair to the match cast joint shall not be conducted without written approval from the Engineer.

During transportation, the support devices shall allow free rotation of the panel at each support point and free torsional rotation (twist) of the panel at all but one of the support points.

5. MOCK-UP OF HAUNCH FORMING SYSTEM AND GROUTING OPERATION. Prior to erecting the panels, the contractor shall perform a mock-up of the proposed haunching forming system and grouting operation. A representative from the grouting manufacturer shall be present for this demonstration on site. The mock-up shall demonstrate containment of grout and the ability to fill all voids between the panels and stringers/beams. The demonstration shall be similar to the conditions that will be encountered during the actual grouting operation and shall take place at the project site. The contractor shall submit a mock-up plan to the Engineer for review prior to the demonstration. If the contractor cannot reasonably prove through the demonstration, that the above requirements are met, the contractor may be asked to revise the grouting operation.

The mock-up of the proposed haunch forming system and grouting operation shall, at a minimum, replicate two panels' length to be installed in the approach spans, including simulating the top flange limits comparable to the bridge's existing stringers. The mockup shall represent the maximum spacing between shear stud pockets in the panels and include studs, so that the most difficult haunch forming, and grouting operation is replicated.

In testing the forming system, the contactor shall check the form tightness and stability under minimum foam compression (1/8" compression of foam) and maximum foam compression (1/2" compression of foam).

After testing the forming system, the grouting test shall be conducted to demonstrate the grouting method can fill the minimum haunch height required of 1". Typically, haunch grouting can be accomplished typically with pouring method. Pouring requires a grout with a fluid consistency. Grout shall be prepared and mixed based on manufacturer's recommendation. Hand tools, such as flexible steel strips, can be used to facilitate grout movement.

If distance between pocket openings is over 3 ft, the Contractor shall use a headbox to increase the hydraulic head for pouring. When a headbox is used and hydraulic head pressure is the means of flowing grout into place, a height of 1 ft headbox on top of deck is sufficient for typical haunch grouting. The typical 5-gallon plastic bucket has frequently been modified to function as a headbox. Fill the head box to the desired height and allow the grout to flow down under the deck, but refill the headbox before the level drops to 1" above bottom of deck. This procedure is repeated until the grout moves completely under the deck, pushing air out in front of it, and rising above the bottom of the deck on the far side. Headbox will be moved to the next pocket along the grouting direction as grouting is progressed. When moving headbox to the next pocket, cover the current grouted pocket with a piece of plywood and weight.

An acceptable mockup test shall demonstrate grout is completely filling over the haunch area with small air voids (less than 1/2 sq. in area each) totaling less than 10% of the interface between haunch and precast deck.

At conclusion of the mock-up, the contractor shall provide final list of materials, grout mix design, and details to be used. All materials, tools and techniques used in the mockup shall be used in production placement.

6. ERECTION. Upon arrival at the erection site, each panel shall again be inspected. Immediately bring evidence of damage and/or defects to the attention of the Engineer.

Attention shall be paid to ensure all matching surfaces are in good condition and clean. There can be no grout, concrete, paste, or other similar obstructions on the joint surface that will interfere with the intended match of the joint surfaces.

(a) Age of Precast Panels at time of Erection. Precast panels shall not be erected until they have reached the age of 60 days, unless otherwise approved by the Engineer.

(b) Setting Haunch Forms and Panel Supports**.** Haunch form and panel support thickness shall be established by stringer/beam as-built elevation survey with considerations to cambers generated by deck weight and by deck jacking. Theoretical deck deflection due to deck weight and deck jacking is provided in the contract drawings.

Shims shall be centered with each panel joint as vertical supports. Shims shall be from non-metallic, hard and durable materials, such as concrete, mortar, HDPE (or a combination of the above). Shims shall have a minimum dimension of 3.5" (transverse direction) x 7". Adjacent panels will share the same shim center at the match cast joint.

Each panel support can consist of shim stacks with different thicknesses. If shim stacks are used, contractor is responsible to ensure the stability of the stacks, with consideration that panels might have moved relative to the shims during joint closing.

Before erection starts, conduct survey on stringers/beams elevation in advance to estimate the haunch height. Evaluate the haunch height with the following considerations:

(1) Ensure there is enough haunch thickness for grout to flow. Pay attention to splice location where actual haunch thickness can be reduced by splice plate and bolts.

(2) Check shear stud length to ensure sufficient stud penetration or concrete cover on top.

(3) Check haunch form and panel support materials

The haunch form consists of a layer of soft material with a capacity to be compressed ½" under panel weight. Attention shall be paid to ensure the stability of soft form layer.

Contractor can have shims in various thickness ready before erection. The shims can be quickly combined into a stack at the desired thickness, based on the as-built survey results after the old deck is removed. Shim packs shall be able to be assembled with an accuracy of 1/8".

If a taller support is expected, a mortar block base can be used to support the shim stack. The mortar base is typically larger than the shim stack to ensure stability.

A minimum of 1" shall be maintained between the haunch form side face and the shim (and the mortar base if used) so to allow grout flow during haunching grouting.

(c) Placement of panels. Deck panels shall be placed within the following erection tolerances:

(1) The maximum accumulated panel alignment offset is 1/2".

(2) The maximum installation tolerance is 1 inch in the longitudinal direction of the bridge.

(3) The vertical installation tolerance is 1/4". Shim packs shall be adjusted to the nearest 1/8".

(4) Longitudinally, the angular deviation from the theoretical slope change between two successive panels shall not exceed 0.23 degrees. In addition, panels shall be placed to avoid concentrated angle break at panel joints and shall not excess ½" out of plane over a length of 20 ft (centering at panel joint). Such checking can be conducted with the typical 20 ft straightedge for pavement surface checking.

Accurate positioning of the starting panel (the panel being place first in one erection run) is very important as it will establish the alignment for subsequent panels. The orientation of first panel (angle rotating along the vertical axis) shall be limited to 0.029 degrees.

Prepare a table of alignments required at each panel before erection. Carefully check alignments after erecting every two panels and correct as required to avoid any possible accumulation of errors.

If geometric corrective measures are necessary, the Engineer will require the Contractor to develop the means and methods to ensure the epoxy joint remains watertight and free from localized stress concentrations. The Contractor will be required to submit the corrective measures to the Engineer for approval. Use shims made of ASTM A240 Type 304 wire cloth (roving) with a maximum of 1/8 inch thickness.

(d) Jointing of Panels.

(1) Preconstruction Requirements. Prior to the manufacture of epoxy for the project, a site meeting will be held with representatives from the Engineer, Contractor and epoxy manufacturer, to discuss the selection of the proper formulations, storage and handling, mixing and application of the epoxy.

Before erection, have the wire cloth used for shimming of match joints as a means of geometry correction available at job site.

Before erection, have the necessary cleaning materials immediately available at the location of the panel jointing, in the event that the panels must be separated, cleaned, and/or epoxy reapplied.

Assure that the time elapsing between mixing components of the first batch of epoxy bonding agent, applying it to the jointing surfaces of precast concrete panels and the application of a compressive contact pressure across the joint does not exceed 70% of the open time for the particular formulation of epoxy bonding agent used.

Before assembling the first matching joint, conduct a mock-up without epoxy to demonstrate how the minimum contact pressure of 10 psi will be applied uniformly to each joint. This mock-up can be included in the mock-up for haunches and panel support, or it can be done independently.

(2) Cleanliness of Matching Surfaces. Ensure that the joint surfaces are free from oil, form release agent, laitance or any other deleterious material that would prevent the epoxy bonding agent from bonding to the concrete surface. Remove laitance by light sandblasting~~,~~ or wire brushing. Do not destroy the surface shape and profile of the mating surfaces.

Ensure that the surfaces have no free moisture on them at the time the epoxy bonding agent is applied. Free moisture will be considered present if a dry rag, after being wiped over the surface, becomes damp.

(3) Substrate Temperatures and Epoxy Formulation. Apply the epoxy bonding agent only when the substrate temperature of both surfaces to be joined is between 40°F and 115°F. The formulation of the epoxy bonding agent must have an application temperature range that conforms to the substrate temperature of the surfaces being joined. If the mating surfaces have different substrate temperatures, then use the formulation for the higher temperature in hot weather periods. In cold weather periods, use the formulation for the lower temperature.

If the substrate temperature exceeds 115°F, do not proceed with epoxy jointing. The Contractor may take precautions to keep the mating substrate surfaces cool by shading and/or wetting with clean water except that the above requirements for no moisture at the time of application must be strictly adhered to.

If electing to erect panels in cold weather when the substrate temperature of the mating concrete surfaces is below 40°F, an artificial environment may be used to increase the substrate temperature subject to the following:

a. Make the artificial environment by an enclosure surrounding the joint through which warm air is circulated, or heating is provided by radiant heaters.

b. Raise the temperature of the concrete substrate across the entire joint surface to at least 40°F.

c. Prevent localized heating and the temperature of the substrate exceeding 95°F at any point on the surface. Direct flame heating of the concrete is not allowed.

d. Maintain the temperature of the substrate surfaces between 40°F and 95°F for at least 24 hours after jointing the surfaces.

The Contractor may propose, for review by the Engineer, an optional method of raising and maintaining the substrate temperature of the mating surfaces. Any optional method must meet the thermal restrictions above.

Epoxy jointing operations may proceed if the air temperature is above 45°F and rising and the limitations above are met.

(4) Mixing of Epoxy Bonding Agent. Mix the two components of the epoxy bonding agent in strict accordance with the manufacturer's instructions, using only full and undamaged containers. Only open the containers immediately before being combined and do not use any which have an expired shelf life. Thoroughly stir each container of component before combining the components. Combine the two components and thoroughly mix until a uniform color is achieved. Mix with a properly sized mechanical mixer operating at no more than 600 rpm and/or in accordance with the recommendations of the epoxy manufacturer.

Schedule mixing of the epoxy bonding agent so that the material in a batch is applied to the face of a joint within a maximum of 20 minutes after combining the components.

(5) Application and Amount of Epoxy. Begin application immediately after a batch has been mixed. Uniformly apply the epoxy bonding agent in accordance with the manufacturer's recommendations by spatula or gloved hand to a nominal thickness of 1/16 inches. Apply the epoxy to all areas of both faces to be joined. Do not exclude epoxy from around holes formed by ducts or the shear keys. Apply additional epoxy thickness, equal to the shim thickness, to panel faces when shims are placed in a joint.

The amount of epoxy may be adjusted provided that a sufficient amount is applied to completely fill all interstitial space in the joint and to extrude a small bead from the joint after application of the compressive contact pressure.

If a bead of epoxy is not extruded all around the joint, determine the reason why before proceeding.

Do not use an epoxy bonding agent from a batch for which the time since combining the components has exceeded 20 minutes.

(6) Mating of Panels. Immediately after each mating surface is covered with epoxy bonding agent, bring the panels together and apply a minimum of 10 psi compressive contact pressure in accordance with the approved erection procedures.

The contact pressure shall be maintained at all time during erection until 20% of the final jacking force is applied.

A discernable bead line of extruded epoxy bonding agent must be apparent along the exposed edges of the joint. Fill all areas of the joint which do not show a bead of epoxy by dispensing additional epoxy, meeting the requirements of this specification, into the joint using a pneumatic gun with epoxy cartridges. Inject epoxy to a minimum depth of 1 inch.

Catch and retain epoxy which is squeezed out of the joint in areas over waterways, roadways, buildings, or as directed by the specific project requirement.

Clean all extruded epoxy bonding agent from external visible surfaces in a way not to damage or stain the concrete surface.

If the time between combining the components of the epoxy bonding agent and applying the compressive contact pressure exceeds 70% of the minimum open time, immediately separate the panels and clean in accordance with section below.

(7) Failure to comply with Time Limits or Incomplete Jointing. If the time limit between mixing of the epoxy-bonding agent and the application of the contact pressure is exceeded, or if the joint is incompletely filled and sealed, separate the panels and remove all epoxy from the faces using spatulas and approved solvent. Do not re-apply epoxy until the faces have been properly cleaned and solvents dispersed, for a period of 24 hours.

(e) Installing Shear Studs. Shear studs are to be installed after panels are in place. Please refer to design plan for stud location and quantity. Shear studs shall be tested in accordance with the requirements of VTrans Standard Specifications Section 508.

Due to large jacking load, studs for end panels at both ends of each jacking unit are very important. Shear studs for end panels shall have a minimum projection (vertical dimension measured from top of stud to the bottom of precast panel) of 4.5”.

(f) Jacking of Suspended Span. Total targeted jacking force for each stage (half of the bridge) is 600 kips.

(1) Equipment and Personnel Requirements. Pressure gauge for determining jacking pressure shall have a minimum dial diameter of six inches.

Each jack and gauge shall be calibrated within the past 6 months. Provide the Engineer with certified calibration charts and curves for each jack and gauge unit used on the project prior to start of work.

All jacks shall have locknuts, be of the same size, and shall be equipped with manifolds that have individual shutoff valves.

(2) Pre-jacking Activities. Submit the jacking procedure and Deck Jacking Record Sheet to the engineer for approval. Jacking procedure calculation sheet shall include:

a. Jacking loads and pressure gauge reading at each load step

b. Layout of jacking gap opening measuring points and expected jacking gap opening at each load step

c. Initial jack stroke setting and margin of safety for stroke.

d. Contingency plan for jack breakdown and stroke recycle.

Grout strength of both end anchor panels have to reach a minimum strength of 4.0 ksi.

(3) Jacking operation. Jacking will be conducted in the following six increments, in terms of percentage of the specified jacking force: 20%, 40%, 60%, 80%, 90%, and 100%.

Do not apply jacking force over the targeted force to achieve theoretical jacking gap opening. Measure elongations to nearest 1/16".

a. Increment 1 - 20% actions. Check all jacks and hardware are fully engage and perform as expected. Check all hydraulic equipment, such as gauge, hose connection, shut off valves.

Measure jacking gap opening and jacking strokes. Conduct calculation to ensure sufficient jacking stroke with a recommended factor of 1.3 for margin. If stroke is not sufficient, adjust jacking shims if necessary.

The jacking gap opening at 20% will be used as the reference point for jacking gap measurement of subsequent jacking increments.

b. Increments 2 to 5 (40%, 60%, 80%, and 90%) actions. At each increment, a holding time of 5 minutes shall be applied when jacks are maintaining the target force. Gap opening shall be measured at the beginning and the end of the holding time. During the holding period, if gap opening increases by more than 1/8" or 10% theoretical opening (whichever is bigger), jacking operation shall be paused by closing all jack valves (not releasing pressures). Cause shall be investigated before continuing jacking operation.

At each increment, compare the field measurement on gap opening with theoretical value. Pause jacking operation if a discrepancy more than 15% of theoretical is observed.

At each increment, observe jack stroke to ensure sufficient stroke is available.

c. Final increment (100% of jacking force) actions. After reaching the final specified jacking force, maintain the jacking force for a holding time of 15 minutes before jacks are locked. Gap opening shall be measured at the beginning and the end of the holding time. If gap opening increases by more than 1/8" or 10% theoretical opening (whichever is bigger), cause shall be investigated before ending the jacking operation.

Compare the field measurement on jacking gap opening with theoretical value. Cause shall be investigated if a discrepancy more than 15% of theoretical is observed.

Lock jacks with locknuts if the Engineer determines the jacking operation is complete.

(4) Jacking Closure Pour. High Performance Concrete, Rapid Set.

Jacking closure pour material shall have a minimum 28 day strength same as precast panels.

Jacking closure pour Stage 1 shall reach a minimum strength of 2.5 ksi before jacks can be removed.

(g) Jacking of approach spans. Total targeted deck compression force for each stage (half of the bridge) is 520 kips. The deck compression is accomplished by tensioning both 1 ¾" PT bars. The effective tension for each PT bar (after anchor set) is 260 kip. The PT bar tensioning shall be applied over seven increments, in terms of percentage of the specified jacking force: 20%, 40%, 60%, 80%, 90%, and 100%. During jacking, tensions shall be applied to both PT bars evenly.

PT bars are all jacked from the abutment end. Please follow PT bar supplier recommendation for equipment requirements. A jacking frame is likely needed to accommodate the jacking operation.

(h) Grouting of Haunch and Shear Pockets.

(1) Mixing Grout. Mix in accordance with the manufacturer's recommendations and continue until all ingredients are thoroughly mixed and free of lumps and un-dispersed cement. Use potable water clean and free of injurious substances known to be harmful to Portland Cement or reinforcing steel in the grout. Use pre-packaged grout mixed in complete units continuously agitated until it is applied. Once mixed, do not re-temper the grout by the adding water and place the grout within the time limit in accordance with the manufacturer's recommendations.

(2) Placing. Place the grout continuously in a manner and sequence such that all voids are completely filled. Size and locate vent holes or tubes in the formwork as necessary to prevent air entrapment. If the Engineer determines the Contractor's methods of placement of grout do not achieve full coverage, pumping of the grout will be required. No more than 15 minutes shall elapse between placements of successive batches of grout over a single stringer/beam.

(3) Bonding of Grout. Prior to placement of grout, clean all surfaces that have not been prepared and will be in contact with grout to create a prepared surface. The surface shall be prepared by washing with water under pressure and by sandblasting to expose a clean roughened surface to a magnitude of 1/8". However, care shall be taken to ensure the top edge of shear pocket shall not be rounded off to avoid delamination between grout and precast panel.

The prepared surface shall be wetted a minimum of three hours before application of the grout and the surface shall be maintained in a dampened condition during that period. One hour before placing the new concrete, any excess water shall be removed and the surface shall be allowed to dry. At the time of placement, the surface shall be saturated surface dry (SSD) with no visible moisture or darkening of the bond surface.

The undersides of the precast deck panels (stringer/beam haunch areas) that are in contact with the grout are exempt from the provisions in this section.

(4) Finishing and Curing. Strike off exposed top surface of the grout with the top of panel pockets and finished with a float. Wet cure exposed surfaces of grout in accordance with the manufacture's recommendations.

(i) Deck Completion. Jacking closure pour (stage 1 and stage 2), haunch grout and shear pocket grout all shall reach a minimum strength of 3.5 ksi before traffic can be applied.

(j) Others. Any steel embeds (such as lifting device) on top of the deck shall be trimmed and touched up to meet DOT coating and minimum cover requirements. All embedded steel components shall be galvanized and comply with relevant sections of Section 506.

7. METHOD OF MEASUREMENT. The quantity of Special Provisions (AccelBridge, Precast Deck Panel System) to be measured for payment will be on a lump sum price basis in the complete and accepted work.

8. BASIS OF PAYMENT. The accepted quantity of Special Provisions (AccelBridge, Precast Deck Panel System) will be paid for at the Contract lump sum price for the respective items. Payment will be full compensation for the materials specified, and furnishing all labor, tools, equipment, and incidentals necessary to complete the work. This includes but is not limited to the proposed deck panels, shear studs, PT bar and all supporting and attachment components, and structural grout.

   Full compensation for the proposed scupper plates and anchorages cast directly into the precast panels shall be incidental to this item. The independent scupper pan components and hardware shall be paid for under a separate item.

   Payment will be made under:

Pay Item	Pay Unit
900.645 Special Provision (AccelBridge Precast Deck Panel System)	Lump Sum

JACKING AND REMOVAL OF SUSPENDED SPAN BEARINGS

1. DESCRIPTION. This work shall consist of furnishing and installing steel stiffener plates and end diaphragm hardware replacement as shown on the Plans in preparation for the proposed jacking procedures outlined in the Plans to remove the existing Suspended Span bearings. This work shall also consist of the jacking of the Suspended Span beams, and the removal of the existing steel expansion and fixed steel bearing assemblies.

   The furnishing and installation of the proposed bearings to be placed while the Suspended Span is still jacked shall be paid for separately under Item 531.18 Bearing Device Assembly, Elastomeric Reinforced Pads with External Load Plates.

   The work under this Section shall be performed in accordance with these provisions, the Plans, and Sections 506, 529, and 531 as herein modified.

2. MATERIALS. Materials used to prepare the end diaphragms for the jacking forces shall conform to the requirements of Subsection 506 with the following specific material requirements:

   (a) Stiffener plates and repair plates shall be Grade 50 ksi in compliance with Subsection 714.03.

   (b) Hardware shall be ASTM 325 Type 1 high strength bolts, nuts and washers in compliance with Subsection 714.05.

   (c) Proposed jacks shall adhere to the capacity requirements provided by AccelBridge on the precast panel system shop drawings and erection/installation plan.

   (d) Proposed scupper plates and anchorages shall adhere to the requirements reference on the Plans.

3. FABRICATION DRAWINGS. Fabrication drawings shall be prepared and submitted in conformance with appropriate requirements of Section 506, and as follows:

   Shop drawings outlining the proposed jacking procedures, cut sheets for the proposed jacks and temporary support elements, and supporting calculations stamped by a Vermont Professional Engineer shall be submitted to the Engineer for review. The Contractor may propose jacking procedures that differ from the approach shown on the plans, if they provide stamped shop drawings, stamped design calculations, and cut sheets for all pertinent equipment and interim support elements to the Engineer for review.

4. FABRICATION. Fabrication shall conform to the requirements of Section 506 of the Standard Specifications.

5. INSTALLATION. Installation of the proposed steel components shall conform to the requirements of Section 506, and as follows:

   Placement of the proposed jacks follow the approved jacking shop drawing and work plan. Under no circumstance shall live traffic or construction materials be placed on the portion of the Suspended Span to be jacked.

6. METHOD OF MEASUREMENT. The quantity of Special Provision (Jacking and Removal of the Suspended Span Bearings) to be measured for payment will be on a lump sum basis in the complete and accepted work.

7. BASIS OF PAYMENT. The accepted quantity of Special Provision (Jacking and Removal of the Suspended Span Bearings) will be paid for at the Contract lump sum price for the respective items. Payment will be full compensation for the materials specified, and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work. Steel plates and hardware for preparing the diaphragms for jacking and repairing afterwards will be included as part of the lump sum, in addition to the labor for performing the jacking and removal of the Suspended Span existing bearing assemblies.

   Payment will be made under:

Pay Item	Pay Unit
900.645 Special Provision (Jacking and Removal of Suspended Span Bearings)	Lump Sum

REMOVAL, CONTAINMENT, AND DISPOSAL OF EXISTING PAINT

1. DESCRIPTION. This work shall consist of the washing of the existing paint coated surfaces, the removal of existing paint and grease rustproofing compounds, as well as the containment, collection, temporary storage, transportation, and disposal of the resulting waste. Waste requiring containment and control includes, but is not limited to, old paint, spent abrasives, corrosion products, mill scale, dirt, dust, grease, oil, salts, solvents, and water used for cleaning the surface of existing coatings. Areas of paint removal operations are indicated below:

   (a) Stringer top flanges for shear stud installation;

   (b) Suspended Span exterior beam bottom flanges for weld removal;

   (c) Suspended Span beams for sole plate removal and cantilever end floorbeams for masonry plate removal;

   (d) Suspended Span cantilever west end floorbeam web at the crack arrest hole location;

   (e) Removal of existing rolled shaped and angles as shown on the Plans for installation of the proposed joint systems, and;

   (f) Installation of proposed bolted connection in the existing floorbeams for the proposed tie beams.

2. GENERAL REQUIREMENTS. The existing coatings are assumed to contain lead and other toxic metals or contaminants (collectively referred to herein as "contaminants"), regardless of any test results. However, some testing has already been performed and the results can be found in the 'Paint Sampling Memo dated June 15, 2020'. All removal activities will be performed accordingly. This specification provides the requirements for containment and for the protection of the public and the environment from exposure to harmful levels of contaminants that may be present in the paint being removed or repaired. The Contractor shall take reasonable and appropriate precautions to protect the public from the inhalation or ingestion of dust or debris from the operations, and is responsible for the clean-up of all spills, releases, or emissions of waste at no additional cost to the Agency.

   The Contractor shall comply with the requirements of this specification and all applicable Federal, State, and Local laws, codes, and regulations. These include, but are not limited to, the regulations of the United States Environmental Protection Agency (EPA), Vermont Occupational Safety and Health Administration (VOSHA), Vermont Department of Health (VDOH), and the Vermont Agency of Natural Resources (ANR). The Contractor shall comply with all applicable regulations even if the regulation is not specifically referenced herein. If a Federal, State, or local regulation is found to be more restrictive than the requirements of this specification, the more restrictive requirements shall prevail as determined by the Engineer.

3. PROJECT CLASSIFICATION. The removal, containment and disposal of existing paint will be classified as either a Type I or a Type II project as follows

(a) Type I. Type I projects shall consist of work to remove all paint from a substantial portion of the existing structure, or to remove the paint from large, contiguous areas of a portion of a structure. Examples of such work would be projects where all or some of the main girders were completely stripped of paint. Often, paint removal and repainting the structure will be a primary goal of a Type I project. Type I projects can usually be expected to require a full external containment system.

(b) Type II. Type II projects shall consist of work to selectively remove paint from multiple small, localized areas, or to remove paint from a few discrete, discontinuous and moderately sized areas. Examples of such work would be the removal of paint associated with gusset plate replacement, bolt or rivet replacement, installation of new cover plates, or installation of new shear studs on existing beams. Typically, paint removal is either a secondary goal or merely a prerequisite for other work on a Type II project. Type II projects can often, but not always, be completed primarily with vacuum blast cleaning and vacuum-shrouded power tools and may not require a full containment system.

Unless identified as being specific to either a Type I or Type II project, all requirements of this specification shall apply to both Type I and Type II projects.

4. REQUIRED REFERENCES. For the duration of the project, the Contractor shall maintain printed copies of the following standards and regulations on the project site:

SSPC Guide 6: Guide for Containing Debris Generated During Paint Removal Operations;

SSPC Guide 7: Guide for Disposal of Lead Containing Surface Preparation Debris;

29 CFR 1926.62 - Lead in Construction;

40 CFR Part 50, Appendix B - Reference Method for the Determination of Suspended Particulate Matter in the Atmosphere (High-Volume Method);

40 CFR Part 50, Appendix G - Reference Method for the Determination of Lead in Suspended Particulate Matter Collected from Ambient Air;

SSPC Guide 16: Guide to Specifying and Selecting Dust Collectors;

SSPC TU-7 - Conducting Ambient Air, Soil, and Water Sampling Activities During Surface Preparation and Paint Disturbance Activities, and;

Vermont Lead Exposure Control Regulations.

5. SUBMITTALS. The Contractor shall submit to the Engineer, in accordance with Subsection 105.03, the following information. Complete submittals shall be provided a minimum of 28 calendar days prior to the anticipated start of the work.

(a) Contractor and Contractor's Personnel Qualifications. The Contractor shall submit documentation verifying that they and their personnel meet the requirements below for the applicable project type.

(1) Type I Projects.

a. Contractor. The paint removal Contractor shall possess a current Lead Abatement Contractor Entity license from the Vermont Department of Health permitting them to perform lead abatement work.

The paint removal Contractor shall also possess current SSPC-QP2 certification and shall maintain certified status throughout the duration of the paint removal work under the Contract.

b. Personnel. The names and qualifications, experience, and training of the personnel managing and implementing the quality control inspections shall be provided.

The quality control personnel shall possess a current Inspector Technician I license from the Vermont Department of Health allowing them to perform lead abatement QC inspections. All laborers performing lead abatement work shall be licensed by the VDOH as Lead Workers, and a VDOH licensed Lead Supervisor shall be on site whenever lead abatement work is being performed.

The quality control personnel shall also possess current SSPC-C3 certification or equal, including the annual training necessary to maintain that certification (SSPC-C5 or equal), and shall provide evidence of successful completion of two projects of similar or greater complexity and scope that have been completed in the last 2 years. References shall include the name, address, and telephone number of a contact person employed by the project owner. Proof of initial certification and the current annual training shall also be provided.

(2) Type II Projects.

a. Contractor. The paint removal Contractor shall possess a current Lead Abatement Contractor Entity license from the Vermont Department of Health permitting them to perform lead abatement work.

b. Personnel. The names and qualifications, experience, and training of the personnel managing and implementing the quality control inspections shall be provided.

The quality control personnel shall possess a current Inspector Technician I license from the Vermont Department of Health allowing them to perform lead abatement QC inspections. All laborers performing lead abatement work shall be licensed by the VDOH as Lead Workers, and a VDOH licensed Lead Supervisor shall be on site whenever lead abatement work is being performed.

(b) Coating Removal Plan. The Coating Removal Plan shall include the specified methods of coating removal and types of equipment to be utilized for water washing; hand and power tool cleaning; removal of rust, mill scale, grease (including grease rustproofing compounds), or foreign matter; and abrasive blast cleaning. If detergents or additives are incorporated into the water used for any water washing operations, the plan shall include the names of the materials and Safety Data Sheets (SDS).

The plan shall identify the solvents proposed for solvent cleaning, together with the SDS.

(c) Abrasives. If the Contractor intends to use abrasive blast cleaning, they shall submit the type of abrasives to be used and the SDS. For expendable abrasives, the Contractor shall provide certification from the abrasive supplier that the abrasive meets the requirements of SSPC-AB1. For steel grit abrasives, the certification shall indicate that the abrasive meets the requirements of SSPC-AB3.

(d) Containment Plan. The Containment Plan shall include drawings, equipment specifications, and calculations (including wind load and airflow) applicable to the removal method and containment system selected by the Contractor (see Subsection 12).

When the use of negative pressure and airflow inside containment is specified, the Contractor shall provide all ventilation calculations and details on the equipment that will be used for achieving the specified airflow and dust collection.

The plan shall include copies of the manufacturer's specifications for the containment materials and equipment that will be used to accomplish containment and ventilation. If abrasives are used, the plan shall note the type of abrasive and account for the weight of spent abrasive on the containment system.

The submittal shall provide drawings showing the containment system and indicating the methods of supporting the working platforms and containment materials to each other and to the existing structure and calculations that assure the structural integrity of the existing structure under all loading conditions.

Loading conditions shall include, but not be limited to, all equipment, materials, and containment system loads. The calculations and drawings shall be prepared, signed, and sealed by a qualified Professional Engineer licensed in Vermont. Additionally, the Professional Engineer shall inspect the completed containment system, review the materials used for its construction, and certify that the as-erected containment is in conformance with the drawings.

The design shall indicate the maximum wind speed allowed for the containment system. In all cases, the containment shall be dropped in the event of sustained winds of 40 mph or greater and all materials and equipment secured.

When working over a railroad or navigable waterways, unless otherwise directed by the Engineer, the Contractor shall provide evidence that the Railroad, Coast Guard, U.S. Army Corps of Engineers, and other applicable agencies are satisfied with the clearance provided and other proposed safety measures.

(e) Environmental Monitoring Plan. The Contractor shall submit an Environmental Monitoring Plan. The plan shall address the visual inspections, monitoring and clean-up of the air, soil, and water that the Contractor will perform, including final project inspection and cleanup.

(1) Type I Projects. The plan shall address the daily visible emission observations that will be performed and the corrective action that will be implemented in the event emissions or releases occur. The plan shall also establish a "Regulated Area and Ambient Air Monitoring Program" in accordance with SSPC TU 7. The results of all area and ambient monitoring will be provided to the Engineer and the Agency Hazardous Materials Coordinator within 72 hours of receipt by the Contractor.

(2) Type II Projects. The plan shall address the daily visible emissions observations that will be performed and the corrective action that will be implemented in the event emissions or releases occur.

(f) Site Specific Health and Safety Plan. The Health and Safety Plan shall identify the Contractor's Health and Safety Officer. The plan shall discuss the Contractor's lead testing program for workers and what course of action will be followed if the reported levels exceed accepted limits.

The plan shall also identify the VOSHA Competent Person for the VOSHA regulated activities. The Competent Person shall be on site during the progress of the regulated activities. In addition to the lead removal activities the plan should emphasize best practice fall protection and prevention and include plans for rescuing individuals hanging from fall arrest devices.

(g) Contingency Plan. The Contractor shall prepare a Contingency Plan for emergencies, including fire, accident, failure of power, failure of dust collection system, failure of supplied air system, or any other event that may require modification of standard operating procedures during lead removal. The plan shall include specific procedures to ensure safe egress and proper medical attention in the event of an emergency.

(h) Waste Management Plan. The Waste Management Plan shall address all aspects of waste handling, storage, testing, hauling, and disposal. The plan shall include the names, addresses, and a contact person for the proposed licensed waste haulers and disposal facilities and the name and qualifications of the laboratory proposed for any testing or analysis.

On behalf of the Agency, the Contractor, in consultation with the Agency Hazardous Waste Coordinator, shall request the EPA ID number for hazardous waste disposal issued by ANR.

(i) Permits. The Contractor shall submit a copy of the site-specific Lead Abatement Permit issued by the Vermont Department of Health (VDOH) for the project. Regardless of project type, the Contractor shall consult with and obtain any permits from the appropriate regulatory authority prior to the commencement of removal operations.

When the Engineer accepts the submittals, the Contractor will receive written notification. The Contractor shall not begin any work until the Engineer has accepted the submittals and the pre-work meeting has been held, as defined under Subsection 8. The Contractor shall not construe Engineer acceptance of the submittals to imply approval of any particular method or sequence for conducting the work, or for addressing health and safety concerns. Acceptance of the plans does not relieve the Contractor from the responsibility to conduct the work according to the requirements of Federal, State, or Local regulations, this specification, or to adequately protect the health and safety of all workers involved in the project and any members of the public who may be affected by the project. The Contractor remains solely responsible for the adequacy and completeness of the programs and work practices, and adherence to them.

6. QUALITY CONTROL (QC) INSPECTIONS.

(a) Type I Projects. The Contractor shall perform first line, in process QC inspections of all environmental control and waste handling aspects of the project to verify compliance with these specification requirements and the accepted drawings and Plans. The Contractor shall use an environmental daily report form approved by the Engineer to record the results of the inspections. The completed reports shall be provided to the Engineer before work resumes the following day.

Contractor QC inspections shall include, but not be limited to, the following:

(1) Proper installation and continued performance of the containment systems in accordance with the Containment Plan.

(2) Visual inspections of emissions into the air and verification that the causes of any emissions are corrected.

(3) Visual inspections of spills or deposits of contaminated materials into the water or onto the ground, pavement, soil, or slope protection. Included is verification that proper cleanup is undertaken and that the causes of releases are corrected.

(4) Proper implementation of the Waste Management Plan.

(5) Proper implementation of the Contingency Plan for emergencies.

(b) Type II Projects. The Contractor shall monitor the paint removal work on a daily basis for compliance with these specification requirements and the accepted drawings and Plans, paying particular attention to the performance of the containment system. If any deviations from the specifications or Plans are found, the Contractor shall immediately submit a report to the Engineer and appropriate corrective action shall be taken. The Engineer may also direct the Contractor to submit a report at any time.

7. QUALITY ASSURANCE (QA) OBSERVATIONS. The Engineer will conduct QA observations of any or all of the QC monitoring inspections that are undertaken. The presence or activity of Engineer observations in no way relieves the Contractor of the responsibility to provide all necessary daily QC inspections and to comply with all requirements of this specification. The Engineer and/or the Engineer's designee shall be allowed access to all work areas, including the containment.

8. PRE-WORK MEETING. A meeting shall be held after the acceptance of all submittals related to the paint removal and before any work covered under this specification may begin. The purpose of the meeting shall be to review all aspects of the removal, containment and disposal of lead paint cleaning residues. The Engineer will notify the Contractor a minimum of 7 calendar days in advance of the meeting.

Individuals attending the meeting representing the Contractor shall be the Project Superintendent and the Quality Control Inspector.

If field painting of the steel is included in the Contract, the pre-paint meeting required by that specification may be combined with the pre-work meeting of this specification. If combined into one meeting, the meeting shall occur prior to any paint removal or painting activities.

9. REGULATED AREAS. Physically demarcated regulated areas shall be established around exposure producing operations wherever concentrations exceed, or can reasonably be expected to exceed, the OSHA Action Level for the toxic metals present in the coating. The Contractor shall provide all required protective clothing and equipment for all personnel, including Agency personnel, entering into a regulated area. Unprotected street clothing is not permitted within the regulated areas.

10. GENERAL CONTAINMENT REQUIREMENTS. The Contractor shall install and maintain containment systems surrounding the work according to the requirements of Subsection 12. The containment systems chosen shall maintain the work area free of visible emissions of dust and debris according to all provisions of this specification, with no debris permitted outside of the regulated area at any time.

The containment materials shall be cleaned of loose material prior to relocation or dismantling. If paint chips or dust are observed escaping from the containment materials during moving, all associated operations shall be halted and the materials and components shall be re-cleaned by HEPA vacuuming.

Working platforms and containment materials that are used shall be firm and stable. Platforms shall be designed to support the workers, inspectors, spent surface preparation media (e.g. abrasives), and equipment during all phases of lead paint removal. Platforms, cables, and other supporting structures shall be designed according to VOSHA regulations.

If the containment needs to be attached to the structure, the containment shall be attached by bolting, clamping, or similar means, as detailed in the approved Containment Plan. The Contractor shall obtain approval from the Structures Engineer prior to drilling into the structure. Welding onto the structure is prohibited. The Contractor shall take appropriate action to avoid damage to the structure from the installation and use of the containment system. If the Engineer determines that there is the potential for structural damage caused by the installed containment system, the Contractor shall take appropriate action to correct the situation.

In addition to complying with the specific containment requirements specified in Subsection 12, the Contractor shall also provide and maintain coverage over the ground in the areas to be cleaned. These ground covers shall be capable of catching and containing surface preparation media, paint chips, and paint dust in the event of an accidental escape from the primary containment. If the area to be cleaned is above an active roadway or railroad, ground covers are only required on areas outside of the traveled way. If the area to be cleaned is over a body of water, ground covers are required on the banks, and, when feasible, water booms, boats with skimmers, or other means as necessary shall be used to capture and remove paint chips or project debris that fall or escape into the water.

11. SURFACE CLEANING PRIOR TO PAINT REMOVAL.

(a) Type I Projects. No more than two weeks prior to starting coating removal operations, the Contractor shall conduct low pressure water washing on the designated surfaces to remove any existing debris. The Contractor shall notify the Engineer 24 hours in advance of beginning low pressure water cleaning.

(1) Low Pressure Water Washing. Washing shall involve the use of chlorine free potable water at a minimum of 1,000 psi and less than 5,000 psi pressure. Paint spray equipment shall not be used to perform the water cleaning. The cleaning shall be performed in such a manner as to remove dust, dirt, chalk, insect and animal nests, bird droppings, and other foreign matter prior to solvent cleaning. All water and debris shall be collected for proper disposal.

If detergents or additives are added to the water, the detergents/additives shall be included in the submittals and not used until accepted by the Engineer. When detergents or additives are used, the surface shall be rinsed with chlorine free potable water before the detergent water dries.

The tops of pier caps and abutments shall be cleaned free of dirt, insect and animal nests, bird droppings, and other foreign matter and the debris collected for proper disposal.

(2) Solvent Cleaning. After washing and debris removal has been accepted by the Engineer, all traces of asphaltic cement, oil, grease (including grease rustproofing compounds), diesel fuel deposits, and other soluble contaminants which remain on the steel surfaces shall be removed by solvent cleaning in accordance with SSPC-SP1, supplemented with scraping (e.g. to remove large deposits of asphaltic cement or grease coatings) as required.

(3) Containment. Low pressure water cleaning shall be performed inside a containment structure meeting the requirements of SSPC-Class 2W or SSPC-Class 3W. The containment shall be designed, installed, and maintained in order to capture and contain all water and waste materials. The containment shall consist of impermeable floors and lower walls to prevent the water and debris from escaping. Permeable upper walls and ceilings are acceptable provided the paint chips, debris, and water, other than mists, are collected. A fine mist passing through the permeable upper walls is acceptable, provided the environmental controls specified herein are met. If paint chips, debris, or water, other than mists, escape the containment system, impermeable walls and ceilings shall be installed.

The collected water shall be filtered to separate the particulates from the water. Recycling of the water is preferred in order to reduce the volume of waste that is generated. The water after filtration shall be collected and disposed of according to the waste handling portions of this specification.

(b) Type II Projects. No more than two weeks prior to starting coating removal operations, the Contractor shall clean all designated surfaces so that they are free of dirt, insect and animal nests, bird droppings, and other foreign matter. All debris shall be collected for proper disposal. Cleaning may be performed using physical methods (e.g. scraping), or other methods as approved by the Engineer, provided debris are properly contained and disposed of.

Following debris removal, the Contractor shall remove all traces of asphaltic cement, oil, grease (including grease rustproofing compounds), diesel fuel deposits, and other soluble contaminants on the steel surfaces using solvent cleaning in accordance with SSPC-SP1, supplemented with scraping (e.g. to remove large deposits of asphaltic cement or grease coatings) as required.

12. PAINT REMOVAL AND CONTAINMENT METHODS. Existing coatings shall be removed from the designated surfaces using one or more of the methods described in this section. The Contractor shall notify the Engineer 24 hours prior to beginning paint removal operations.

The Contractor shall note that the methods of removal specified below only apply to the work covered under this specification. Additional surface preparation work under other specifications (e.g. “Field Painting Steel, Three Coat System”) may require the Contractor to use other methods.

(a) Allowable Removal Methods. The existing surface shall be cleaned using one or more of the following methods to meet the requirements of Subsection 12(c):

(1) Dry Abrasive Blast Cleaning Without Vacuum

(2) Dry Abrasive Vacuum Blast Cleaning

(3) Wet Abrasive Blast Cleaning

(4) Power Tool Cleaning Without Vacuum

(5) Vacuum-Shrouded Power Tool Cleaning

If dry abrasive blast cleaning is used, it shall be performed using either expendable abrasives (other than silica sand) or recyclable steel grit abrasives. Expendable abrasives shall be used one time and disposed of.

On a daily basis, the Contractor shall verify that recycled abrasives are free of oil contamination by conducting oil content tests in accordance with SSPC-AB2.

All surfaces prepared with abrasives not meeting the SSPC-AB1, SSPC-AB2, or SSPC-AB3 requirements, as applicable, shall be solvent cleaned or low pressure water cleaned as directed by the Engineer, and re-blast cleaned at the Contractor's expense.

When metallic abrasives are used, extra care shall be given to recovering all of the abrasive from joints, horizontal surfaces, and hard to access areas to prevent rust bleed caused by fugitive abrasives.

(b) Containment Systems. The containment systems used for each method shall comply with the applicable SSPC Guide 6 classifications described below.

(1) Dry Abrasive Blast Cleaning Without Vacuum. Dry abrasive blast cleaning shall be performed inside full containment with negative pressure meeting the requirements of SSPC-Class 1A. The enclosure shall be designed, installed, and maintained to sustain maximum anticipated wind forces, including negative pressure. Flapping edges of containment materials are prohibited and the integrity of all containment materials, seams, and seals shall be maintained for the duration of the project. Airflow inside containment shall be designed to provide visibility and reduce worker exposures to toxic metals according to VOSHA regulations and as specified in the submitted Containment Plan. The minimum airflow shall be 60 cfm for down draft systems and 100 cfm for cross draft systems.

When the location of the work on the structure permits, the blast enclosure shall extend a minimum of 3 feet beyond the limits of surface preparation to allow the workers to blast away from, rather than into, the seam between the containment and the structure. The blast enclosure shall have an entrance chamber to allow entrance and exit from the enclosure without allowing the escape of blasting residue.

If recyclable metallic abrasives are used, the Contractor shall operate the equipment in a manner that minimizes waste generation. Steps shall also be taken to minimize dust generation during the transfer of all abrasive/paint debris (expendable or recyclable abrasives) for recycling or disposal. Acceptable methods include, but are not limited to vacuuming, screw or belt conveyance systems, or manual conveyance. Manual conveyance is only permitted if the work is performed inside a containment that is equipped with an operating ventilation system capable of controlling the dust that is generated.

Appropriate filtration shall be used on the exhaust air of dust collection and abrasive recycling equipment as required to comply with VDOH Lead Abatement Permit and State and Federal regulations. The equipment shall be enclosed if visible dust and debris are being emitted and/or the regulated area or high-volume monitor lead levels are not in compliance.

Areas beneath containment connection points that were shielded from abrasive blast cleaning shall be prepared by vacuum blast cleaning or vacuum-shrouded power tool cleaning after the containment is removed.

(2) Dry Abrasive Vacuum Blast Cleaning. Dry abrasive vacuum blast cleaning shall meet the containment requirements of SSPC-Class 4A. Vacuum blasting equipment shall be fully automatic and capable of cleaning and recycling the abrasive. The system shall be designed to deliver cleaned, recycled blasting abrasives and provide closed system containment during blasting. The removed coating, mill scale, and corrosion shall be separated from the abrasive and stored for disposal.

The Contractor shall ensure that the vacuum shrouds are fully engaged while the tool is in use to prevent the escape of abrasive and lead paint chips. The Contractor shall attach containment materials around and under the work area to catch and contain abrasive and waste materials in the event of an accidental escape from the vacuum shroud. This containment is in addition to the ground covers specified in Subsection 10.

It is possible that the close proximity of some structural steel members, such as the end diaphragms or end cross-frames underneath transverse deck expansion joints, preclude the use of the vacuum blasting equipment for the removal of the old paint. For surfaces that are inaccessible for the nozzles of the vacuum blasting equipment, the Contractor shall remove the paint by means of dry abrasive blast cleaning inside a fully enclosed containment structure as directed by the Engineer.

(3) Wet Abrasive Blast Cleaning. Wet abrasive blast cleaning shall be performed inside a containment structure meeting the requirements of SSPC-Class 2W or SSPC-Class 3W. The containment shall be designed, installed, and maintained in order to capture and contain all water and waste materials. The containment shall consist of impermeable floors and lower walls to prevent the water and debris from escaping. Permeable upper walls and ceilings are acceptable provided the paint chips, debris, and water, other than mists, are collected. A fine mist passing through the permeable upper walls is acceptable, provided the environmental controls specified herein are met. If paint chips, debris, or water, other than mists, escape the containment system, impermeable walls and ceilings shall be installed.

(4) Power Tool Cleaning Without Vacuum. Power tool cleaning without vacuum shall be performed inside a containment meeting the requirements of SSPC-Class 2P. The Contractor shall securely install containment walls and flooring around the work area to capture and collect all debris that is generated. The containment material requirements for this Class 2P are similar to Class 3P used for vacuum-shrouded tools, but the supporting structure will be more substantial in Class 2P to better secure the containment materials from excessive movement that could lead to the loss of waste paint chips and debris. Containment beneath the work shall be within 10 feet of the areas being cleaned, and is in addition to the ground covers specified earlier.

(5) Vacuum-Shrouded Power Tool Cleaning. Vacuum-shrouded power tool cleaning shall meet the containment requirements of SSPC-Class 3P. The Contractor shall ensure that the vacuum shrouds are fully engaged while the tool is in use to prevent the escape of abrasive and lead paint chips. The Contractor shall utilize power tools equipped with vacuums and High Efficiency Particulate Air (HEPA) filters. The Contractor shall attach containment materials such as tarps adjacent to and under the work area to catch and contain waste materials in the event of an accidental escape from the vacuum shroud. This containment is in addition to the ground covers specified earlier and shall be installed within 10 feet of the areas being cleaned.

(c) Cleaned Surface Condition. Work under this specification shall be considered complete when the surface meets the requirements of either SSPC-SP6 (for all wet or dry abrasive blast cleaning, with or without vacuum), or SSPC-SP15 (for all power tool cleaning, with or without vacuum), except that a specific surface profile is not required. However, work under other specifications (e.g. “Field Painting Steel, Three Coat System”) may require that a specific surface profile be achieved.

When viewed without magnification, the surface shall be free of all visible oil, grease, dust, dirt, mill scale, rust, coatings, oxides, corrosion products, and other foreign matter. Random staining and discoloration shall be limited to no more than 33 percent of each 9 square inches.

If no further surface preparation is required by the Contract, paint removal will be considered complete when the Engineer has determined that the requirements above have been satisfied. If other Contract items require more extensive surface preparation that exceeds the requirements of this section, the Contractor may choose to have the Engineer inspect and pay for the paint removal after meeting the requirements above, or they may choose to wait until after the additional surface preparation has been completed.

13. ENVIRONMENTAL CONTROLS AND MONITORING. The Contractor shall follow the submitted and approved Environmental Monitoring Plan. The purpose of the monitoring is to confirm that project dust and debris are not escaping the containment into the surrounding air, soil, and water.

(a) Soil and Water. The Contractor's containment systems shall be maintained to prevent the escape of paint chips, abrasives, and other debris into the water, and onto the ground, soil, slope protection, and pavements. Releases or spills of paint chips, abrasives, dust and debris on to surrounding property, structures, equipment or vehicles, and bodies of water are unacceptable. If there are inadvertent spills or releases, the Contractor shall immediately shut down the emissions-producing operations, clean up the debris, and change work practices, modify the containment, or take other appropriate corrective action as needed to prevent similar releases from occurring in the future.

At the end of each workday, at a minimum, the work area inside and outside of containment, including ground covers, shall be inspected to verify that paint debris are not present. If debris are observed, they shall be removed by HEPA-vacuuming.

Upon project completion, the ground and water in and around the project site are considered to have been properly cleaned if paint chips, paint removal media (e.g. spent abrasives), fuel, materials of construction, litter, or other project debris have been removed, even if the material being cleaned was a pre-existing condition.

(b) Visible Emissions. The Contractor shall conduct observations of visible emissions and releases on an ongoing daily basis when dust-producing activities are underway, such as paint removal, clean-up, waste handling, and containment dismantling or relocation.

If visible emissions or releases are observed, the Contractor shall immediately shut down the emission-producing operations, clean up the debris, and change work practices, modify the containment, or take other appropriate corrective action as needed to prevent similar releases from occurring in the future.

(c) Emissions Monitoring.

(1) Type I Projects. The Contractor shall conduct monitoring of both the regulated area and the ambient air in accordance with SSPC TU 7. The Contractor shall be prepared to conduct baseline and start-up monitoring and shall be prepared to conduct full time and/or complaint related monitoring as warranted. The Contractor shall verify that all calibration, sampling and laboratory analysis are conducted in a manner compliant with SSPC TU 7.

(2) Type II Projects. No monitoring of emissions is required, except as described in part (b) above, or as specified elsewhere in the Contract Documents based on site conditions.

14. HYGIENE FACILITIES. The Contractor shall provide clean lavatory and hand washing facilities according to VOSHA regulations and confirm that all employees wash hands, forearms, and face before breaks. The facilities shall be located at the perimeter of the regulated area in close proximity to the paint removal operation. Shower facilities shall be provided when workers' exposure exceed the Permissible Exposure Limit. Showers shall be located at each work site. The shower and wash facilities shall be cleaned at least daily during use.

All wash and shower water shall be filtered and containerized. The Contractor is responsible for filtration, testing, and disposal of the water.

The Contractor shall make the decontamination facilities on the project available for use by Agency personnel and other Agency representatives assigned to the project.

15. SITE EMERGENCIES.

(a) Stop Work. The Contractor shall stop work at any time the conditions are not within specifications and take the appropriate corrective action. The stoppage will continue until conditions have been corrected to the satisfaction of the Engineer. Standby time and cost required for corrective action is at the Contractor's expense. The occurrence of any of the following events shall be reported in writing to the Agency and shall require the Contractor to automatically stop lead paint removal and initiate clean-up activities:

(1) Break in containment barriers.

(2) Emissions in excess of specification or permit tolerances.

(3) Loss of negative air pressure when negative air pressure is specified (e.g. for dry abrasive blast cleaning).

(4) Serious injury within the containment area.

(5) Fire or safety emergency.

(6) Respiratory system failure.

(7) Power failure.

(b) Contingency Plans and Arrangements. The Engineer will refer to the Contingency Plan for site specific instructions in the case of emergencies. The Contractor shall post the telephone numbers and locations of emergency services including fire, ambulance, doctor, hospital, police, power company, and telephone company on the clean side of the personnel decontamination area.

A copy of the Contingency Plan shall be maintained at each work site during cleaning operations and during the time the Contractor's personnel are at the work site under this Contract. The Contractor shall designate the emergency coordinators required who shall be responsible for the activities described.

16. COLLECTION, TEMPORARY STORAGE, TRANSPORTATION, AND DISPOSAL OF WASTE.

(a) General. The Agency will not require solid waste generated by the project to be tested. However, permitting agencies, waste haulers and disposal facilities may require testing of the waste, and the Contractor shall adhere to all such requirements. All paint removal wastes shall be considered hazardous waste regardless of any test results. The Contractor and the Agency are considered to be co-generators of the waste.

The Contractor is responsible for all aspects of waste collection, testing and identification, handling, storage, transportation, and disposal according to these specifications and all applicable Federal, State, and Local regulations. Contractor personnel shall be trained in the proper handling of hazardous waste and the necessary notification and clean up requirements in the event of a spill. The Contractor shall maintain a copy of the personnel training records at each work site. The Agency will not perform any functions relating to the waste.

The Contractor is responsible for paying all taxes, fees, and permit costs associated with the removal, transportation, and disposal of waste. The Contractor is also responsible for paying any fines and undertaking any clean-up activities mandated by State or Federal environmental agencies for improper waste handling, storage, transportation, or disposal.

(b) Collection and Temporary Storage of Surface Preparation Waste. All surface preparation/paint residues within the regulated area and the containment, including spent abrasives, shall be collected at the end of the last shift each day, or every 24 hours for continuous operations. The collected waste shall be deposited in all-weather containers supplied by the Contractor as temporary storage. No residues shall remain on surfaces overnight, either inside or outside of containment. Waste materials shall not be removed through floor drains or by throwing them over the side of the bridge.

The all-weather containers shall meet requirements for the transportation of hazardous materials. The Contractor shall ensure that no breaks and no deterioration of these containers occurs and shall maintain a written log of weekly inspections of the condition of the containers. A copy of the log shall be furnished to the Engineer upon request. The containers shall be kept closed and sealed from moisture except during the addition of waste. Each container shall be permanently identified with the date that waste was placed into the container, Contract number, hazardous waste name and ID number, and other information required by the Agency of Natural Resources.

The temporary waste storage area shall be located outside of any flood plain and secure to prevent unauthorized entry or tampering with the containers. Acceptable measures include storage within a fully enclosed (e.g. fenced-in) and locked area, within a temporary building, or implementing other reasonable means to reduce the possibility of vandalism or exposure of the waste to the public or the environment (e.g. securing the lids or covers of waste containers and roll-off boxes). Waste shall not be stored outside of the containers. Flammable materials shall not be stored around or under any bridge structures.

Waste shall be collected and transferred to bulk containers, taking extra precautions as necessary to prevent the suspension of residues in air or contamination of surrounding surfaces. Precautions may include the transfer of the material within a tarpaulin enclosure. All waste storage containers shall be placed on tarpaulins. Transfer into roll-off boxes shall be planned to minimize the need for workers to enter the roll-off box.

(c) Transportation and Disposal of Surface Preparation Waste. All paint removed from the structure, together with the surface preparation media (e.g. abrasive) shall be handled as a hazardous waste, regardless of any test results. The waste shall be transported by a licensed hazardous waste transporter, treated by a permitted treatment facility to a non-hazardous special waste, and disposed of at a permitted disposal facility.

The treatment/disposal facilities shall be approved by the Engineer, and shall hold an ANR permit for waste disposal and waste stream authorization for the cleaning residue. The ANR permit and waste stream authorization must be obtained prior to beginning cleaning, except that if necessary, limited paint removal will be permitted in order to obtain samples of the waste for the disposal facilities. The waste shall be shipped to the facility within 90 calendar days of the waste generation. Arrangements for the final waste pickup shall be made with the waste hauler by the time paint removal operations are completed, or as required to meet the 90 day limit.

The Contractor shall prepare a manifest approved by ANR for off-site treatment and disposal before transporting the hazardous waste off-site. The Contractor shall prepare a land ban notification for the waste to be furnished to the disposal facility. The Contractor shall obtain the handwritten signature of the initial transporter and date of the acceptance of the manifest. The Contractor shall send one copy of the manifest to ANR within two working days of transporting the waste off-site. The Contractor shall furnish the generator copy of the manifest and a copy of the land ban notification to the Engineer. The Contractor shall give the transporter the remaining copies of the manifest.

(d) Waste Water. Waste water generated from washing the structure, hygiene purposes, and cleaning of equipment shall be filtered on site to remove particulates and disposed of at a Publicly Owned Treatment Works (POTW) according to State regulations. The Contractor shall provide the Engineer with a letter from the POTW indicating that they will accept the waste water. If the POTW allows the filtered water to be placed into the sanitary sewer system, the Contractor shall provide a letter from the POTW indicating that based on the water test results, disposal in the sanitary sewer is acceptable to them. Water shall not be disposed of until the above letters are provided to, and accepted by, the Engineer.

(e) Other Project Waste. All other project waste shall be removed from the site according to Federal, State, and Local regulations, with all waste removed from the site prior to final Contractor demobilization.

The Contractor shall make arrangements to have other hazardous waste generated by the Contractor, such as used paint solvent, transported to the Contractor's facility at the end of each day that the waste is generated. These hazardous wastes shall be manifested using the Contractor's own generator number to a treatment or disposal facility from the Contractor's facility. The Contractor shall not combine solvents or other wastes with cleaning residue wastes. All waste streams shall be stored in separate containers.

17. METHOD OF MEASUREMENT. The quantity of Special Provision (Removal, Containment, and Disposal of Lead Paint) of the type specified to be measured for payment will be on a lump sum basis in the complete and accepted work.

18. BASIS OF PAYMENT. The accepted quantity of Special Provision (Removal, Containment, and Disposal of Lead Paint) of the type specified will be paid for at the Contract lump sum price. Payment will be full compensation for performing the work specified, including construction of a work platform, construction of a containment structure, and removal of the existing paint; soil, water, and air monitoring; collection, temporary storage, transportation, testing, and disposal of all project waste; and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Payment will be made as follows:

(a) The first payment of 30% of the Contract unit price will be paid when all submittal requirements have been met and accepted by the Agency, and the Contractor is fully mobilized to begin work.

(b) An additional 30% of the Contract unit price will be paid when 50% of the paint has been removed.

(c) An additional 30% of the Contract unit price will be paid when 100% of the paint has been removed.

(d) The final 10% of the Contract unit price will be paid when the Contractor has fully demobilized the containment equipment and properly disposed of the waste to the satisfaction of the Engineer. The Engineer may elect to withhold the final 2% of the Contract unit price until the hazardous waste tax has been paid.

Payment will be made under:

Pay Item	Pay Unit
900.645 Special Provision (Removal, Containment, and Disposal of Existing Paint)(Type II)	Lump Sum

STRUCTURAL STEEL REPAIRS, END FLOORBEAM CRACK

1. DESCRIPTION. This work shall consist of furnishing and installing steel angles, high strength bolts, and hardware as shown on the Plans to replace the existing connection between the girder and end floorbeam web at the southwest corner of the Suspended Span. This work shall also consist of the reaming out the existing crack arrest holes at the same location to an increased diameter as shown on the Plans, and as directed by the Engineer.

   The work under this Section shall be performed in accordance with these provisions, the Plans, and Sections 506 and 529 of the Standard Specifications as herein modified.

2. MATERIALS. Materials to replace the existing connection between the girder and end floorbeam web shall conform to the requirements of Subsection 506 of the Standard Specifications with the following specific material requirements:

   (a) Hardware shall be ASTM 325 high Type 1 strength bolts, nuts and washers shall be in compliance with Subsection 714.05.

   (b) Zinc rich paint shall be on hand for touch ups in compliance with Subsection 726.08.

3. FABRICATION DRAWINGS. Fabrication drawings shall be prepared and submitted in conformance with requirements of Section 506 of the Standard Specifications, and as follows:

   Shop drawings outlining the proposed crack repair procedure shall be submitted to the Engineer for review.

4. FABRICATION. Fabrication shall conform to the requirements of Section 506 of the Standard Specifications.

5. INSTALLATION. Installation of the proposed steel connection angles and hardware, as well as the reaming out of the existing crack arrest holes, shall conform to the requirements of Section 506 of the Standard Specifications, and as follows:

   The end floorbeam crack repair shall be coordinated so that it is performed when live load has been removed from that half of the structure.

6. METHOD OF MEASUREMENT. The quantity of Special Provision (Structural Steel Repairs, End Floorbeam Crack) to be measured for payment will be on a lump sum basis in the complete and accepted work.

7. BASIS OF PAYMENT. The accepted quantity of Special Provision (Structural Steel Repairs, End Floorbeam Crack) will be paid for at the Contract lump sum price for the respective items. Payment will be full compensation for the materials specified, and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Payment will be made under:

Pay Item	Pay Unit
900.645 Special Provision (Structural Steel Repairs, End Floorbeam Crack)	Lump Sum

STRUCTURAL STEEL REPAIRS, WELD REMOVAL

1. DESCRIPTION. This work shall consist of removing the existing welds on the Suspended Span exterior beams bottom flanges at the existing connection of the bridge railing to the beams as shown on the Plans. It also includes any repairs required to the Suspended Span beams base metal during the weld removal.

   The work under this Section shall be performed in accordance with these provisions, the Plans, and Sections 506 and 529 of the Standard Specifications as herein modified.

2. MATERIALS. Materials for any repairs required to the existing Suspended Span exterior beams during weld removal shall conform to the requirements of Subsection 506 of the Standard Specifications.

3. FABRICATION DRAWINGS. Contractor is required to submit a weld removal procedure for review and approval by VTrans and the Engineer. This procedure shall include that all operators will be expected to perform mock ups on scrap metal following the approved procedure and demonstrating their competence.

4. INSTALLATION. Weld removal procedures shall be prepared in compliance with Section 506 of the VTrans Standard Specifications and AWS, and submitted for review along with certifications for the workers performing the weld removal. All operators shall be D1.5 certified welders and be on the VTrans Pre-qualified welder list.

   Any repairs to base metal required as a result of errors during weld removal shall also be developed in accordance with Section 506 of the VTrans Standard Specifications and AWS, and submitted for review and approval along with certifications for the workers performing the repairs.

5. METHOD OF MEASUREMENT. The quantity of Special Provision (Structural Steel Repairs, Weld Removal) to be measured for payment will be on a lump sum basis in the complete and accepted work. The lump sum shall include all labor, materials, access, tools, equipment and incidentals to complete the work.

6. BASIS OF PAYMENT. The accepted quantity of Special Provision (Structural Steel Repairs, Weld Removal) will be paid for at the Contract lump sum price for the respective items. Payment will be full compensation for the materials specified, and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

   Payment will be made under:

Pay Item	Pay Unit
900.645 Special Provision (Structural Steel Repairs, Weld Removal)	Lump Sum

TEMPORARY ACCESS ROAD AND BULKHEAD

1. DESCRIPTION. This work shall consist of constructing temporary access roads and bulkhead, and associated staging and work areas for accessing all necessary components of the bridge as shown and described on the Contract Plans, and restoring the disturbed areas to their original condition in accordance with the Plans and as directed by the Engineer.

   This item is included in the Contract to provide the Contractor with a permitted means of water access for construction activities; however, this work is not prescriptive and access to complete the project scope is part of the Contractor's means and methods. If this item is determined to be unnecessary by the Contractor due to alternative means and methods, it does not need to be included in the scope of the project and payment for this item will not be made as part of this contract.

2. MATERIALS. The Contractor may use the materials specified on the Contract Plans or otherwise authorized by the Engineer. Fill materials used for access to and travel along the shoreline must be able to support construction equipment loads and must not be detrimental to the existing condition of any existing utilities, US Route 2 and/or Lake Champlain. Embankments modified for the temporary access or staging shall be reconstructed to match their existing grade and condition using existing material where possible, augmented by fill, stone fill, loam, seed, mulch, fertilizer, lime and temporary erosion matting.

   The impervious separation barrier shall be puncture proof and of sufficient strength/durability to prevent intermixing/contamination of fill above and below the geotextile. The physical barrier shall require no excavation of existing lakebed sediment for installation or removal and shall be rated to withstand the expected loading forces exerted by the construction of the access road so that it does not tear or break during installation use or removal, or result in comingling fill with sediment. Prior to use, the impervious separation barrier shall be approved by the Engineer.

   The proposed steel sheet piling to define the bulkhead limits shall conform to the material requirements of Section 505.

3. GENERAL REQUIREMENTS. Prior to construction, the Contractor shall submit to the Engineer site-specific plans, including proposed temporary access road, bulkhead design, staging area, and structural, dewatering, environmental, restoration, geotechnical, and maintenance details associated with the work.

   These plans shall also include limits for temporary construction and locations of erosion prevention and sediment control measures in the project areas affected by temporary access road and staging area construction. All work shall be performed within the Temporary Construction Limits.

   The temporary access roads, bulkhead, and work area must be kept within the Temporary Construction Limits as indicated on the Contract Plans. Staging Areas for heavy equipment shall be completed without excavation adjacent to existing abutments.

Prior to construction, the Contractor shall place the impervious separation barrier on the existing slope to delineate the boundary between existing fill and fill associated with the access road. It is the Contractor's responsibility to anchor the impervious separation barrier below the water surface so that the impervious separation barrier lies flush against the bank of the lake. The Contractor shall take care as to not remove existing fill beyond the impervious separation barrier when restoring the slope to its existing condition.

The impervious separation barrier separates the proposed fill for the temporary access road and bulkhead from the potentially contaminated soil below. If there is any intermingling of soils during removal of the temporary access road due to puncturing or tearing of the impervious separation barrier, then the soil must be handled in accordance with the Soil Management Plan requirements at no additional cost to VTrans.

The roadway will remain active throughout the construction period.

Construction drawings of the temporary access roads, bulkhead, and staging areas shall be submitted in accordance with Subsection 505.03(d). All work and material required within the limits of the temporary access roads and staging areas, except for stone fill, topsoil, seed, mulch, lime, fertilizer and temporary erosion matting required to re-establish grade and conditions, is considered incidental to this special provision.

Primary access to the contract work shall be via US Route 2. The Contractor shall ensure that access points to the roadway and the bulkhead are sufficient to support any heavy equipment to be used. Modifications to access locations, such as the construction of stabilized construction entrances, clearing of brush or similar, may be necessary. This work shall be coordinated with the Agency or private property owners. An agreement between the property owner for access and improvements is required to be obtained by the contractor.

Filter bags will likely be required within the temporary access road and bulkhead during bridge deck replacement operations. Installation of check dams or similar to prevent erosion due to flows from the filter may be required. Costs for filter bags and check dams will be paid for separately under the respective pay items and installed as detailed on the EPSC detail sheets of the contract plans.

It shall be incumbent upon the Contractor to determine the level of protection required to protect the work. However, the protection of existing facilities, structures, and property must also be undertaken and any damage thereto shall be repaired by the Contractor at no additional expense to the State.

It shall be the responsibility of the Contractor to adhere to the permitting requirements and IWWR on the project, and for obtaining any variances.

Furnishing and installing Stone Fill shall be in conformance with the requirements of Section 613.

4. METHOD OF MEASUREMENT. The quantity of Special Provision (Temporary Access Road and Bulkhead) to be measured for payment will be on a lump sum basis in the complete and accepted work.

5. BASIS OF PAYMENT. The accepted quantity of Special Provision (Temporary Access Road and Bulkhead) will be paid for at the Contract lump sum price. Payment will be full compensation for preparing a site plan; obtaining all required permits and necessary property owner agreements; designing, constructing, and removing the temporary access road and associated staging areas at the location(s) specified; performing any necessary excavation; installation of sheet piling or temporary support of excavation measures dependent upon Contractor means and methods, installing geotextile fabric separator, restoring the site to its original condition within the limits defined on the plans; and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work. No work outside the permitted limits shown on the plans for the Temporary Access Road and Bulkhead limits shall be allowed.

Payment for materials, including erosion prevention and sediment control measures, structural support, stone fill, dense graded crushed stone, and geotextiles, associated with the work and not paid for under a separate Contract item will be considered incidental to Special Provision (Temporary Access Road and Bulkhead).

Partial payments will be made as follows:

(a) An initial payment of 60% of the Contract lump sum price will be made upon satisfactory construction of the temporary access road, bulkhead, and/or staging area.

(b) The remaining 40% of the Contract lump sum price will be paid upon removal of the temporary access road, bulkhead and/or staging area; restoration of the work area outside the final work limits; cleaning up of the temporary staging area; and establishment of vegetation, all to the satisfaction of the Engineer.

Payment will be made under:

Pay Item	Pay Unit
900.645 Special Provision (Temporary Access Road and Bulkhead)	Lump Sum

REMOVE AND REPLACE NAVIGATION LIGHTING SYSTEM

1. DESCRIPTION. This work shall consist of replacing the existing navigation lighting system (conduit, pull boxes, junction boxes, navigation lights, etc.) on the bridge, as well as any temporary lighting system required during construction to accommodate staging and work zone access.

   Furnish and install navigation lighting system, including all wiring, conduit, wiring devices, transformers, enclosures, grounding system, controls, protective devices, lights, etc., as shown in the Plans and in compliance with Code of Federal Regulations (CFR), Title 33, Part 118, which is further clarified in U.S. Coast Guard (USCG) Publication "A Guide to Bridge Lighting". Navigation lights must operate from sunset to sunrise and during periods of low visibility. The proposed navigation lights shall be 180-degree 'Pilot'-style lights that comply with the requirements of Code of Federal Regulations (CFR), Title 33, Part 118 for a 'Single Span - Fixed Bridge'. They shall match the proposed dimensions as shown on the Plans to allow for maintenance access from the bridge deck via chain pull.

   The proposed conduit, junction boxes, and pull boxes shall be replaced in compliance with Section 678, as well as in compliance with the procured navigation lights manufacturer recommendations.

   Also included in this scope of work is furnishing and installing the proposed navigation lighting system conduit supports and all hardware attachments as shown on the Plans and per the manufacturers recommendations for the components (i.e. lights, junction boxes, etc.). All steel attachment components and hardware shall comply with the requirements of Section 506, and associated material specifications. All proposed steel components shall either be painted with a three coat system, galvanized, or stainless steel.

2. CONSTRUCTION REQUIREMENTS. The Contractor shall remove and replace lighting assembly components in such a manner that there is always navigation lighting provided in the Suspended Span that meets the federal requirements.

3. METHOD OF MEASUREMENT. The quantity of Special Provision (Remove and Replace Navigation Lighting System) to be measured for payment will be lump sum for the complete and accepted work.

4. BASIS OF PAYMENT. The accepted quantity of Special Provision (Remove and Replace Navigation Lighting System) will be paid for at the Contract unit price per lump sum. Payment will be full compensation for removing and replacing the light fixtures and conduit, and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work. The lighting conduit supports detailed on the Plans are considered incidental to this item.

Payment will be made under:

Pay Item	Pay Unit
900.645 Special Provision (Remove and Replace Navigation Lighting System)	Lump Sum

IMPERVIOUS SEPARATION BARRIER

1. DESCRIPTION. This work shall consist of furnishing and placing non-biodegradable indicator fabric over areas with Category-3 soils that have been disturbed or excavated. Non-biodegradable indicator fabric shall be placed over Category-3 contaminated soil and below the engineered soil cap. It shall function as a warning indicator during future excavation and to mitigate erosion or migration of contaminated soil.

2. MATERIALS. Non-biodegradable indicator fabric shall be a nonwoven, needle-punched product. The fabric shall be a bright orange color (or similar) and shall be resistant to ultraviolet and biological deterioration, rotting, and naturally encountered bases and acids. The geotextile shall be puncture resistant and of sufficient strength/durability to prevent intermixing/contamination of fill above and below the geotextile. Please see the table below for more information:

Geotextile Property	Test Method	Required Thresholds
Elongation Criteria at Failure	ASTM D 4632 / D 4632 M	50%
Grab Tensile Strength (lbs)	ASTM D 4632 / D 4632 M	200 min,
Static (CBR) Puncture (lbs)	ASTM D 6241	535 min.
Trapezoidal Tear Strength (lbs)	ASTM D 4533 / D 4553 M	80 min.
Apparent Opening Size (mm)	ASTM D 4751	80 max.
Permiitivity (sec^{-1}) (minimum)	ASTM D 4491 / D 4491 M	1.35
UV Resistance (% Strength Retained)	ASTM D 4533 / D 4553 M	70% at 500 hrs
Woven/Nonwoven	N/A	Nonwoven

3. METHOD OF MEASUREMENT. The quantity of Special Provision (Impervious Separation Barrier) to be measured for payment will be the number of square yards placed in the completed and accepted work.

4. BASIS OF PAYMENT. The accepted quantity of Special Provision (Impervious Separation Barrier) will be paid for at the Contract unit price per square yard. Payment will be full compensation for performing the work specified and for furnishing all materials, labor, tools, equipment, and incidentals necessary to complete the work.

Payment will be made under:

Pay Item	Pay Unit
900.675 Special Provision (Impervious Separation Barrier)	Square Yard

BITUMINOUS CONCRETE PAVEMENT, SMALL QUANTITY

1. DESCRIPTION. This work shall consist of constructing one or more courses of bituminous mixture on a prepared foundation in accordance with these specifications and the specific requirements of the type of surface being placed, and in reasonably close conformity with the lines, grades, thicknesses, and typical cross sections shown on the Plans or established by the Engineer.

   The work under this Section shall be performed in accordance with these provisions, the Plans, and the appropriate provisions of Section 406 of the Standard Specifications, except as modified below.

2. REQUIREMENTS FOR SUPERPAVE BITUMINOUS MIXTURES.

   (a) Acceptance Testing. For evaluating mixtures and pavement produced under this special provision, the following acceptance practices replace the acceptance testing listed in Subsection 406.03C and Subsection 406.14(a) with the procedures listed below and the criteria specified in Table 1.

      (1) Sampling. The material will be sampled at the frequency specified by the Engineer, but in no case shall the frequency be less than that specified in Table 1. Each sample or lot will be considered representative of a particular quantity of material outlined in Table 1, or as determined by the Engineer.

      (2) Acceptance Quality Characteristics. For items listed as Acceptance Quality Characteristics (AQC), if the material meets or exceeds the Acceptable Quality Level (AQL), it will be deemed compliant, and subject to a pay adjustment that is positive or zero. If any AQC fails to meet the Rejectable Quality Level (RQL), the material will be deemed unacceptable, and shall be rejected unless otherwise directed by the engineer. Test results that fall between the AQL and RQL will be deemed acceptable and subject to negative pay adjustment.

      (3) Pay Factors. When they are included in the Contract, the following pay factors will apply to all accepted material, except as noted below:

         a. Mixture Properties Pay Factor (PF_{MP}). This pay factor will be calculated based on air voids. Box samples will be subject to full Pay Factor determination.

b. Mat Density Pay Factor (PF_{MD}). This pay factor does not apply to material used for leveling courses, side roads, independent shoulders paved separately, or handwork. The Engineer may elect to waive the pay factor for other material at their discretion. Cores will not be taken within 6 inches of a longitudinal joint or within 50 feet of a transverse joint, except on bridges. Bridge decks or approaches will not be cored within 10 feet of a bridge joint or transverse joint, and bridges less than or equal to 20 feet in length will not be cored.

(4) Rounding and Reporting of Values. Results from all calculations shall be rounded and reported as specified below:

a. Report all pay factors to 0.0001 and all pay adjustments to 0.01. For intermediate calculations used to obtain pay factors and pay adjustments, Quality Indices shall be rounded to 0.01, and all other values should retain the maximum available precision.

b. For rounding, the use of AASHTO Rounding Rule D shall not be permitted. Instead, when rounding, if the first digit to the right of the number to be rounded is greater than or equal to 5, then the number shall be rounded away from zero to the next number with larger magnitude. If the digit to the right of the number to be rounded is less than 5, then the number shall remain the same.

For example, for rounding to the nearest one decimal (0.1):

5.35 rounds to 5.4 -5.35 rounds to -5.4

5.34 rounds to 5.3 -5.34 rounds to -5.3

TABLE 1 – Acceptance Quality Characteristics

Quality Characteristic	Min. Sampling Frequency	Evaluation Method	Type of Criteria	Lower Specification Limit (LSL)	Upper Specification Limit (USL)	AQL	RQL
Air Voids	1 per 500 tons	Single Test Deviation	Acceptance	JMF–1.0%	JMF+1.0%	D = 0	D = -1
Mat Density – All Courses	Minimum 4 per paving course, 1 per 500 tons	PWL	Acceptance	91%	-	PWL = 80	PWL = 50

(5) Evaluation Method.

a. Single Test Deviation. The value obtained from the tested sample will be compared to the JMF, USL and LSL using the following formulas.

$$D = 1 - \frac{|TR - JMF|}{0.5(USL - LSL)}$$

where:

D = Deviation of the sample from the specification limits.

TR = Sample test result

JMF = Job mix formula

USL = Upper specification limit

LSL = Lower specification limit

c. Percent Within Limits. Determination performed in accordance with Subsection 406.03C(d).

(6) Pay Factor Determination.

a. Mixture Properties Pay Factor. Once the Deviation for Air Voids has been determined, the Mixture Properties Pay Factor for acceptable material will be calculated using the formula below.

$$PF_{MP} = 0.1D_{AV}$$

where:

PF_{MP} = Mixture Properties Pay Factor

D_{AV} = Deviation for Air Voids

b. Mat Density Pay Factor. Once the PWL for Mat density has been determined, the Mat Density Pay Factor for acceptable material will be calculated using the formula below.

For $80\% \leq PWL_{MD} \leq 100\%$

$$PF_{MD} = 0.00150\, PWL_{MD} - 0.1200$$

For $80\% \leq PWL_{MD} < 50\%$

$$PF_{MD} = 0.0050\, PWL_{MD} - 0.4000$$

where:

PWL_{MD} = Total percent within specification limits for mat density

PF_{MD} = Mat Density Pay Factor

3. METHOD OF MEASUREMENT. The quantity of Special Provision (Bituminous Concrete Pavement, Small Quantity) to be measured for payment will be the number of tons for a lot of mixture (each type) complete in place in the accepted work (Q) as determined from the weigh tickets.

   The quantities of all applicable Pay Adjustments calculated for the project will be determined as specified below.

   When applicable, the measured quantity of Special Provision (Bituminous Concrete Pavement, Small Quantity) placed (Q) will be multiplied by the Mixture Properties Pay Factor, (PF_{MP}), and the Contract Bide Price (B), to determine a Mixture Pay Adjustment, (PA_{MP}) as follows:

   $$PA_M = PF_{MP} \times Q \times B$$

   When applicable, the measured quantity of Special Provision (Bituminous Concrete Pavement, Small Quantity) placed (Q) will be multiplied by the Mat Density Factor, (PF_{MD}), and the Contract Bide Price (B), to determine a Mat Density Pay Adjustment, (PA_{MD}) as follows:

   $$PA_D = PF_{MD} \times Q \times B$$

4. BASIS OF PAYMENT. The measured quantity of Special Provision (Bituminous Concrete Pavement, Small Quantity) will be paid for at the Contract unit price per ton. Payment shall be full compensation for furnishing, mixing, hauling, and placing the material specified and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

   Payment for Pay Adjustments shall be debited against the Contract prices (lump units) bid for the Pay Adjustment items.

   The cost of repairing core areas will not be paid for separately but will be considered incidental to Special Provision (Bituminous Concrete Pavement, Small Quantity).

   The costs of furnishing testing facilities and supplies at the plant will be considered included in the Contract unit price of Special Provision (Bituminous Concrete Pavement, Small Quantity).

   The costs associated with obtaining samples for acceptance testing will be incidental to the cost of Special Provision (Bituminous Concrete Pavement, Small Quantity).

When not specified as items in the Contract, the costs of correcting deficiencies in the existing pavement, cleaning and filling joints and cracks, sweeping and cleaning existing paved surfaces, the emulsified asphalt applied to tack these surfaces, and tacking of manholes, curbing, gutters, and other contact surfaces will not be paid for directly, but will be incidental to Special Provision (Bituminous Concrete Pavement, Small Quantity).

Special Provision (Bituminous Concrete Pavement, Small Quantity) mixture approved by the Engineer for use in correcting deficiencies in the aggregate subbase or base course constructed as part of the Contract will not be paid for as Special Provision (Bituminous Concrete Pavement, Small Quantity), but will be incidental to the Contract item for the specified type of base course.

Special Provision (Bituminous Concrete Pavement, Small Quantity) mixture used to correct deficiencies in an existing pavement or to adjust the grade of a bituminous concrete surface completed under the Contract will be paid for at the Contract unit price for Special Provision (Bituminous Concrete Pavement, Small Quantity).

Payment will be made under:

Pay Item		Pay Unit
900.650	Special Provision (Mat Density Pay Adjustment, Small Quantity) (N.A.B.I.)	Lump Unit
900.650	Special Provision (Mixture Pay Adjustment) (N.A.B.I.)	Lump Unit
900.680	Special Provision (Bituminous Concrete Pavement, Small Quantity)	Ton