Bid Number YY.XXXXX

Hansen Number XXXXX

SPECIAL PROVISIONS

MONTH 20XX

**PROJECT NAME**

PREPARED FOR:

CITY OF LAS VEGAS

PREPARED BY:

CONSULTANT

FUNDED BY:

LIST FUNDING SOURCES

**PROJECT NAME**

**SPECIAL PROVISIONS**

The following special provisions supplement and modify the "Uniform Standard Specifications for Public Works' Construction Off-site Improvements Clark County Area Nevada", most current edition; and the "Uniform Standard Drawings for Public Works' Construction Off-site Improvements Clark County Area Nevada, Volume I, and Volume II, along with revisions thereto, also referred to as the "Standard Specifications" and "Standard Drawings". Said Standard Specifications and Standard Drawings are hereby incorporated into these Special Provisions.

***NOTE: THE ENGINEERS’ APPROVAL AND SUBSEQUENT SEAL IS LIMITED TO THE FOLLOWING PORTIONS OF THESE DOCUMENTS AS PREPARED BY OR UNDER THE DIRECT SUPERVISION OF THE ENGINEER:***

1. ***SPECIAL PROVISIONS, PAGES SP-100-1 THROUGH SP-XXX-XX***
2. ***BID SCHEDULE PAGE(S) – ATTACHMENT A***

***ALL OTHER ATTACHMENTS, INCLUSIONS, ENCLOSURES, SCHEDULES, FORMS, GRAPHICS, ETC. WERE PREPARED BY OTHERS AND NOT UNDER THE DIRECT SUPERVISION OF THE ENGINEER.***

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SECTION 100 – GENERAL PROJECT REQUIREMENTS

**100.01 REFERENCE SPECIFICATIONS AND DRAWINGS**

A. Work specified herein shall conform to or exceed the requirements of all applicable codes and the applicable requirements of the following documents to the extent that the provisions of such documents are not in conflict with the requirements of these Special Provisions or the applicable codes. Wherever references are made in the contract, standards or codes in accordance with which work under this contract is to be performed or tested, the latest edition or latest revision(s) of the standards or codes shall apply.

B. The following standards and codes are an integral part of the contract and are incorporated herein by reference. The Contractor is advised to become familiar with the contents of the “Uniform Standard Specifications”, “Special Provisions” and the “Uniform Standard Drawings”, as they shall govern the construction of this Project. Work on any public utility shall be performed in accordance with the Uniform Standard Specifications and Drawings except where modified by the utilities’ own standards.

C. **“Uniform Standard Specifications for Public Works Construction Off-Site Improvements, Clark County Area, Nevada”**, also referred to as the “Uniform Standard Specifications” or “USS”. All of the requirements and provisions of said Uniform Standard Specifications shall apply except where otherwise provided herein or otherwise shown on the Contract Drawings. There may be recently adopted changes to the Uniform Standard Specifications and the Contractor should be aware of these before he submits a bid. Copies may be obtained from the Regional Transportation Commission of Southern Nevada, 600 S. Grand Central Parkway, Suite 350, Las Vegas, Nevada 89106 or online at www.rtcsouthernnevada.com

D. **“Uniform Standard Drawings for Public Works Construction, Clark County Area, Nevada Volume I and Volume II”**, also referred to as the “Uniform Standard Drawings” or “USD” and shall be adhered to except where otherwise provided herein or otherwise shown on the Contract Drawings. Copies may be obtained from the Regional Transportation Commission of Southern Nevada, 600 S. Grand Central Parkway, Suite 350, Las Vegas, Nevada 89106 or online at www.rtcsouthernnevada.com

E. **“Manual on Uniform Traffic Control Devices”**, also referred to as “MUTCD” and shall be adhered to except where otherwise provided herein or otherwise shown on the Contract Drawings. Copies may be obtained from the U.S. Government Printing Office, Washington, D.C. 20402 or online at mutcd.fhwa.dot.gov

F. **“State of Nevada Department of Transportation Standard Specifications for Road and Bridge Construction”**, also referred to as the “NDOT Standard Specifications” or the “State of Nevada Standard Specifications” and shall be adhered to when specifically referenced herein or as shown on the Contract Drawings. NDOT is located at 123 E. Washington Blvd., Las Vegas, Nevada 89101; Phone (702) 385-6500 or online at www.nevadadot.com/business/contractor/standards/

G. **“State of Nevada Department of Transportation Standard Plans for Road and Bridge Construction”**, also referred to as the “NDOT Standard Drawings” or the “State of Nevada Standard Plans” and shall be adhered to when specifically referenced herein or as shown on the Contract Drawings. NDOT is located at 123 E. Washington Blvd., Las Vegas, Nevada 89101; Phone (702) 385-6500 or online at www.nevadadot.com/business/contractor/standards/.

H. **“Nevada Work Zone Traffic Control Handbook”**, also referred to as the “Work Zone Handbook”. Copies may be obtained from Lisa Cody, University of Reno Nevada, (775) 784-1433.

I. **“American Society for Testing and Materials”**, also referred to as the “ASTM”. ASTM is located at 100 Barr Harbor Drive, Conshohocken, Pennsylvania, 19428-2959; Phone (610) 832-9585 or online at www.astm.org

J. **“Uniform Design and Construction Standards for Water Distribution Systems”**, also referred to as the “Water District Standards” or “UDACS”. Copies may be obtained from the Las Vegas Valley Water District, 1001 South Valley View Boulevard, Las Vegas, Nevada 89153 or online at http://www.lvvwd.com/html/eng\_udacs.html

K. **“LVVWD Design Guidance Documents”**, Copies may be obtained from the Las Vegas Valley Water District, 3700 W. Charleston Blvd., Las Vegas, Nevada 89153.

L. **“Design and Construction Standards for Wastewater Collection Systems – Southern Nevada Current Edition”**, also referred to as the ”Sewer Specifications” or “DCSWCS”. Issued by the Clark County Water Reclamation District, 5857 E. Flamingo Blvd., Las Vegas, Nevada, 89122; Phone (702) 668-8160.

**END OF SECTION 100**

SECTION 101 – DEFINITIONS AND TERMS

***DELETE SUBSECTION 101.01 BLANK AND REPLACE WITH THE FOLLOWING:***

**101.01 ABBREVIATIONS**

|  |  |
| --- | --- |
| AGA | American Gas Association |
| AI | The Asphalt Institute |
| AIEE | American Institute of Electrical Engineers |
| AISI | American Iron and Steel Institute |
| AMS | Arterial Management System (Operated by FAST) |
| ANSI | American National Standards Institute |
| API | American Petroleum Institute |
| ASHRAE | American Society of Heating, Refrigerating and Air Conditioning Engineers |
| ATSSA | American Traffic Safety Services Association |
| CCAUSD | Clark County Area Uniform Standard Drawings |
| CDCA | Communications Distribution Cable Assembly |
| CFR | Code of Federal Regulations |
| CFO | CLV Fiber Optic |
| CLV | City of Las Vegas |
| CPM | Critical Path Method |
| CRSI | Concrete Reinforcement and Steel Institute |
| EPA | Environmental Protection Agency (USA) |
| FAST | Freeway and Arterial System of Transportation (AMS and FMS Operator) |
| FMS | Freeway Management System (Operated by FAST) |
| IMSA | International Municipal Signal Association |
| IPCEA | Insulated Power Cable Engineers’ Association |
| ITB | Instructions to Bidders |
| ITS | Intelligent Transportation System |
| NBFU | National Board of Fire Underwriters |
| NCPI | National Clay Pipe Institute |
| NDEP | Nevada Department of Environmental Protection |
| NDOT | Nevada Department of Transportation |
| NOAA | National Oceanic and Atmospheric Administration |
| NPDES | National Pollutant Discharge Elimination System |
| NRS | Nevada Revised Statutes |
| OSHA | Occupational Safety and Health Standards |
| PCA | Portland Cement Association |
| SSPC | Steel Structures Painting Council |
| TED | CLV Transportation Engineering Division |
| TEFO | CLV Traffic Engineering Field Operations |
| TELECOM | CLV Roadside Infrastructure Telecommunications Cabinet |
| TIA | Telecommunications Industry Association |
| UBC | Uniform Building Code, International Conference of Building Officials |
| USS | Uniform Standard Specifications for Public Works’ Construction Off-Site Improvements, Clark County Area Nevada |
| USD | Uniform Standard Drawings for Public Works’ Construction Off-Site Improvements, Clark County Area Nevada, Volumes I & II |

**101.02 ADDENDUM**

***DELETE THIS SUBSECTION IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:***

Refer to the INSTRUCTIONS TO BIDDERS section IT B 1 Definitions of the Bid Documents.

**101.06 BASE COURSE**

***DELETE THIS SUBSECTION IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:***

A. The layer or layers of specified or selected material of designated thickness on a subgrade to support a surface course.

**101.07 BIDDER**

***DELETE THIS SUBSECTION IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:***

Refer to the INSTRUCTIONS TO BIDDERS section ITB 1 Definitions of the Bid Documents.

**101.11 CONTRACT CHANGE ORDER OR FIELD CHANGE ORDER**

***DELETE THIS SUBSECTION IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:***

**101.11 CHANGE ORDER AND CONSTRUCTION CHANGE DIRECTIVE**

A. Change Order means a written order issued by the Owner to the Contractor after execution of the Contract that authorizes a change in the Work, Contract Amount or Contract Time. Except as allowed by the Contract Documents, the Contract Amount or Contract Time may be changed only by the issuance of a Change Order. The execution of the Change Order indicates the Contractor’s agreement to the terms set forth therein including the adjustment, if any, in the Contract Amount or Contract Time.

B. Construction Change Directive means a written order issued by the Owner to the Contractor directing immediate changes in the Work for which a modification to the Contract Amount, Contract Time or other provision of the Contract may be appropriate but may not have been negotiated at the time of issuance. The Contractor is to proceed immediately with the implementation of the Construction Change Directive.

**101.13 CONTRACT**

***DELETE THIS SUBSECTION IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:***

A. Refer to the INSTRUCTIONS TO BIDDERS section ITB 1 Definitions of the Bid Documents.

**101.16 CONTRACTOR**

***DELETE THIS SUBSECTION IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:***

A. Refer to the INSTRUCTIONS TO BIDDERS section ITB 1 Definitions of the Bid Documents.

**101.17 CONTRACT TIME**

***DELETE THIS SUBSECTION IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:***

A. Refer to the INSTRUCTIONS TO BIDDERS section ITB 1 Definitions of the Bid Documents.

**101.40 NOTICE TO PROCEED**

***DELETE THIS SUBSECTION IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:***

A. Refer to the INSTRUCTIONS TO BIDDERS section ITB 1 Definitions of the Bid Documents.

**101.50 QUALITY ASSURANCE (QA)**

***DELETE THIS SUBSECTION IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:***

* 1. Planned and systematic operations conducted to ensure that the operations and/or product meets specifications. QA encompasses the Engineer’s review and oversight of the Contractor’s “Quality Control”; verifying the results of “Quality Control”; and inspecting for conformance to plans and specifications. QA is the responsibility of the “Engineer.”

**101.51 QUALITY CONTROL (QC)**

***DELETE THIS SUBSECTION IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:***

* 1. Planned and specified operations necessary to construct items that will meet the requirements for quality and performance as specified. QC includes, but should not be limited to material testing, controlling the quality of raw materials, produced materials assemblies, components, finished product, and construction process. QC is the responsibility of the “Contractor.”

**101.58 SPECIAL PROVISIONS**

***DELETE THIS SUBSECTION IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:***

A. Special Provisions mean the written descriptions of the requirements for the Work incorporated as a part of the Contract.

**101.61 SUBCONTRACTOR**

***DELETE THIS SUBSECTION IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:***

A. Refer to the INSTRUCTIONS TO BIDDERS section ITB 1 Definitions of the Bid Documents.

***ADD THE FOLLOWING SUBSECTIONS TO THIS SECTION:***

**101.80 ACTIVITY-ON-NODE (AON)**

A. A format for illustrating a network diagram where activities are represented by nodes, and arrows are used to show the precedence relationships. AON format is utilized in Precedence Diagramming.

**101.81 AGENCY**

A. The governing body to which a work or facility will be dedicated upon successful completion. Agency may be one or more of the following entities: City of Las Vegas, Nevada; City of North Las Vegas, Nevada; Las Vegas Valley Water District, Las Vegas, Nevada; Clark County Sanitation District, Las Vegas, Nevada; Clark County, Nevada; and state of Nevada Department of Transportation.

**101.82 BAR (GANTT) CHART**

A. A graphical format for displaying network schedules which shows planned and actual progress for a number of tasks against a horizontal time scale. The Bar Chart is frequently updated throughout the project to monitor the detailed progress of the work and is the primary source of reporting/displaying project schedule information to others.

**101.83 CERTIFIED ENVIRONMENTAL MANAGER (CEM)**

A. One who is certified by Nevada Department of Environmental Protection as an Environmental Manager.

**101.84 CRITICAL PATH METHOD (CPM)**

A. A mathematical analysis technique for schedule development utilizing realistic activity time estimates. CPM is designed to control both the time and costs of a project by identifying the activities, which must be kept on schedule (“critical” activities) and the activities, which have extra time (“float”) available for their completion.

**101.85 DEWATERING**

A. The removal and/or lowering of any surface or subsurface water by a method chosen by the Contractor and acceptable to the Engineer, which results in a ground moisture content which enables construction to be carried out under relatively dry and stable conditions. Unless specifically indicated elsewhere in these specifications, no separate payment will be made for dewatering but shall be included in other items of work.

**101.86 FLOAT**

A. The amount of time between the early start date and the late start date, or the early finish date and the late finish date, of any activity or group of activities in the schedule.

**101.87 NETWORK DIAGRAM**

A. A general scheduling term for several methods of describing the net effect of interconnecting lines used to indicate dependencies and interrelationships of project activities.

**101.88 NOMINAL DIAMETER**

A. The inside diameter of a standard pipe as specified by the manufacturer.

**101.89 PRECEDENCE DIAGRAMMING (PDM)**

A. A graphical format of presenting a schedule utilizing the AON network diagramming method. All activities are linked to successor and predecessor activities with start-start, finish-finish, finish-start or start-finish relationships, allowing lead and lag.

**101.90 PROJECT SCHEDULE (SCHEDULE)**

A. The fundamental basis for planning, scheduling, monitoring and controlling project activity. The schedule illustrates the interdependence of all tasks, work packages and work units.

**101.91 SERVICE CONNECTION LATERAL**

A. All or any portion of a utility, including pipe, conduit, wire, cable or duct, including meters between a utility distribution (or collection) line and an individual customer or customers.

END OF SECTION 101

SECTION 102 – BIDDING REQUIREMENTS AND CONDITIONS

SUBSECTIONS 102.01 THROUGH 102.03 AND 102.06 THROUGH 102.13 SHALL BE DELETED IN THEIR ENTIRETY AND REPLACED WITH THE FOLLOWING:

A. The INSTRUCTIONS TO BIDDERS section of the Bid Documents shall govern.

**102.04 interpretation of quantities in the proposal**

ADD THE FOLLOWING TO THIS SUBSECTION:

C. It shall be the Contractor’s responsibility to field verify required quantities prior to bidding.

**102.05 EXAMINATION OF PLANS, SPECIFICATIONS, CONTRACT DOCUMENTS AND SITE OF WORK**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

G. The Contractor, by submitting a bid proposal for this work, represents that Contractor has studied all surveys and investigative reports about potential surface and subsurface conditions pertaining to the site of work; that Contractor has performed such additional surveys and investigations as Contractor deems necessary to complete the work at Contractor's bid proposal price; and that Contractor has correlated the results of all such data with the requirements of the contract documents.

Note to Spec Writer: Use the applicable paragraph H below depending on whether or not a geotech report was completed for the project.

H. A geotechnical exploration report was prepared by [GEOTECH CONSULTANT] on [DATE] and may be reviewed at the following address: [ADDRESS] or may be purchased by calling the following phone number: [PHONE] twenty-four hours prior to pick-up.

1. Bidders shall be aware of the contents of these reports and shall make their own interpretation of the data contained therein.
2. ***This report(s) is provided as “Materials Information” only.***
3. The Contractor shall not be relieved of liability under the Contract for any loss sustained as a result of variances between conditions indicated and the actual conditions encountered during the progress of the work.

H. A geotechnical exploration report was not prepared for this project. Therefore it will be the Contractor’s responsibility to determine the actual conditions encountered during the progress of the work and the Contractor shall make revisions or modifications as the conditions dictate and as directed by the Engineer.

I. The Contractor should be aware that high levels of petroleum hydrocarbons [MAY BE/ARE] present in the area.

1. In such case that hazardous material is encountered, the Contractor shall notify the Engineer and all appropriate agencies in writing in accordance with subsection 203.03.71 “Hazardous Material” of these Special Provisions.

END OF SECTION 102

SECTION 103 – AWARD AND EXECUTION OF CONTRACT

THIS SECTION SHALL BE DELETED IN ITS ENTIRETY AND REPLACED WITH THE FOLLOWING:

A. The INSTRUCTIONS TO BIDDERS section of the Bid Documents shall govern.

END OF SECTION 103

SECTION 104 – SCOPE OF WORK

ADD THE FOLLOWING SUBSECTION:

**104.00 LOCATION AND SCOPE OF WORK**

A. LOCATION: [DESCRIBE THE LOCATION AND SCOPE OF WORK]

B. SCOPE OF WORK: [DESCRIBE THE LOCATION AND SCOPE OF WORK]

**104.04 MAINTENANCE OF TRAFFIC**

***add the following to this subsection:***

F. The maximum amount of open trench permitted in any one location shall be per Section 624 of these Special Provisions.

END OF SECTION 104

SECTION 105 – CONTROL OF WORK

**105.01 AUTHORITY OF THE ENGINEER**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

E. The Engineer shall not direct Contractor’s means, methods, techniques, sequences, or procedures of construction, or the safety precautions and program incident thereto and will not be responsible for Contractor’s failure to perform the work in accordance with the Contract.

F. Engineer will not be responsible for the acts or omissions of the Contractor, or any Subcontractor or any of his or their agents or employees or any other persons at the site or otherwise performing any of the work.

**105.02 PLANS AND WORKING DRAWINGS**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

D. The Contractor shall make submittals for all materials prior to use. All submittals shall be via electronic communication (pdf at ≥ 300 dpi) unless otherwise approved by the Engineer.

1. All submittals made and signed by the Contractor shall be accompanied by a submittal coversheet with the Contractor’s review stamp and the Contractor’s standard transmittal form, containing, at a minimum, the bid item to which the submittal pertains. All submittals are to be numbered by specification section then sequential submittal number (e.g. 203-001, 203-002, etc.).
2. Any submittals not accompanied by such a form, or where all applicable items on the form are not completed, will be returned for re-submittal.
3. Items submitted by anyone other than the Contractor will be returned, without action, for resubmission by the Contractor.
4. All submittals shall be carefully reviewed by an authorized representative of the Contractor prior to submission to the Engineer.
5. Each submittal shall be dated, signed, and certified by the Contractor as being correct and in strict conformance with the Contract Documents.
6. All non-certified submittals will be returned to the Contractor without action taken by the Engineer and any delays caused thereby shall be the total responsibility of the Contractor.

E. The Contractor shall submit any City of Las Vegas acceptance letters for asphalt concrete, aggregate, and Portland Cement Concrete in the absence of test data.

1. If the asphalt concrete, aggregate, or Portland Cement Concrete mix designs are not on the current IQAC list of approved materials, a mix design for asphalt or Portland Cement Concrete or test data must be signed and approved by a Nevada Licensed P.E.
2. The Contractor shall establish its bid price according to the mix designs that are delineated on the current IQAC list of approved materials.
3. Any additional costs arising from mix designs submitted by the Contractor that are rejected for not meeting the IQAC criteria for any reason whatsoever shall be borne solely by the Contractor.
4. All mix designs are to be submitted thirty (30) days prior to anticipated material placement.

F. The Engineer’s review of working drawings submitted by the Contractor will cover only general conformity to the drawings, specifications and special provisions, external connections and dimensions which affect the layout. Unless otherwise specified within the Special Provisions, allow Owner fifteen (15) Working Days for each submittal review.

Note to Spec Writer – for any submittals that will require NDOT review, add 30 days to the review time for each item that you expect to be reviewed by NDOT. Also extend the contract time to allow for NDOT review.

1. The Engineer’s review does not indicate a thorough review of all dimensions, quantities and details of the material, equipment, devices or items shown.
2. The Engineer’s review of submittals shall not relieve Contractor from responsibility for errors, omissions, or deviations, or responsibility for compliance with the Contract Documents.
3. Corrections indicated on submittals shall be considered as changes necessary to meet the requirements of the Contract Documents and shall not be taken as the basis of claims for extra work.

G. If a submittal is returned to the Contractor marked “NO EXCEPTIONS TAKEN” or “MAKE CORRECTIONS AS NOTED”, formal revision and resubmission of said submittal will not be required.

H. If a copy of the submittal is returned to the Contractor marked “AMEND – RESUBMIT”, or “REJECTED – RESUBMIT” the Contractor shall revise said submittal and shall resubmit to the Engineer.

1. When corrected copies are submitted, the Contractor shall indicate any revisions not made and any revisions made other than those called for by the Engineer on previous submissions.
2. Manufacture, fabrications or purchasing of items prior to final acceptance is at the Contractor’s own risk.

**105.03 CONFORMITY WITH PLANS AND SPECIFICATIONS**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

D. In the event the Contractor desires to substitute materials or perform work that does not conform with the plans and specifications, the Contractor will make a written request to the Engineer for review and approval.

E. As a minimum, the written request will address the following:

1. The Contractor will demonstrate that the substituted materials and/or the performed work are of equal or greater value than the materials and/or work specified in the plans and specifications.
2. Various requests for substitution may require the seal and signature of approval from a licensed Nevada Professional Engineer. Prior to submitting a request for substitution, the Contractor shall inquire as to whether the Owner will require the approval of an Engineer, and if so, the Contractor will be responsible for the associated costs of this review.

F. The substitution of material or performance of work as requested by the Contractor will not begin until the Contractor has received a written approval by the Engineer. Any additional costs or delays incurred as a result of unapproved substitutions shall be the responsibility of the Contractor. Manufacture, fabrication or purchasing of items prior to final acceptance is at the contractor’s own risk.

**105.04 COORDINATION OF PLANS, SPECIFICATIONS, SUPPLEMENTAL SPECIFICATIONS AND SPECIAL PROVISIONS**

***DELETE THIS SUBSECTION IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:***

A. During the Bidding Phase of the proposed Work the governing order of the Bid Documents shall be per Instruction to Bidders (ITB) Section 3.2 “Governing Order of Bid Documents”.

B. After the Contract has been awarded, the governing order of the Contract Documents shall be per General Conditions (GC) Section 14.03 “Governing Order of Bid Documents”.

C. The Contractor shall take no advantage of any apparent error or omission in the plans or specifications. In the event the Contractor discovers such an error or omission, he shall immediately notify the Engineer. The Engineer will then make such corrections and interpretations as may be deemed necessary for fulfilling the intent of the plans and specifications.

D. The Contractor shall attend the Pre-Construction meeting.

**105.05 COOPERATION BY CONTRACTOR**

***DELETE PARAGRAPH “A” OF THIS SUBSECTION AND REPLACE WITH THE FOLLOWING:***

A. All approved plans and contract assemblies including special provisions are available on demandstar.com or ngemnv.com and the Contractor is responsible for printing all copies for his use, one set of which the Contractor shall keep available on the work site at all times.

***DELETE PARAGRAPH “C” OF THIS SUBSECTION AND REPLACE WITH THE FOLLOWING:***

C. The Contractor shall provide his own mobile telephone, capable of making and receiving both local and long distance calls to allow communication with the Engineer and Resident Project Representative at all times. The contractor shall provide his own electronic device capable of receiving and sending e-mails from the field. The Contractor shall also provide his own electric power, potable water, construction water and sanitary facilities required in the performance of the work under the contract. All costs associated with these items shall be the responsibility of the Contactor.

***ADD THE FOLLOWING TO THIS SUBSECTION:***

G. Contractor shall utilize MasterWorks, the Owner’s online project management software as the primary means of communication with the Owner for this Project including, but not limited to, correspondence, submittals, claims, reports, schedules, manuals, invoices, photos, RFIs, change orders, and drawings.

The Owner shall provide:

1. A limited training manual for the MasterWorks software and a maximum of two hours of MasterWorks software training for up to four people at the Owner’s offices.
2. The cost of any software licenses required by the MasterWorks software manufacturer or distributor.
3. User accounts for Contractor’s access to the MasterWorks software.

The Contractor shall provide:

1. Training of Contractor personnel required to utilize the MasterWorks software, except as provided by the Owner above.
2. Information using the forms, screen views, and information fields provided in the software and training materials.
3. Electronic notification in the MasterWorks software of any submittals that cannot be transmitted electronically, such as samples and spare parts.
4. Large format scanning capabilities with file size, resolution, and file naming convention as directed by the Owner.
5. Computer hardware, software, peripheral equipment, accessories, and Internet access as needed to integrate with and fully utilize the MasterWorks software, such as Adobe Acrobat, Internet Explorer, and Microsoft Word. The required equipment and capabilities shall be located at both the Project site and Contractor’s local office unless allowed otherwise by the Owner in writing.
6. Frequent monitoring of the MasterWorks software.

Documents approved in the MasterWorks software shall have the same effect as ink-signed originals. Accordingly, the Contractor is required to safeguard his usernames and passwords, particularly those that have been given the rights within the MasterWorks software to provide approvals, and no excuse will be entertained by the Owner for unauthorized MasterWorks software access that uses the Contractor’s assigned usernames. The Contractor shall ink-sign documents, in addition to or instead of the MasterWorks approvals, upon Owner request.

[LIST AND DESCRIBE ANY REQUIRED COORDINATION WITH CONCURRENT PROJECTS.] [LIST ANY CONTACTS FOR CONCURRENT PROJECTS AND SPECIAL EVENTS.]

**105.06 COOPERATION WITH UTILITIES**

***ADD THE FOLLOWING PARAGRAPHS TO THIS SUBSECTION:***

X. The Contractor shall be responsible for verifying that each utility has responded to each notification.

Y. If, during the course of paving operations, the Contractor paves over manholes, water, and/or gas distribution valves, the Contractor shall have no more than 48 hours to remove the asphalt over the manholes or valves and adjust the manholes or valves to grade. The Contractor shall be responsible for adequately marking all such manholes and valves prior to paving operations so as to readily locate them after paving. Adjustment of manhole and valves may require a temporary adjustment to dense grade prior to the permanent final adjustment to the top of finish grade.

Z. [DESCRIBE IN DETAIL WHAT utility relocations will be accomplished prior to the start of construction. The Contractor will be made aware of the status of utility relocations at the pre-construction meeting, so that said work can be taken into account in the construction schedule. Upon request, copies of the utility company’s relocation drawings will be made available to the Contractor.]. The Contractor shall be responsible for coordination with Utility Companies for, but not limited to, relocations to be performed by the Utility Company, installations to be performed by the Contractor, and field adjustments as required.  This list does not excuse the Contractor from coordination with any Utility Companies not listed below:

1. Las Vegas Valley Water District (LVVWD)

**Contact: [Name; phone number; email]**

[Improvements] Contractor to coordinate with LVVWD for required inspections.

1. NV Energy (NVE)

**Contact: [Name; phone number; email]**

NVE PROJ# XXX (Relocation)

NVE plans are included with the contract plans for work that will be completed as part of this contract by the Contractor and coordinated with NVE.

NVE PROJ# XXXX (Services)

NVE plans are included with the contract plans for work that will be completed as part of this contract by the Contractor and coordinated with NVE.

The Contractor shall coordinate with NVE and allow for time in the Contractors construction schedule for NVE to complete their work without delays to the Contractor’s operations. NVE will require **XX working days** of notice prior to the site availability for their work.

List any time restraints on NVE work that affect the contractor’s work schedule, especially seasonal work restraints.

1. Southwest Gas (SWG)

**Contact: [Name; phone number; email]**

SWG W.O.# XXXXX

SWG plans are included for “reference only” with [contract plans or in Appendix XX].  The Contractor shall review these plans and be made aware that concurrent construction will be required with portions of the Contractors work.  These improvements will be completed by SWG or their Contractor.

The Contractor shall coordinate with SWG and allow for time in the Contractors construction schedule for SWG to complete their work without delays to the Contractor’s operations.  SWG will require **XX working days** of notice prior to the site availability for their work.

For SWG relocation work that is to be done concurrently with the project, the Contractor shall develop mutually approved staging plans with the City and with SWG to ensure that SWG’s relocation work can be completed without conflicts or delays to the Contractor’s operations.  SWG will need **XX calendar days** to complete the work.

SWG will require **XX calendar days** to install [improvements].

When the relocation work of a SWG facility is within the limits of removals, excavation and/or construction for improvements as part of this Contract and as indicated within the plans, it shall be the Contractor’s responsibility to complete this work as per plan including the required traffic control, to facilitate the relocation of the SWG facility by SWG.  SWG will be responsible for relocating the gas facility and any other related work outside the limits of construction for this project including permanent asphalt patch.

The Contractor shall coordinate with SWG to verify the location and depth of all underground SWG facilities and provide a suitable timeframe for SWG to relocate their facilities without impeding or delaying the Contractor’s operation.

List any time restraints on SWG work that affect the contractor’s work schedule, especially seasonal work restraints.

1. Cox Communications (Cox)

**Contact: [Name; phone number; email]**

COX PR# XXX (Relocation)

COX will be relocating their own facilities within the project limits as shown in the “for reference only” plans included in [contract plans or in Appendix XX].  This work shall be done prior to or concurrently with this project

The Contractor shall coordinate with COX and allow for time in the Contractors construction schedule for COX to complete their work without delays to the Contractor’s operations. COX will require **XX working days** of notice prior to the site availability for their work.

1. Century Link

**Contact: [Name; phone number; email]**

CTL JOB N. XXXX (Relocation)

The Contractor shall coordinate with Century Link to verify the location and depth of all underground Century Link facilities.  Century Link will be responsible for lowering existing conduits and installing manholes concurrently with the Contractor’s construction without impeding or delaying the Contractor’s operation as per the Century Link drawings provided in the plans for reference only.  The Contractor shall notify Century Link **XX working days** before the start for Century Link required work and provide Century Link **XX working days** for required work.

1. Etc.

**105.07 COOPERATION BETWEEN CONTRACTORS**

***ADD THE FOLLOWING PARAGRAPHS TO THIS SUBSECTION:***

E.

[LIST AND DESCRIBE ANY REQUIRED COORDINATION WITH CONCURRENT PROJECTS.] [LIST ANY CONTACTS FOR CONCURRENT PROJECTS AND SPECIAL EVENTS.]

Note to Spec Writer – for any Sanitary Sewer Rehabilitation projects, add the following paragraph:

F.      The contractor shall coordinate work with ADS Environmental Services minimum two weeks prior to work in manhole XX-XXXX (located at Xxxxx) for removal and re-installation of the permanent flow monitor in the manhole:

1.      ADS Environmental Services, Ashura Takanohara (256) 929-0075

**105.08 CONSTRUCTION STAKES, LINES AND GRADES**

***DELETE THIS SUBSECTION IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:***

A. Construction staking work shall be required of the Contractor, as indicated in Section 622 “Construction Surveying by the Contractor” of these Special Provisions, and shall conform to all requirements therein.

***DELETE SUBSECTION 105.09 “BLANK” OF THE USS IN ITS ENTIRETY AND REPLACE WITH 105.09 “RECORD DOCUMENTS” AS DESCRIBED BELOW:***

**105.09 RECORD DOCUMENTS**

A. General Instructions

1. Ensure entries are complete and accurate. Current Progress Record Documents shall be available for review by the Owner, Owner’s Consulting Engineer and the Owner’s Construction Management Consultant (if applicable) at all times during the progress of the work.
2. Store Progress Record Documents separate from documents used for construction.
3. Neatly record information concurrent with construction progress. Maintain Progress Record Documents in a clean and orderly manner. The Contractor shall not conceal any work until the required record information has been recorded on the record document set. The Contractor shall bear the cost of uncovering any prematurely concealed work for required record documentation.
4. Progress Record Documents shall be made available to the Owner, the Owner’s Consulting Engineer, and the Owner’s Construction Management Consultant (if applicable) for review at the site, at progress meetings, and during Owner’s review of the monthly progress bill requesting payment.
5. Failure of the Contractor to maintain a current record of information on the Progress Record Documents shall entitle the Owner to withhold payment until corrected. The release of payment to the Contractor shall be contingent upon the Contractor’s diligent performance as required herein.
6. Contractor may elect to use an electronic version of the contract documents for record documents in lieu of paper. All other provisions of this section still apply.
7. Progress Record Documents - The Contractor shall maintain the following documents, which constitute the Progress Record Documents, at the job site during construction:
8. Drawings – A full scale approved set of drawings for use as the Progress Record Document drawings.
   1. The Contractor will supplement the drawing set with approved drawings submitted as deferred submittals. The Contractor shall insert approved Addenda and revision sheets in front of the original sheet
   2. The Contractor shall legibly mark each sheet to record actual construction including (but not limited to):
      1. Measured horizontal and vertical locations of underground installations, utilities and appurtenances referenced to permanent surface improvements;
      2. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work;
      3. Field changes of dimension and detail;
      4. Details not on original Contract Drawings
9. Specifications – The Contractor shall legibly mark and record at each product section description of actual products installed, including (but not limited to) the following:
   1. Manufacturer’s name and product model and number
   2. Product substitutions or alternates utilized;
   3. Changes made by addenda and modifications.
10. The Contractor shall keep copies of and maintain a record of all Change Orders and any other modifications to the Contract.
11. The Contractor shall keep copies of and maintain a record of all reviewed Shop Drawings, Product Data and Samples.
12. The Contractor shall keep copies of and maintain a record of all Manufacturer’s instructions for assembly, installation and adjusting.
13. Final Record Documents - Upon completion of the work, including all punch list items and prior to Release of Retention, the Contractor shall provide to Owner a complete set of Final Record Documents. The Final Record Documents shall be provided to the Owner electronically in pdf format. The Final Record Documents shall include (but not limited to) the following:
    1. Final Drawings
    2. The Contractor will supplement the drawing set with approved drawings submitted as deferred submittals. The Contractor shall insert approved Addenda and revision sheets in front of the original sheet including any revisions required for completion of the punch list.
    3. The Contractor shall legibly mark each sheet to record actual construction including, (but not limited to):
       1. Measured horizontal and vertical locations of underground installations, utilities and appurtenances referenced to permanent surface improvements;
       2. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work;
       3. Field changes of dimension and detail;
       4. Details not on original Contract Drawings;
       5. Changes made during completion of the punch list.
    4. The Contractor shall mark each sheet as “Record” or “As-Built”.
    5. Specifications
14. Manufacturer’s name and product model and number
15. Product Substitutions or alternates utilized
16. Changes made by Addenda and modifications
17. Changes made during completion of the punch list.
    1. Contractor shall keep copies of and maintain a record of all Change Orders and any other modifications to the Contract including any changes made during completion of the punch list.
    2. The Contractor shall keep copies of and maintain a record of all reviewed Shop Drawings, Product Data, and Samples including any additional shop drawings, product data, and samples required for completion of the punch list.
    3. The Contractor shall keep copies of and maintain a record of all Manufacturer’s instructions for assembly, installation, and adjusting and any Manufacturer’s instructions for assembly, installation, and adjusting required for completion of the punch list.

**105.17 CLAIMS FOR ADJUSTMENT AND DISPUTES**

***DELETE PARAGRAPH “A” OF THIS SUBSECTION AND REPLACE WITH THE FOLLOWING:***

A. If the Contractor deems that additional compensation is due for work or material not clearly covered in the Contract and not ordered by the Engineer as extra work as defined herein, the Contractor shall notify the Engineer in writing within 24 hours of his intention to make claim for additional compensation before beginning the work which will be the subject of the claim.

1. If the notification is not given, and the Engineer is not afforded proper facilities by the Contractor for keeping strict account of actual cost as required, then the Contractor shall be deemed to have waived any claim for such additional compensation.
2. The notice by the Contractor, and the fact that the Engineer has kept account of the cost as aforesaid, shall not in any way be construed as proving or substantiating the validity of the claim.
3. If the claim, after consideration by the Engineer, is found to be just, it will be paid as extra work as provided for as “Force Account” work.
4. Nothing in this subsection shall be construed as establishing any claim contrary to the terms of Subsection 104.02, “Increased or Decreased Quantities and Change in Character of Work”.

***DELETE PARAGRAPH “C” OF THIS SUBSECTION IN ITS ENTIRETY.***

Note to Spec Writer – for CMAR Projects, do not include 105.18

***ADD THE FOLLOWING SUBSECTION:***

**105.18 VALUE ENGINEERING PROPOSALS**

1. Value Engineering Proposals (VEP) may be submitted in writing for modifying the plans, specifications or other requirements of the contract for the purpose of reducing the total cost of construction without reducing design capacity or quality of the finished product. If accepted, net savings resulting from a VEP will be shared by the Owner and the Contractor on a 50-50 basis.
2. The requirements herein apply to all VEPs initiated and developed by the Contractor and which are identified as such at the time of submission. Nothing herein shall be construed as requiring consideration or approval of a VEP submitted hereunder.
3. Each VEP shall result in a net savings over the contract costs without impairing essential functions and characteristics of the item(s) or of any other part of the project, including but not limited to environmental considerations, service life, reliability, economy of operation, ease of maintenance, desired aesthetics and safety. Submit the following information with each VEP:

(a) A statement that the proposal is submitted as a VEP;

(b) A statement concerning the basis for the VEP and benefits to the Owner together with an itemization of the contract requirements affected by the VEP;

(c) A detailed estimate of the cost under the existing contract and under the VEP;

(d) Proposed specifications and recommendations as to how such VEP changes are to be accomplished; and

(e) A statement as to the time by which a contract change order adopting the VEP must be issued so as to obtain the maximum cost effectiveness.

1. The VEP will be processed in the same manner as prescribed for any other proposal which would necessitate issuance of a contract change order. The Owner may accept in whole or in part any VEP by issuing a contract change order which will identify the VEP on which it is based. The Owner will not be liable for failure to accept or act upon any VEP submitted pursuant to these requirements nor for any delays to the work attributable to any such proposal. Until a proposal is effected by contract change order, remain obligated to perform under the terms and conditions of the existing contract. If an executed contract change order has not been issued by the date upon which the proposal specifies that a decision thereon should be made, or such other date as the Contractor may have subsequently specified in writing, such proposal shall be deemed rejected.
2. The contract change order effecting the necessary contract modification will establish the net savings agreed upon, will provide for adjustment in the contract prices and will indicate the new savings to be equally divided between the Contractor and the Owner. Absorb all costs incurred in preparing a VEP for submission. All reasonably incurred costs of reviewing and administering the VEP will be borne by the Owner. The Owner reserves the right to include in the agreement any conditions it deems appropriate for consideration, approval, and implementation of the proposal. The Contractor’s 50% share of the net savings shall constitute full compensation to him for effecting all changes pursuant to the agreement.
3. Acceptance of the VEP and performance of the work thereunder will not change the contract time limit as a result of the VEP, unless specifically provided for in the contract change order authorizing the VEP.
4. The Owner expressly reserves the right to adopt a VEP for general use in contracts administered by the Owner when it determines that said proposal is suitable for application to other contracts. VEPs identical or similar to previously submitted proposals will be eligible for consideration and compensation under these provisions if such proposals were not previously adopted for general application to other contracts administered by the Owner. When a VEP is adopted for general use, compensation pursuant to these requirements will be applied only to those contracts awarded and for which the subject VEP has been submitted before the date of adoption of the specific VEP.
5. Proposed changes in the basic design of a bridge or pavement type, traffic control plan, or changes which require different right of way limits, will not normally be considered as an acceptable VEP. The elimination or changes to the required marination of plantmix bituminous aggregates will not be considered as an acceptable VEP. The Engineer shall be the sole judge of the acceptability of a VEP. Subject to the provisions contained herein, the Owner or any other public agency shall have the right to use all or part of any accepted VEP without obligation or compensation of any kind to the Contractor. In the event a VEP is accepted by the Owner, the provisions of Subsection 104.02 which pertain to adjustment of contract unit prices due to alterations of contract quantities will not apply to items adjusted or deleted as a result of effecting the VEP by contract change order.

Note to Spec Writer – The following QA, QC, and payment sections shall be used for Non-Federal projects ONLY.

**105.69 QUALITY ASSURANCE (QA)**

* 1. Quality Assurance encompasses the Engineer’s review and oversight of the Contractor’s Quality Control. Quality Assurance will verify the results of Quality Control and shall also be inspecting for conformance to plans and specifications.
  2. The Quality Assurance is the responsibility of the Engineer. Results determined by the Quality Assurance will be the deciding factor of the materials acceptance.

**105.70 QUALITY CONTROL (QC)**

* 1. The Contractor is responsible for submitting a Quality Control Program to the Engineer for acceptance two weeks prior to the tentative notice to proceed and must be approved prior to beginning work. If a program is not submitted for acceptance, the Contractor is responsible to have Quality Control performed in accordance with Sections 111 through 117 of these special provisions and the requirements set forth in the latest copy of the approved City of Las Vegas Department of Public Works Construction Quality Program for non-federal projects (See Appendix X).
  2. The Contractor Quality Control Program is to ensure that materials and workmanship incorporated into the work meet the requirements of the Standard Specifications, Special Provisions, and all other contract documents. Quality Control is the sole responsibility of the Contractor for all projects.
  3. In order to ensure an understanding of the program by all persons, including both Quality Control and Quality Assurance, there is a mandatory Quality Control program pre-activity meeting to be conducted by the Engineer.

***ADD THE FOLLOWING SUBSECTION:***

**105.71 PAYMENT FOR CONTRACTOR QUALITY CONTROL PROGRAM**

* 1. Payment will be made for Contractor Quality Control. The costs for all quality control efforts required to complete the work described in the General and Special Provisions and project Drawings, including the Contractor’s QC Plan, punch list, and cleanup shall be paid as LUMP SUM.
  2. The LUMP SUM price bid for Contractor Quality Control shall include full compensation for performing all required control of quality including, but not limited to, costs to develop the quality control program, management of the quality control program, on-site testing, off-site source/production inspection, off-site source/production testing, laboratory testing of field samples, preparation of the weekly and monthly reports, submittal of the program, submittal of results and daily, weekly, and monthly reporting of results.
  3. The Engineer may request additional testing not to exceed a maximum of 5% of the required testing for a given type performed on the project at no additional cost to Owner. Additionally, extra testing required for minor line item extensions, up to 5% increase in said line item will be performed on the project at no additional cost to Owner
  4. Testing at a frequency greater than the minimum called for, other than at the direction of the Engineer, is considered to be a methods and means decision of the Contractor and as such is at the expense of the Contractor.
  5. In the event of improperly conducted Quality Control Program, the Progress Payment amount will be reduced by **$300.00** per day per incident by the Engineer until resolved. No retroactive payments will be provided for improperly conducted Quality Control Program. An incident is defined as:
     1. The use of an incorrect or the improper test method.
     2. Non-compliance to any portion of the Contractor Quality Control Program.
     3. Non inspection
     4. No documentation of inspection
     5. No notification of the QA inspector
     6. Not using hold points.
     7. No pre-activity meeting.
     8. Improperly submitted reports.
     9. Testing not in conformance with the testing procedure.
     10. Lack of timely resolution of deficiencies and non-compliances.
     11. Non-compliance of a Quality Control Administration audit.
  6. If the testing was conducted by a non-accredited laboratory, the testing will not be accepted and payment will not be made for the installed material or testing cost unless resolved to the satisfaction of the Engineer within 30 days. If after 30 days, the laboratory cannot satisfy the Engineer, the Contractor shall replace the non-complying laboratory. If the testing was conducted by a non-certified technician, the quantity of material and testing cost shall be subject to non-payment and the Contractor shall also pay for the Quality Assurance testing until such time the certified technician is replaced.
  7. The Contractor shall implement removal of personnel for the following infringements:
     1. Nonqualified personnel based on the ICC, WAQTC, and NAQTC requirements.
     2. Knowingly falsify contract documents of any kind.

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 105.0010 | CONTRACTOR QUALITY CONTROL | LS |

END OF SECTION 105

Note to Spec Writer – The following QA, QC, IA, and Audits sections shall be used for Federal projects ONLY.

**105.69 QUALITY ASSURANCE (QA)**

* 1. Quality Assurance encompasses the Engineer’s review and oversight of the Contractor’s Quality Control. Quality Assurance will verify the results of Quality Control and shall also be inspecting for conformance to plans and specifications.
  2. The Quality Assurance is the responsibility of the Engineer. Results determined by the Quality Assurance will be the deciding factor of the materials acceptance.
  3. For inspection and testing requirements, frequencies, and procedures, the latest copy of the NDOT approved City of Las Vegas Department of Public Works Construction Quality Program shall be followed.

**105.70 QUALITY CONTROL (QC)**

* 1. The Contractor Quality Control Program was developed to ensure that materials and workmanship incorporated into the work meet the requirements of the Standard Specifications, Special Provisions, and all other contract documents. Quality Control is the sole responsibility of the Contractor. Quality Control shall be performed in accordance with Sections 111 through 117 of these special provisions and the latest copy of the NDOT approved City of Las Vegas Department of Public Works Construction Quality Program.
  2. In order to ensure an understanding of the program by all persons, including both Quality Control and Quality Assurance, there is a mandatory Quality Control program pre-activity meeting to be conducted by the Engineer. The contractor shall have the Responsible Person-in-Charge, Quality Control Coordinator, and the testing professional engineer at the meeting. The positions are defined in Section 113, “Contractor Quality Control Organization and Qualification of Laboratories and Technicians”.

***ADD THE FOLLOWING SUBSECTION:***

**105.71 INDEPENDENT ASSURANCE SAMPLING**

A. The Contracting Agency Independent Assurance (IA) person is responsible for administering the split sample program among the various QC and QA certified personnel. This involves supervising the sampling, splitting, and distribution of the samples and collecting and reporting the results of the tests and the observation of the testing.

B. The IA is performed by a consultant contracted by the Contracting Agency.

C. As a part of the regular IA sampling and testing program samples are split three ways by the QC personnel as directed by the IA. One sample is tested by QC, one is tested by QA and one is retained by IA. The IA unit may observe the QA/QC testing process. The Contractor shall expect that up to three of the materials listed below shall be required for sampling throughout the duration of the contract:

* 1. Select Borrow.
  2. Selected Material.
  3. Granular and Drain Backfill.
  4. Base Aggregates.
  5. Concrete Aggregates.
  6. Aggregates for Plantmix Bituminous Surface and UTACS.
  7. Concrete.
  8. Plantmix Bituminous Surface.
  9. UTACS.

D. The IA person shall retain custody of the samples from the time they are taken until they are delivered to the QC or QA laboratories for testing.

E. The test results for this sampling shall be transmitted as per the contract documents. The results shall not be a part of the contract acceptance data.

***ADD THE FOLLOWING SUBSECTION:***

**105.72 ENGINEER AUDITS**

A. The Engineer will audit randomly the Contractor project records. These will be scheduled by the Engineer in coordination with the Contractor. Audits will be subject to a $100 demerit for the third and subsequent non-compliant items.

B. A mandatory pre-audit will be conducted for projects of durations greater than or equal to 6 months in duration within one month of the project construction start. For all other projects, they shall be scheduled within two weeks, or as determined by the Engineer.

END OF SECTION 105

SECTION 106 – CONTROL OF MATERIALS

**106.05 cERTIFICATE OF COMPLIANCE**

***DELETE PARAGRAPH “D” OF THIS SUBSECTION AND ADD THE FOLLOWING PARAGRAPHS TO THIS SUBSECTION:***

1. The Contractor shall submit a Certificate of Compliance from the intended aggregate producer. This certificate shall verify that the material conforms to the applicable Special Provisions and Sections 412 and 705 of the Standard Specifications. This certificate shall be supplemented by laboratory test data performed by an independent testing laboratory at no expense to the City.
2. The Contractor shall submit a Certificate of Compliance from the emulsion supplier verifying that the emulsion conforms to the applicable Special Provisions and Sections 412 and 703 of the Standard Specifications.

END OF SECTION 106

SECTION 107 – LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC

**107.02 PERMITS, LICENSES, AND TAXES**

***ADD THE FOLLOWING PARAGRAPHS TO THIS SUBSECTION:***

1. The Contractor shall obtain Grading and/or Stockpile permits for on-site storage or disposal of materials from the City of Las Vegas Building Department prior to beginning the work.
2. It shall be the Contractor's responsibility to determine if the permit requirements of Section 637 “Pollution Control” shall be required.
3. The Contractor shall obtain a permit from the Las Vegas Valley Water District to use a hydrant as a water source.
4. The contract documents detail the right-of-way and construction easement/AEPs and in some cases staging areas the contractor may occupy during the duration of the project and traffic control requirements associated with the occupation of said areas. If the contractor desires to use any areas outside the limits described in the drawings and specifications, he shall be responsible for meeting the requirements of the Unified Development Code (UDC) or applicable requirements for jurisdictions outside of the City. The contractor shall obtain all permits required for the use of private property and provide copies to the City prior to any use of the site. If a temporary commercial permit is required for work performed on private property, the Contractor shall ensure that a temporary commercial permit is obtained through the City of Las Vegas Planning Department or other applicable jurisdictions prior to any use of the site. All work, fees, and scheduling associated with compliance to this subsection shall be borne entirely by the contractor and shall not be a justification for delay claims.

***DELETE SUBSECTION 107.05 BLANK AND REPLACE WITH THE FOLLOWING:***

**107.05 SAFETY**

1. General: Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the work. The name and telephone number of the Contractor’s safety officer shall be provided to the Contracting Agency. He shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:
2. All employees engaged in the work and the other persons who may be affected thereby;
3. All the work and all materials or equipment to be incorporated therein, whether in storage or on the project site, and
4. Other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of the work.
5. Contractor shall comply with all applicable laws, ordinances, rules, regulations and orders of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury or loss. He shall erect, install, employ and maintain, as required by the conditions and progress of the work, all necessary safeguards. Contractor's duties and responsibilities for the safety and protection of the work shall continue until such time as all the work is completed and a "Notice of Completion" has been issued to the Contractor by the Engineer.
6. Trench Safety: Trench Safety shall be per Subsection 208.03.01.

**107.07 TRAFFIC AND ACCESS**

Note to Spec Writer: When setting lane restrictions, keep in mind items of work which will require waivers from these limitations, for example, milling operations will typically require two lanes.

***ADD THE FOLLOWING TO PARAGRAPH “C” OF THIS SUBSECTION:***

1. When the Contractor’s construction operations encroach upon a sidewalk, walkway, or crosswalk area, the Contractor shall take special precautions to protect the pedestrian's safety including provisions to separate pedestrian traffic from the work area and vehicular traffic.
   1. When pedestrian traffic is routed onto the roadway, at other than existing crosswalk locations, the Contractor shall use portable precast concrete barrier rails to separate the pedestrian traffic from the work area and vehicular traffic.
   2. All portable precast concrete barrier rails shall be butted tight and pinned in accordance with the requirements of the Nevada Department of Transportation Standard Drawing RB-47A and RB-47B “Concrete Barrier Rail Portable Precast”.
   3. Pedestrian sidewalk/route closures may require physical barriers (i.e. Type III barricades, rail, etc.) to ensure pedestrian safety and compliance with the closure. When closing access to a crosswalk at a signalized intersections, the pedestrian signal heads shall be completely covered so the indication is not visible to pedestrians.

Note to Spec Writer: Website for suggested routes to school can be found here: <https://www.lasvegasnevada.gov/Residents/Parking-Transportation/Parking/Suggested-Routes-To-School>

1. When a designated *Suggested Route to School* is encroached upon by a construction work zone or the City of Las Vegas’ Transportation Engineering Division identifies a need for students to be assisted in the safe crossing through the work zone, the Contractor shall be required to provide a qualified crossing guard.
   1. The guard shall be present for the full duration of time that children are likely to be present, as determined by the Transportation Engineering Division.
   2. It will be the Contractor’s responsibility to contact the City of Las Vegas Transportation Engineering Field Operations Division 702-229-6331 to arrange for crossing guards properly trained in traffic control.
   3. Fees for the use of these guards, if required, will be paid under Bid Item No. 624.01 “Traffic Control and Maintenance”.
   4. Following are designated Suggested Routes to School that will be impacted by construction:
      1. LIST THE SUGGESTED ROUTES TO SCHOOL LOCATIONS HERE
      2. LIST THE SUGGESTED ROUTES TO SCHOOL LOCATIONS HERE
      3. LIST THE SUGGESTED ROUTES TO SCHOOL LOCATIONS HERE
   5. If construction work is located along a school frontage, no work shall be performed within 500 feet (NOTE TO SPEC WRITER – distance may change, confirm with CLV PM) of the school frontage during bell times at the following locations:
      1. LIST SCHOOL NAME AND STREET HERE
      2. LIST SCHOOL NAME AND STREET HERE

***DELETE PARAGRAPH “K” OF THIS SUBSECTION IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:***

[NOTE TO SPEC WRITER: Federal courthouse requires notification on any work adjacent to their building, the block of Bridger, LVB, Clark, and 6th. Contact Darrell McGirt [darrell.mcgirt@gsa.gov](mailto:darrell.mcgirt@gsa.gov). Please provide a minimum 3-day email notice to Mr. McGirt.

1. Notifications:
2. The Owner shall receive a copy of all notifications for acceptance prior to distribution.
3. The Contractor shall cooperate with, and give written notice to all emergency agencies, public entities, each resident, homeowner, homeowner association, business or school that will be directly affected by any part of the construction process, particularly concerning temporary interruptions to vehicular access. Written notice shall include project limits, a brief scope of the project, anticipated construction start date, and the Contractor’s 24-hour contact information. NOTE TO SPEC WRITER: if a radius of notification is necessary for your project, it needs to be detailed here.
4. This notice of the approximate schedule and explanation of work shall be distributed at least fourteen (14) days prior to commencement of work in the area.
5. A second written notice, as well as a verbal notice, including door-to-door communication, shall be made at least twenty-four (24) hours prior to construction [seventy-two (72) hours for homeowner associations] to remind all affected parties of the construction to take place.
6. LIST KNOWN GATED COMMUNITY LOCATIONS HERE
7. The Contractor shall notify by phone the following agencies:

|  |  |
| --- | --- |
| METRO DISPATCH | 702-795-3111 |
|  |  |
| FIRE DEPARTMENT DISPATCH | 702-382-3001 |
|  |  |
| AMBULANCE DISPATCH CENTER | 702-384-3400 |
|  |  |
| RTC TRANSIT | 702-676-1731 |
|  |  |
| RTC SPECIAL EVENTS & DETOUR COORDINATION | 702-676-1867 |
|  |  |
| CLARK COUNTY SCHOOL DISTRICT | 702-799-8100 X 5395 |
| NEVADA DEPT. OF TRANSPORTATION (NDOT) | 702-385-6588 |
|  |  |
| CLV TRANSPORTATION ENGINEERING DIVISION | 702-229-6331 |
| UNITED STATES POSTAL SERVICE | 1-888-275-8777 |
|  |  |
| REPUBLIC SERVICES | 702-735-5151 X 314 |
|  |  |

1. Fire Station Captain, Name, phone, email for Station XX shall be kept informed of major traffic control and closures that could impact the Station’s response area. (Note to Spec Writer: Please review the map at [Fire-Rescue-Master-Plan.pdf (windows.net)](https://sawebfilesprod001.blob.core.windows.net/map/Fire-Rescue-Master-Plan.pdf?sv=2017-04-17&sr=b&si=DNNFileManagerPolicy&sig=mW8XO0ajSRqXDvXqvIgz5fLbA3Cd8Wj071HXsxx3KXk%3D) and provide Response Area Station Number for each fire station that will be affected by temporary traffic control. This paragraph may not be required on every project; however, if there is an anticipation of substantial traffic control or street closures the Station’s Captain must be informed of the impact to response routes.)

***ADD THE FOLLOWING PARAGRAPHS TO THIS SUBSECTION:***

1. Construction materials may not be stored in streets, roads or highways for more than five days after unloading. All materials or equipment not installed or used in the construction within five days after unloading shall be stored elsewhere by the Contractor at his expense unless he is authorized additional storage time.
2. Construction equipment shall not be stored at the work site before its actual use on the work nor for more than five days after it is no longer needed on the work. Time necessary for repair or assembly of equipment may be authorized by the Engineer.
3. Excavated material, except that which is to be used as backfill in the adjacent trench, may not be stored in public streets, roads or highways unless otherwise permitted. After placing backfill, all excess material shall be removed immediately from the site.
4. Wherever possible the contractor shall use high early strength concrete for final utility grade adjustments to facilitate reopening the road to traffic.

[NOTE TO SPEC WRITER: CONSIDER THE BELOW INCLUSIONS IN DOWNTOWN PROJECTS, BUT ALSO INCLUDE PROJECT SPECIFIC TRAFFIC CONTROL RESTRICTIONS IN THIS SECTION AND REMOVE THE NON-PERTINENT DOWN TOWN INFORMATION]

MAKE SURE THE SPECIAL EVENTS LISTED ARE RESEARCHED, RELEVANT, DATE SPECIFIC, AND PROJECT AND AREA SPECIFIC

1. PROJECT TRAFFIC CONTROL RESTRICTIONS:
2. Alley closures will be permitted only after scheduling is done to limit disruptions to casino, business deliveries, and trash pick-up.
3. Full road closures and 24 hour setups are required to have a letter of justification submitted with the Temporary Traffic Control Plans (TTCP).
4. Truck access must be maintained for deliveries between 5:00 AM and 3:00 PM for the following Hotel and Casinos:
   1. The California
   2. Binion’s Horseshoe
   3. The Fremont
5. Traffic access must be maintained for the following parking garages:
   1. The California (ingress/egress at the alley between Main Street and 1st Street)
   2. Circa
   3. Binion’s Horseshoe (ingress/egress southeast corner of Ogden/1st)
   4. City of Las Vegas (ingress/egress 333 E. Ogden Avenue)
6. A continuous safe pedestrian path must be maintained at all times. Any time a pedestrian is directed onto the street to move parallel with vehicular traffic, pedestrians shall be protected by either concrete barrier or completely filled water rails. Note, completely filled water rails can only be utilized on side streets with a maximum speed limit of 35 mph or lower or as continuous detectable edging on the interior of a pedestrian diversion along arterial streets. Sidewalk closures maybe allowed but only for one block and on one side of the street at a time. However, due to high pedestrian volumes, a pedestrian safe path shall be maintained at all times along business frontages unless approved by City of Las Vegas Traffic Engineer.
7. The contractor shall maintain pedestrian access at all times to the Fremont Street Experience, the emergency exit between Main Street and 1st Street for the California Hotel and Casino (along Ogden Avenue), all private residences and other commercial businesses and Hotel/Casinos.
8. Special Events may occur within the project limits where the Contractor shall be required to keep roadways clear of traffic control devices and construction equipment. For these events, the City will provide the Contractor with at least 14 days notice prior to each event to allow the Contractor to plan and make necessary preparations to accommodate the particular event. The following are known and scheduled Special Events, this list is not meant to represent all Special Events that may occur during the project:
   1. Martin L King Parade – Day of the Holiday
   2. Mint 400 – March
   3. Las Vegas Days Parade – May
   4. Life is Beautiful – September
   5. Vegas Strong 5K – September
   6. Pride Parade – October (night event)
   7. Veteran’s Day Parade – Day of the Holiday
   8. Rock & Roll Marathon – November
   9. Great Santa Run 5K – December

**107.12 PROTECTION AND RESTORATION OF PROPERTY AND LANDSCAPE**

***ADD THE FOLLOWING PARAGRAPHS TO THIS SUBSECTION:***

1. Contractor shall provide for the drainage of storm water and such water as may be applied or discharged on the site in the performance of the work. Drainage facilities shall be adequate to prevent damage to the work, the site and the adjacent property.
2. Contractor shall prevent erosion of soil on the site and adjacent property resulting from his construction activities. Effective measures shall be initiated prior to the commencement of clearing, grading, excavation or other operation that will disturb the natural protection of the soil.

**107.17 CONTRACTOR’S RESPONSIBILITY FOR UTILITY PROPERTY AND SERVICE**

***ADD THE FOLLOWING PARAGRAPH TO THIS SUBSECTION:***

1. All utility valves, manholes, vaults, pull boxes, etc., which are buried, shall be conspicuously marked by the Contractor to allow their location to be determined by the Engineer or utility personnel under adverse conditions (i.e. inclement weather or darkness).

**107.18 FURNISHING RIGHT-OF-WAY**

***ADD THE FOLLOWING PARAGRAPH TO THIS SUBSECTION:***

1. Contractor shall provide copy of necessary permits and written consent from property owner(s) prior to entering or occupying any lands outside the right-of-way or easement or where no Authorization to Enter Property exists.

***ADD THE FOLLOWING SUBSECTIONS TO THIS SECTION:***

**107.70 CONTRACTOR’S RESPONSIBILITY TO THE PUBLIC**

1. The Contractor is responsible to answer and resolve any conflicts that may arise between a homeowner or business owner and himself during the construction process.

NOTE TO SPEC WRITER: MAKE SURE WORK HOURS ARE RELEVANT FOR THE PROJECT (I.E. SCHOOLS, RESIDENTIAL, ETC). VERIFY WITH TED PRIOR TO BIDDING

**107.71 ALLOWABLE WORK HOURS**

1. No work between the hours of 6 p.m. and 7 a.m. will be allowed in residential areas unless approved by the Engineer or otherwise stated in the Special Provisions. If work after the aforementioned hours is approved, then the Contractor shall provide each affected resident at least forty-eight (48) hours written notice explaining the reason for the work after hours and providing an approximate duration of the activity.

**107.72 NATURAL DRAINAGE AND STORM WATER RUNOFF**

A. TheContractor shall be responsible for protecting and preserving public and private property from damage directly or indirectly caused by drainage or storm water runoff leaving the project during construction of all improvements, including downstream properties if damage is a result of the Contractor’s actions in diverting or redirecting existing natural runoff patterns.

**107.73 NDOT RIGHT-OF-WAY OCCUPANCY TERMS AND CONDITIONS**

Note to Spec Writer: Consider highlighting any requirements from the NDOT Encroachment Permit that would affect the cost of the project.

1. TheContractorshall abide by the terms and conditions of the NDOT right-of-way occupancy permit, if required, as attached in the Appendix of these Special Provisions.
   1. The contractor is responsible for preparing a Runoff Control Plan (RCP) and submitting via email to [d1stormwaterreview@dot.nv.gov](mailto:d1stormwaterreview@dot.nv.gov) with the appropriate cover sheet. The approval of this document is required prior to start of construction within the area covered by the NDOT right-of-way occupancy permit.

Note to Spec Writer: Work with management to verify use of this section and disposition of 3rd Party PIO. There are **2** section 107.74 to choose from, delete the one not needed. Understand that language may need to change based on specific project needs.

Note to Spec Writer: THIS IS FOR CONTRACTOR DESIGNATED PIO

**107.74 PUBLIC OUTREACH**

1. The Contractor shall have an expectation setting meeting with the Engineer prior to public outreach activities commencing.
2. The Contractor shall work with the Engineer to coordinate, provide project information (handouts, boards, etc.) and attend a project information meeting shortly after the pre-construction meeting to inform the public of the project. (Delete if this is not necessary for project, or if there is a question it may or may not happen add “if necessary” to text).
3. Provide public information/outreach to build and maintain positive public relations throughout the construction process through continuous, effective, two-way communications including updates on the progress of the work and information on changes affecting the movement of traffic.
4. All outreach communications shall comply with section 107.07K.
5. PUBLIC INFORMATION STAFF

The Contractor shall be required to designate a Public Information Officer (PIO).

1. The Contractor shall maintain a stakeholder list of property addresses and/or email addresses including, but not limited to:

* 1. Property owners;
  2. Homeowners Associations;
  3. Interested individuals who have requested that their names be added to the mailing list;
  4. Emergency Service Providers;
  5. City staff as designated;
  6. Funding source contacts, if applicable.

1. PUBLIC OUTREACH EFFORTS AND ACTIVITIES
   1. Participate in weekly progress meetings;

2. Prepare and distribute a recurring email update up to once per week for all stakeholders that includes upcoming work and traffic impact information. Prepare any necessary graphics/flyers for closures and construction impacts. All updates shall be approved by the Engineer before distribution;

1. Respond to stakeholder concerns/complaints to reach positive resolution;
2. Prepare and submit a monthly outreach summary report for project documentation.
3. The Public Affairs Office (PAO) will manage all media relations, including issuing press releases, media advisories, and maintaining regular contact with the media. Refer all requests from the media for interviews, quotes, and/or detailed project information directly to the Contracting Agency’s PAO. Immediately notify the Engineer of any situations that may involve the media. Coordinate with PAO as necessary.

Note to Spec Writer: THIS IS FOR 3rd Party DESIGNATED PIO by the Engineer

**107.74 PUBLIC OUTREACH**

1. The Contractor shall have an expectation setting meeting with the Engineer and their designated third party Public Information Officer (PIO) prior to public outreach activities commencing.
2. The Contractor shall coordinate with the Engineer and their designated third party PIO to coordinate, provide project information (handouts, boards, etc.) and attend a project information meeting shortly after the pre-construction meeting to inform the public of the project. (Delete if this is not necessary for project, or if there is a question it may or may not happen add “if necessary” to text).
3. Coordinate with Engineer’s third party designated PIO who shall act as a point of contact for stakeholder communication. The goal will be to work collaboratively to provide public information/outreach to build and maintain positive public relations throughout the construction process through continuous, effective, two-way communications including updates on the progress of the work and information on changes affecting the movement of traffic. Contractor shall provide PIO with necessary project updates including traffic control movements, areas of affected work, and any/all necessary items that may impact stakeholders.
4. The Contractor shall be required to designate a primary contact to coordinate with PIO.
5. PUBLIC OUTREACH EFFORTS AND ACTIVITIES
   1. Participate in weekly progress meetings;

2. Assist PIO with preparation of a recurring email update up to once per week for all stakeholders that could include providing traffic control updates such as shifts, lane restrictions, or upcoming closures, areas of significant impact, upcoming activities, creation of graphics, and any and all information that is pertinent to the surrounding stakeholders;

1. Assist PIO as needed in responding to stakeholder concerns/complaints to reach positive resolution.
2. The Public Affairs Office (PAO) will manage all media relations, including issuing press releases, media advisories, and maintaining regular contact with the media. Refer all requests from the media for interviews, quotes, and/or detailed project information directly to the Contracting Agency’s PAO. Immediately notify the Engineer of any situations that may involve the media. Coordinate with PAO as necessary.

**107.75 PUBLIC OUTREACH MEASUREMENT**

PUBLIC OUTREACH PROGRAM will be measured for payment per lump sum.

**107.76 PUBLIC OUTREACH PAYMENT**

The PUBLIC OUTREACH PROGRAM will be paid for at the contract unit price per lump sum and shall include all materials, equipment, and labor necessary to complete this work as described herein.

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 107.0010 | PUBLIC OUTREACH PROGRAM | LS |

END OF SECTION 107

SECTION 108 – PROSECUTION AND PROGRESS

**108.03 PROSECUTION AND PROGRESS**

DELETE THIS SUBSECTION IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:

1. The CONTRACTOR shall be responsible for planning, scheduling and reporting the progress of the work to ensure timely completion of the contract utilizing realistic durations, material lead time, logic flow, representative cure time, etc. CONTRACTOR acknowledges overall duration as realistic and buildable per provided plans and within the contract duration.
2. The CONTRACTOR shall designate an authorized representative who will be responsible for the preparation, revision, modification, and maintenance of all project schedules. This person shall be experienced in the preparation and management of schedules of similar complexity. For projects longer than 90 days in duration [NOTE TO SPEC WRITER: EVALUATE IF 90 DAY TIME FRAME REQUIRING A “PROJECT SCHEDULER” IS APPLICABLE TO THIS PROJECT.], as established by the Owner, the project scheduler shall have 3 years verifiable experience and shall be proficient in the use of a Critical Path Method Scheduling (CPM) Software (i.e. Primavera, Suretrack). The contractor shall submit the name and resume of the project scheduler per ITB 8.4.2.

ENGINEER may order that the scheduler be removed and replaced with a competent scheduler if the scheduler provided does not meet acceptable qualifications and performance standards.

Additional schedule formatting & presentation requirements may be requested by ENGINEER.

1. The CONTRACTOR shall utilize critical path method (CPM) format.

General Definition of Critical Path Method Schedule: The Critical Path Method (CPM) is a project schedule model that reflects all the work required under the contract, and depicts the CONTRACTORs preferred sequence, or means and methods, of completing the work within the required contract time. The CPM calculations assist the CONTRACTOR and subcontractors, in proactively planning, coordinating, managing and measuring the level of effort required to complete the work within the contract time. In CPM “work” is defined as schedule activities, and “sequence” is defined as appropriate applied logic dependencies that represent the CONTRACTOR’s means and methods for completion of the work. The Completed CPM shall not be artificially constrained, and shall have the ability to dynamically measure the CONTRACTOR’s actual progress of the work as it occurs over the duration of the project.

Software Settings:

1. Retained logic shall be used.
2. All schedule activities shall be considered contiguous.
3. Critical activities shall be defined as those activities whose total float is less than or equal to zero (0) Days.
4. Duration percent complete shall be utilized to update schedule progress.
5. Calculate "Start-to-Start" lag from early start.
6. Show open ends as critical.
7. Calculate total float as finish float.

1. The CONTRACTOR shall submit a CPM baseline schedule in two parts, based upon the Sequence of Construction shown in the project plans or in these Special Provisions, in accordance with the following:
   1. Part I shall be a Preliminary Baseline Project Schedule (PBPS) and shall be submitted in accordance with ITB 8.5, within 24 hours of bid opening. Note, this is prior to Notice of Award.
   2. Part II shall be a Baseline Project Schedule (BPS) and shall be submitted 7 calendar days prior to Notice to Proceed.

E. Schedule Acceptance:

1. ENGINEER's review and acceptance of CONTRACTOR's CPM Schedule is for conformance to the requirements of the Contract Documents only. Review and acceptance by ENGINEER of CONTRACTOR's CPM Schedule does not relieve CONTRACTOR of any of its responsibility whatsoever for the accuracy or feasibility of the CPM Schedule, or of CONTRACTOR's ability to meet interim Contract Milestone dates and the Contract Times, nor does such review and acceptance expressly or impliedly warrant, acknowledge, or admit the reasonableness of the logic, durations, and resource value loading of CONTRACTOR's CPM Schedule.

2. In the event that a schedule submittal is rejected, the CONTRACTOR's Project Manager and Scheduler may be asked to attend a Corrective Action Meeting with the OWNER within five (5) Work Days.

F. Milestones - Schedule shall identify the following milestones as a minimum:

1. Notice to Proceed Date (NTP): Issuance of this date indicates the Project site is available to the CONTRACTOR and contract time has begun. The NTP is determined in coordination between the ENGINEER and the CONTRACTOR and shall be within 60 calendar days of the Award Date unless extenuating circumstances warrant setting the NTP more than 60 calendar days after the Award Date. Include any extenuating circumstances in the narrative. The Notice to Proceed Date shall be the first milestone in the schedule.

2. Interim Completion Dates or Interim Milestones: When interim completion dates or interim milestones (associated with Project stages) are included in the Contract. [NOTE TO SPEC WRITER: IF INTERIM MILESTONES ARE NECESSARY ADD THE FOLLOWING LANGUAGE HERE. For complex milestones, consider running them by John Ridilla for legal ramifications to the contract.]

1. Milestone 1: XXX Work: All project work XXX must be completed by [duration].
2. Should the CONTRACTOR fail to meet Milestone(s), there shall be deducted from any money due to the CONTRACTOR the sum of $XXX per each calendar day exceeding the Milestone. This sum shall be treated as damage due to the Contracting Agency from the CONTRACTOR by reason of added administration of the contract, including cost of engineering, inspection, supervision and other items which have caused an expenditure of funds resulting from the CONTRACTOR’s failure to complete the work.

3. Substantial Work Completion Date: Anticipated date that all work under the Contract will be substantially complete. Should the CONTRACTOR fail to substantially complete the project within the allotted contract time, there shall be deducted from any money due to the CONTRACTOR the sum of $3500 ($1500 FOR SMALLER PROJECTS) per each calendar day exceeding the allotted time. This sum shall be considered and treated, not as a penalty, but as Liquidated Damages due to the Contracting Agency from the CONTRACTOR.

4. Final Completion Date: Date defined by the Owner as the end of the 30 calendar day punchlist period per Section 108.70.

1. Float:
2. Float within the schedule, and total float within the overall schedule, is not for the exclusive use of either OWNER or CONTRACTOR, but is jointly owned by both parties and is a resource available to be reasonably used by both parties as needed to meet the Contract Times (or Milestones).
3. Since float within the schedule is jointly owned, it is acknowledged that OWNER caused delays may be offset by OWNER caused time savings (i.e. critical path submittals returned in less time than allowed by the Contract, approval of substitution requests which result in a savings of time to CONTRACTOR, etc.). In such an event, CONTRACTOR shall not be entitled to receive a time extension until all OWNER caused time savings are exceeded and the Contract Times (or Milestones) are also exceeded.
4. Use of float suppression techniques such as preferential sequencing or logic, special lead/lag logic restraints, and extended activity durations are prohibited.
5. CALENDARS
   1. CONTRACTOR's planned work schedule, assigned to all general work activities.
   2. OWNER Calendar: 5-day calendar that depicts all of the CLV's holidays, assigned to all OWNER-related activities, such as submittal review & approval, inspection, startup & testing, and training activities.
   3. Seven-Day Calendar: 7-day calendar containing no holidays or "nonwork" days, assigned to activities such as concrete curing time and Contract Milestones.
   4. If CONTRACTOR has alternate work schedules these shall also be identified with a separate calendar.
   5. If CONTRACTOR submits a written request to perform physical work during a CLV holiday, observed holiday, or a non-work period, and the request is approved by ENGINEER, any resulting inspection overtime costs shall be the sole responsibility of CONTRACTOR.

CLV's holidays are:

* + - 1. New Year's Day
      2. Martin Luther King Day
      3. Presidents’ Day
      4. Memorial Day
      5. Juneteenth
      6. Independence Day
      7. Labor Day
      8. Nevada Day Friday
      9. Veterans Day
      10. Thanksgiving Day
      11. Family Day (Friday after Thanksgiving)
      12. Christmas Day.

I. The ENGINEER may conduct a Preconstruction Scheduling Meeting with CONTRACTOR’s Project Manager, General Superintendent and Scheduler to take place within 7 calendar days after Award. This meeting is intended to cover schedule requirements including; baseline schedule preparation, reporting required, updates, revisions, and schedule delay analysis.

**108.03.01 PRELIMINARY BASELINE PROJECT SCHEDULE (PBPS)**

A. The PBPS as specified herein shall illustrate the CONTRACTOR’s overall plan and sequence of all work under the contract, within the contract time required.

1. This submittal shall be a general time-scaled logic diagram displaying the major activities and sequence of planned operations. This shall include a depiction of any phasing that may be required.
2. This diagram shall also display how the CONTRACTOR will complete work within the Contract requirements.
3. Along with the PBPS, the CONTRACTOR shall include his calendar for the contract period, which shall show workdays, calendar days and dates, CONTRACTOR holidays and historical anticipated weather delays.

B. **Failure to submit required and acceptable PBPS may be grounds for award reconsideration. PBPS should represent a realistic Level 1 type schedule recognizing overall project completion. See Appendix B for sample project schedules.**

**108.03.02 BASELINE PROJECT SCHEDULE (BPS)**

A. Part II shall be submitted for the ENGINEER’s acceptance at least seven (7) calendar days prior to Notice to Proceed. The CONTRACTOR shall allow seven (7) calendar days for review by the ENGINEER. If BPS is rejected, an additional seven (7) calendar days is allowed for each subsequent review by the ENGINEER. Note that the NTP will not be issued until the BPS is accepted. If an acceptable BPS is not agreed upon within the time frame referred to in Section 108.03, Paragraph F of these Special Provisions, then the CONTRACTOR may be considered in breach of contract. The BPS shall be generated using either Primavera or a compatible scheduling program acceptable to the Project ENGINEER.

B. The BPS shall include a detailed network diagram acceptable to the ENGINEER with the following features:

1. It shall be time scaled in calendar days. Construction activities may be measured in work days, however all schedule Milestones shall be based on Calendar days, not work days. Unless approved by the ENGINEER, activities shall not exceed twenty-one (21) calendar days in length except concrete curing, Submittal review and equipment fabrication and deliveries.
2. All activities shall be plotted on their early start and finish dates. The plot shall have a size and scale acceptable to the ENGINEER.
3. Each Activity shall be part of the logic driven network and include a predecessor (excepting the first activity) and a successor (excepting the last activity).
4. It shall show the order and interdependence of activities and the sequence of work. The critical activities shall be prominently distinguished on all reports by the use of color or other means acceptable to the ENGINEER.
5. It shall include any utility relocation required by project documents and any coordination required with other projects. Further, any owner furnished CONTRACTOR installed items shall be included. See Section 105.06 for additional utility scheduling requirements.
6. The construction activities shall be in sufficient detail to list all components of the work and to allow day-to-day monitoring of the CONTRACTOR’s operations. For example, an activity such as placement of a concrete structure should show the interdependency of all related items, such as submittals (mix designs, rebar certifications, shop drawings, etc.); any required review period; start work; excavation; forming; reinforcing; concrete placement; concrete curing; removal of forms; etc.
7. The activities shall be coded so as to conform to the contract bid item number in order to demonstrate the schedule contains all contractual work.
8. Only the NTP, Substantial Completion & Final Completion Milestones shall have constraints. Further, the use of mandatory constraints is not acceptable. (Reference Section 108.03.F for required Milestones)
9. No schedule activities shall be allowed after Final Completion
10. The use of Notebook topics or logs shall not be considered written notification to the owner.
11. The diagram shall be accompanied by a Schedule Report of the network with a tabulation of the following data for each activity:
    1. Activity ID number
    2. Activity description
    3. Activity duration
    4. Earliest start date
    5. Earliest finish date
    6. Latest start date
    7. Latest finish date
    8. Total float
    9. Predecessor & Successors
    10. Responsibility for activity (e.g. CONTRACTOR, SubCONTRACTOR, Supplier, etc.)
    11. Bid item for which the activity is a part
    12. Any activity constraints
    13. **For Projects Over Five (5) Million Dollars** –
        1. Schedule activities shall be assigned a budgeted cost & resource value.
        2. Cost and resource loading shall define Cost, Labor and Equipment (model/size) by CONTRACTOR, SubCONTRACTOR and Suppliers for all activities in the schedule
        3. The sum of all budgeted cost values shall be equal to the Contract Value and the sum of all of the resource values shall equal the total resources included in the CONTRACTORs bid estimate.
    14. Additional schedule formatting & presentation requirements may be requested by ENGINEER.
12. The CONTRACTOR shall not submit a proposed baseline Schedule that indicates an overall forecast substantial completion date earlier than contractually required. If interim completion milestones are included in the contract, their dates must also reflect the dates required by the contract as well. If the CONTRACTOR feels they can finish the project earlier than contract dates, they can add a Schedule Contingency activity to capture the float time between last day of work and Contract Completion. This float or contingency allowance belongs to the project, ie; both the CONTRACTOR and Owner (Reference Section 108.03.02.B.17 below)
13. Seasonal weather conditions shall be considered and included in the planning and scheduling of all work influenced by high or low ambient temperatures and/or precipitation to ensure completion of all work within the contract time.
14. Seasonal weather conditions shall be determined by an assessment of average historical climatic conditions based upon the preceding ten (10) year records published for the locality by the National Oceanic and Atmospheric Administration (NOAA) and entitled “Local Climatological Data”.
15. The following schedule of anticipated adverse weather delays is based on NOAA or similar data for the project location and will constitute the baseline for the total contract time adverse weather delay evaluations. The CONTRACTOR’s Baseline Project Schedule must assume to anticipate this degree of adverse weather delays in all weather dependent activities.

|  |
| --- |
| MONTHLY ANTICIPATED ADVERSE WEATHER DAYS  Based on Work Days as Described in Section 110 |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| 6 | 2 | 2 | 1 | 1 | 0 | 2 | 2 | 1 | 1 | 1 | 3 |

1. The CONTRACTOR is to provide written notification to the ENGINEER of the occurrence of adverse weather delay days and resultant impact to normally scheduled work, within ten (10) calendar days of each occurrence, when such weather prevents work on critical activities for fifty percent (50%) or more of the CONTRACTOR’s scheduled workday. A time extension may be granted when the number of actual adverse weather days calculated from the Notice to Proceed date to the date the CONTRACTOR asserts the request exceeds the total anticipated adverse weather delays using the above table for the same time period. If the CONTRACTOR wishes to assert additional claim(s) for time adjustment at later date(s), each succeeding claim must address the time period from Notice to Proceed date to the date of the request. No compensation will be made for monetary damages due to anticipated adverse weather delay(s).
2. Float time belongs to the project and is not for the exclusive use or benefit of either the Owner or the CONTRACTOR. Extension of time for performance may be granted to the extent that equitable time adjustment for the activity affected exceeds the total float, or where otherwise justified, and impact on the contract completion can be shown. The CONTRACTOR’s schedule shall be based on the contract time and shall not be based on an early completion schedule. No additional compensation will be allowed to the CONTRACTOR for delays to an early completion schedule.
3. Baseline Schedule Submittal shall include as a minimum the following components;
   1. Tabular listing of all activities including activity data
   2. Time scaled bar chart
   3. Predecessor/successor report
   4. Budgeted cost assigned to each construction activity
   5. Phase, responsibility, area and work type coding of activities (P3/ Suretrak)
   6. Work Breakdown Structure (P6 Software)
   7. Total Float Report (organized by total float)
   8. The Baseline Schedule narrative shall at a minimum explain the schedule logic and construction sequencing, identify risk areas, and identify critical path
   9. Digital submittal containing all of the above diagrams in PDF form and the complete native CPM schedule program file for electronic review by ENGINEER.

See Appendix B for sample project schedules.

1. Acceptance of the CONTRACTOR’s schedules by the ENGINEER is not to be construed as relieving the CONTRACTOR of his obligation to complete the work within the contract time; or as granting, rejecting or in any other way acting on the CONTRACTOR’s requests for adjustments to the date for completing contract work, or claims for additional compensation.
2. Furthermore, the accuracy and viability of the submitted schedule is the responsibility of the CONTRACTOR. The ENGINEER does not take responsibility for the CONTRACTOR’s actions by either accepting or approving the schedule submittal, they merely indicate, whether or not, the schedule submittal complies with the required scheduling specification and standard of care regarding current scheduling practices.
3. Progress payments to the CONTRACTOR may be, at the option of the ENGINEER, withheld until the Baseline Schedule, satisfactory in form and substance to the ENGINEER, has been received, review and accepted. Further, CONTRACTOR may be subject to receipt of a Stop Work notice and potential default of contract, pursuant to NRS Chapter 338.

**108.03.03 MONTHLY PROGRESS SCHEDULE**

1. For all projects the CONTRACTOR shall submit a monthly progress schedule with each pay estimate.
2. Monthly progress schedules shall be submitted and accepted monthly. Should the CONTRACTOR fail to submit two consecutive acceptable monthly progress schedules or three over the course of the project, CONTRACTOR will be issued a 10-day cure notice and may be subject to receipt of a Stop Work notice and potential default of contract, pursuant to NRS Chapter 338. 10% of the monthly progress payment will be withheld until an acceptable monthly progress schedule is submitted. NOTE TO SPEC WRITER ‘3 over project’ should be project specific based on duration – 3 is based on a 12 mo project…
3. The monthly progress schedule shall conform to all the requirements indicated under Section 108.03.02 “Baseline Project Schedule” and shall state the percentage of revenue actually earned as of the report date. The monthly progress schedule shall also be accompanied by a narrative description of job progress, problem areas and current and anticipated delaying factors and their expected effect and any corrective actions proposed or taken. The narrative description shall also clearly identify any departures from earlier Baseline Project Schedules, including but not limited to, changes in logical sequence or logical ties, constraints, changes in activity duration and changes, additions or deletions in event numbers, activity numbers and activity descriptions. The reasons for each departure shall be included in the narrative description.
4. Monthly Schedule Submittal shall include as a minimum the following components;  
   1. Work Completed this Period
   2. All Activities Progress Schedule
   3. Critical Path Filter
   4. Three Week Look Ahead
   5. Total Float Report (organized by total float)
   6. Resource Reports (as required)
   7. The Monthly Project Status Schedule narrative shall at a minimum explain schedule logic changes, added activities, identify risk or delay areas, identify critical path and general progress of work
   8. Digital submittal containing all of the above diagrams in PDF form and the complete native CPM schedule program file XML (generated by Microsoft Project or Primavera P6) for electronic review by ENGINEER.
5. The CONTRACTOR shall allow fourteen (14) calendar days for the Owner’s review and acceptance or rejection of any Monthly Progress Schedules or Project Recovery Schedules. The CONTRACTOR shall participate in a review and evaluation of the schedules with the ENGINEER, as requested. Requested revisions to the schedules shall be provided to the Owner within seven (7) calendar days.

**108.03.04 THREE WEEK LOOK AHEAD SCHEDULE – FOR ALL PROJECTS**

A. Concurrent with the weekly progress meetings, the CONTRACTOR shall submit a three week look ahead schedule (two weeks forward and one behind) to the Construction Manager and/or ENGINEER. This schedule shall be generated from the master schedule. It shall indicate the status on scheduled activities within the three week window, including:

1. Percent complete
2. Actual start/finish dates
3. Planned start dates
4. Continuation of work
5. Start and Finish Variance Columns (Targeted to the previous update)

B. These status reports shall serve as the basis for discussion at construction progress meetings and will be used to evaluate the status of the work in progress on a continuing basis.

**108.03.05 PROJECT RECOVERY SCHEDULE**

A. The CONTRACTOR shall submit a Project Recovery Schedule, at the discretion of the ENGINEER, when the most current Progress Schedule Update reflects a calculated schedule status of negative fifteen (15) calendar days (or five percent (5%) of the remaining duration of time to complete the Project, whichever is less) later than currently contractually allowed.

B. The Project recovery Schedule shall utilize as its basis, the most current Progress schedule update data with reasonable modifications to remaining work sequences, means or methods that will allow the project to complete, as required, by the current contractual completion date.

C. The conditions under which a Project Recovery Schedule will be required include the following:

1. When delays in submittals or deliveries make re-planning or rescheduling of the work necessary.
2. When the schedule does not represent actual prosecution and progress of the work.
3. When any change to the sequence of activities, the completion date for major portions of the work, or changes occur which affect the critical path.
4. When contract modification necessitates schedule revision.

**108.04 LIMITATIONS OF OPERATIONS**

***ADD THE FOLLOWING PARAGRAPH TO THIS SUBSECTION:***

D. The CONTRACTOR shall conduct the work in such a manner and in such a sequence as will ensure the least interference with traffic and as approved by the ENGINEER.

**108.05 CHARACTER OF WORKMEN; METHODS AND EQUIPMENT**

***ADD THE FOLLOWING PARAGRAPH TO THIS SUBSECTION:***

H. OSHA Standards and Interpretations, CFR 29 Part 1926 Subpart P, defines “competent person”, one who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate those hazards and conditions.

**108.08 DETERMINATIONS AND EXTENSION OF CONTRACT TIME**

***DELETE PARAGRAPH “A” OF THIS SUBSECTION AND REPLACE WITH THE FOLLOWING:***

A. The contract time for completion will be fixed by the Contracting Agency and will be stated in the Owner–CONTRACTOR Agreement, either as a calendar date or based on a number of working days or on a specified number of calendar days.

***ADD THE FOLLOWING PARAGRAPHS TO THIS SUBSECTION:***

1. Completion of all Work within Contract Time Limits. When change orders are indicated, possible delays can be experienced, or the CONTRACTOR proposes to revise the Baseline Project Schedule with impact to project milestones and/or substantial completion, the CONTRACTOR shall submit to the Owner a written Time Impact Analysis (TIA) illustrating the influence of each modification, delay or CONTRACTOR request on the contract time. The preparation costs for the TIA is considered part of the potential added CONTRACTOR’s Overhead pricing, if a change order impacted the project milestones.

Each TIA shall include a fragmentary network (network analysis) demonstrating how the CONTRACTOR proposes to incorporate the modification, delay or CONTRACTOR request into an accepted progress schedule with a status date immediately before or just prior to the delaying event. The TIA shall demonstrate the time impact based on the date the modification is given to the CONTRACTOR or the date the delay occurred; the status of construction at that point in time; and the event time computation of all affected activities. The event times used in the TIA shall be those included in the latest schedule update or as adjusted by mutual agreement. The possible time impact demonstrated by the TIA will serve as justification for an excusable time extension, but not necessary a compensable one. In order for a time extension to be both excusable and compensable, the CONTRACTOR must account for the effects of other concurrent delays that were on-going at the time, but had a differing, and less impact of the project milestones.

1. A contract time change shall only be authorized by executed Change Order, and when a TIA justifies and substantiates a time impact to milestone or substantial completion dates extending them beyond that required by the Contract. The approved revision shall then be incorporated into the next monthly progress schedule submission.
2. No time impact costs, delays, or damages shall be considered by the Owner if during the period that the CONTRACTOR’s actual performance of work is better than that planned and the effect of the better than planned work is that the contract schedule reflects an earlier than required contractual date.

***ADD THE FOLLOWING SUBSECTIONS TO THIS SECTION:***

**108.70 CONTRACT CLOSE-OUT PROCEDURE**

1. When the CONTRACTOR considers that all work under the contract is substantially complete, the CONTRACTOR shall inform the ENGINEER in writing.
2. Upon receipt of notification from the CONTRACTOR that all work has been substantially complete, the ENGINEER shall:
3. Inspect the work to determine if it is substantially complete and inform the CONTRACTOR in writing of this determination.
4. Notify, in writing, all affected utilities and other governmental agencies and request their acceptance or punch list comments within fourteen (14) calendar days of receipt of the request or as an alternate their participation in the project walk-thru.
5. Schedule an inspection with the CONTRACTOR’s representative and any other affected agency. This inspection shall be for the purpose of developing a punch list of items requiring correction, repair or completion. The punch list shall include comments made by the ENGINEER to date on the Record Drawings submitted by the CONTRACTOR.
6. Compile the punch list from the comments provided at the inspection and supply type written copy to the CONTRACTOR. Upon distribution of the punch list items to the CONTRACTOR, the punch list time allotment shall commence.
7. At the time of the CONTRACTOR’s notice of presumptive completion of the work, which shall include all valve and manhole adjustments, video inspection approvals for sewer systems, complete signal systems and streetlight assemblies which are operational with permanent power, all permanent signage, striping and other pavement markings and all other work, excepting punch list items and clean up, the CONTRACTOR will receive a Notice of Substantial Completion from the ENGINEER. On the date of the Notice of Substantial Completion, the time specified in the contract for completion of the work will terminate. Thereafter, the CONTRACTOR shall complete all work on the punch list and required clean up **within thirty (30) calendar days** or other time as agreed to by the CONTRACTOR and the ENGINEER. Granting of additional time shall not be considered a compensable time extension.
8. Scheduled completion of the punch list shall not exceed thirty (30) calendar days from date of the punch list letter or as otherwise agreed to by the CONTRACTOR and ENGINEER.
9. When all punch list items are completed and as-built drawings are submitted, the CONTRACTOR shall then notify, in writing, the Owner/ENGINEER who will verify their completion and CONTRACTOR shall submit the Final Record Drawings (Reference section GC 5.06; and Section 105 of the Special Provisions)
10. Should the CONTRACTOR fail to complete the punch list and required clean up within the allocated time or within such extra time as allowed by the ENGINEER, there shall be deducted from any money due the CONTRACTOR the sum of ***$3500 ($1500 FOR SMALLER PROJECTS)*** per each calendar day exceeding the allotted time. This sum shall be considered and treated, not as a penalty, but as damage due the Contracting Agency from the CONTRACTOR by reason of added administration of the contract, including cost of engineering, inspection, supervision and other items which have caused an expenditure of funds resulting from the CONTRACTOR’s failure to complete the work on the punch list and required cleanup.

**108.71 WARRANTY INSPECTION**

1. The CONTRACTOR shall be responsible for scheduling and conducting a warranty inspection with the Owner and its representatives approximately one (1) month prior to the expiration of the warranty period. This shall also include a meeting prior to the warranty inspection.
2. All warranty corrections identified during the warranty inspection shall be commenced prior to the Guarantee Bond expiration date. The CONTRACTOR shall be required to comply with all Federal, State and local laws, regulations and ordinances regarding safety and environmental issues as it applies to the warranty inspection. The warranty inspection shall include, but not limited to, the following: traffic control plan submission; approval and set up for the inspection; confined space entry; support staff as needed; provide access to the inspection site and all equipment, materials, and manpower required to conduct the warranty inspection.
3. The cost of this inspection shall be considered incidental to the bid items in the contract. The CONTRACTOR’s failure to perform the inspection shall not constitute waiver of warranty, and may necessitate the Owner to complete the warranty inspection and corrections, with costs incurred charged to the CONTRACTOR or against the Warranty Bond at the option of the Owner.

**108.72 METHOD OF MEASUREMENT**

A. Submittals required by this section will not be measured for payment directly but shall be included as 10 percent of Bid Item No. 200.0010 “Mobilization and Demobilization”.

**108.73 METHOD OF PAYMENT**

1. No direct payment will be made for CONTRACTOR costs relating to preparation and submission of schedules and reports and revisions thereto, the cost being considered as included in the Bid Item No. 200.0010 “Mobilization and Demobilization”.
2. The CONTRACTOR’s cost for Section 108 shall be included in Bid Item No. 200.0010 “Mobilization and Demobilization”, which shall be full compensation for all materials, equipment and labor required including, but not limited to, Preliminary Baseline Project Schedule; review meetings; revisions as directed by the ENGINEER; Schedule Reports; Monthly Progress Schedules; Three Week Look Ahead; any required Time Impact Analysis; Remedial Project Schedules; including any and all other incidentals necessary to complete and comply with the work as described herein.

END OF SECTION 108

SECTION 109 – MEASUREMENT AND PAYMENT

* 1. **CONSTRUCTION CONFLICTS AND ADDITIONAL WORK**

***ADD THE FOLLOWING TO PARAGRAPH “E.6” OF THIS SUBSECTION:***

c. No payment will be made for labor performed on force account work until the Contractor shall furnish to the Contracting Agency the base rates as defined in USS Section 109.03.E.3.

***ADD THE FOLLOWING SUBSECTION:***

* 1. **CONSTRUCTION CONFLICTS AND ADDITIONAL WORK**

1. This work shall consist of repairing, rebuilding, relocating, replacing, constructing or reconstructing any surface or sub-surface improvements which cannot be paid by extending bid items and which are not shown on the drawings, or not otherwise covered in these Special Provisions. Such work shall be performed in accordance with the Standard Specifications Standard Drawings, and these Special Provisions and as directed by the Engineer.
2. The work shall include, but is not limited to, supplying all labor, material, equipment, and transportation necessary to repair, rebuild, remove, relocate, replace, construct or reconstruct any surface or subsurface improvements which are not shown on the plans and or otherwise addressed in the contract documents. Such work shall be performed in accordance with the USS, USD, and Special Provisions and/or as directed by the Engineer.
3. This bid item is present in the Contract documents to account for corrections, alterations, or modifications of the work that are not included in the Contract and are approved by the Engineer, and increase the amount of work to be done.
4. Construction Conflicts may be tracked using Construction Change Directives.
5. Measurement for work under this item shall be based on the actual quantities of a similar item, negotiated lump sum of the actual labor, material and equipment used to perform the work, or on a Force Account basis. The method of payment shall be determined by the City. No work shall occur nor shall payment be made without prior authorization of the City.
6. "Construction Conflicts and Contingency Allowance." has been entered into the bid schedule under bid item number 109.0001, The bidder shall include this amount in the total base bid base amount. Additional Work authorized through construction change directives or change orders issued in accordance with Contract Documents and accepted by the Engineer will be deducted from and paid through the Allowance specified in this subsection.
7. Funds associated with changes to contract work scope resulting in a credit to the owner shall revert to the "Construction Conflicts and Contingency Allowance," bid item number 109.0001. At the Owner’s discretion, these funds may be reallocated for other project work or be retained by the owner upon contract completion.

**109.06 partial payment**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

1. Invoices may not be submitted for payment until the Project Baseline Schedule has been accepted and approved by the Engineer.
2. Invoices may not be submitted for payment until the Survey cut sheets have been submitted pursuant to Section 622.
3. Prior to monthly payment being processed the following will be required: traffic control checklist, monthly schedule update, SWPPP report, monthly QC report, photo log, and superintendent daily reports.

**109.07 ACCEPTANCE AND FINAL payment**

***DELETE PARAGRAPH B IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:***

B. Final acceptance of the work by the Contracting Agency shall be withheld until the Contractor furnishes all certificates, guaranties, releases, certified payroll records, affidavits, approval letter of NPDES permit termination (NOT) from NDEP, etc., required by these specifications or the Special Provisions.

NOTE: THE CITY HAS DETERMINED THAT THE FOLLOWING SECTION IS TO BE INCLUDED ON ALL PROJECTS OVER $500,000.

***ADD THE FOLLOWING SUBSECTIONS TO THIS SECTION:***

**109.60 EXTENSION OF QUANTITIES**

1. The extension of quantities for the purpose of paying for unrelated items of work shall not be permitted. Only in kind pay item quantities will be allowed to be extended for additional work, for example, plantmix bituminous surface will only be extended for additional plantmix bituminous surface, or concrete sidewalk will only be extended for additional concrete sidewalk, etc.

**109.61 UNSETTLED CLAIMS**

A. If the Contractor and Engineer cannot agree on a negotiated cost for the additional work, the Engineer may give the Contractor a written notice to proceed with the additional work. The Contractor shall then expeditiously perform the work as required and the additional compensation for such work shall be paid under Subsection 109.03, "Extra and Force Account Work." However, if the Contractor deems that any additional compensation is due him for the additional work, the Contractor may file a claim in accordance with Subsection 105.17, "Claims for Adjustments and Disputes."

**109.70 CONTRACTOR EVALUATION NOTIFICATION**

1. The City of Las Vegas Engineering Department has instituted a post construction process of Contractor Evaluation. This performance evaluation will encompass all aspects of project performance and responsiveness to all job related issues. These can and will include: adherence to schedule; expertise shown in field and management personnel; quality of the finished product; response to changes and project closeout. Additional items will include: compliance to Contract Documents; compliance with labor laws and Equal Opportunity Contracting Policy (EOCP); and overall cooperation of the Contractor and sub-contractors. This evaluation will be done with the input from all relevant City of Las Vegas Departments up to and including any outside consultants.

NOTE: DO NOT INCLUDE B. ON CMAR PROJECTS.

1. A performance evaluation score of 4.0 or higher may result in a bonus payment to the Contractor of up to one-half of one percent (0.5%) of the final contract amount (not to exceed $20,000.00).
2. Substandard performance could result in possible temporary bidding suspension, lasting a maximum of twelve months, on future City of Las Vegas related projects beginning in the next annual quarter.
3. Results will be sent via registered mail to the company Principals as recorded by the Nevada State Contractor’s Board.

NOTE: THE CITY HAS DETERMINED THAT THE FOLLOWING SECTION IS TO BE INCLUDED ON ALL DESIGN-BID-BUILD PROJECTS. VERIFY THAT FUNDING SOURCE(S), ESPECIALLY FEDERAL, WILL PAY FOR THIS ITEM. DO NOT INCLUDE ON CMAR PROJECTS.

**109.71 COMPENSATION FOR OWNER INITIATED TIME EXTENSIONS**

1. Any claim by the Contractor for additional compensation for time extensions to the Project Schedule caused by the Owner shall be subject to the requirements of this Section. The parties agree that for the Owner initiated time extensions which the Owner agrees to pay, or is found liable for payment, shall be based on the unit price set forth herein. The unit price for additional compensation is composed of the allowance established by the Owner based upon the Contracting Agency’s historical experience with the cost of Owner initiated time extensions plus the additional amount bid by the Contractor per day for the time extension. The unit price multiplied by the number of days that the Owner initiated time extension impacts the Project Schedule shall be the full compensation due the Contractor for all time extension related costs, both direct and indirect, connected to the Project, including, but not limited to, home and field office overhead, supervision costs, and opportunity costs, except traffic control costs which will be paid on a per day basis in accordance with Sections 624 and 625. The Traffic Control per day costs shall be calculated by dividing the lump sum amount by the original contract duration. Equipment standby costs shall be compensated at 50% of the hourly rate to be paid for each piece of idle equipment, which shall be calculated from the weekly rate divided by 40 with a maximum of 8 hours in any 24 hour period, as determined in the *Rental Rate Blue Book for Construction Equipment*, Volumes 1-3. Standby equipment rental rates will not include the estimated operating cost due to inactivity. Owner initiated time extensions shall mean the time extensions authorized by Time Impact Analysis (TIA), as set forth in Section 108.08 of the Standard Specifications and these Special Provisions.
2. If the Owner initiated time extension for which the Contractor is seeking additional compensation is concurrent with (i) an excusable time extension as defined in Section 108.08, (ii) with a time extension which is beyond the control of the Owner, or (iii) with a time extension caused by the Contractor, the Contractor shall not be entitled to any additional compensation for that portion of time during which the time extensions are occurring concurrently. In no event shall the Contractor be entitled to any additional compensation on the basis that an early completion date in the Project Schedule was anticipated or planned for by the Contractor. If the Contractor experiences multiple concurrent Owner initiated time extensions which are not concurrent with any other time extensions, compensation will be paid for one Owner initiated time extension only based upon the bid price day per calendar day set forth in this Section.
3. Any time extension costs incurred while performing additional work on a force account basis shall be considered as compensated for within the markups allowed in Subsection 109.03 “EXTRA AND FORCE ACCOUNT WORK.” Owner initiated time extensions will not be added to extra work or force account markups.
4. This is an allowance item that will be paid for the actual quantity used, and is not subject to price re-negotiation based on quantity variance from the bid quantity of days. The claim for additional compensation submitted by the Contractor shall be evaluated by the City and, if deemed valid, paid pursuant to this Section. Section 104.02 of the Standard Specifications does not apply to this item.
5. In the case that the owner initiates a “stop work” on the project, the contract days will not be affected, per Section 108.06 of the Standard Specifications, and bid amounts for Owner Initiated Time Extension will not be paid. The Contractor will, however, be allowed compensation for actual costs associated with demobilization, remobilization, site security, traffic control, temporary pavement, including asphalt and concrete patches, and compliance with section 637 “Pollution Control”.
6. The Owner initiated Time extension Allowance shall be $XXXX (NOTE, FOR LARGE STORM PROJECTS $500/DAY HAS BEEN USED) per day. The Owner initiated Time extension Amount in Addition to Allowance will be paid for at the contract unit price per day and shall be in an amount as bid by the Contractor. NOTE TO SPEC. WRITER: ON THE BID SCHEDULE FOR BID ITEM109.0010 YOU WILL PROVIDE THE UNIT COST AND THE NUMBER OF DAYS, FOR BID ITEM 109.0020 YOU WILL PROVIDE THE NUMBER OF DAYS, THE NUMBER OF DAYS CAN LOOSELY BE CALCULATED AS ABOUT 10% OF THE TOTAL NUMBER OF DAYS IN CONSTRUCTION.

**METHOD OF MEASUREMENT**

**109.80 MEASUREMENT**

Measurement for construction conflicts and additional work will be in accordance with the approved change orders and deducted from the allowance amount specified in item 109.0001.

Measurement for OWNER INITIATED TIME EXTENSION ALLOWANCE and OWNER INITIATED TIME EXTENSION AMOUNT IN ADDITION TO ALLOWANCE will be paid per day as approved by the Engineer.

**109.81 PAYMENT**

1. Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 109.0001 | CONSTRUCTION CONFLICTS AND CONTINGENCY ALLOWANCE | ALLOW |
| 109.0010 | OWNER INITIATED TIME EXTENSION ALLOWANCE (NOTE: YOU WILL PROVIDE THE NUMBER OF DAYS AND THE AMOUNT PER DAY ON THE BID SCHEDULE FOR THIS ITEM) | DAY |
| 109.0020 | OWNER INITIATED TIME EXTENSION AMOUNT IN ADDITION TO ALLOWANCE (NOTE: YOU WILL PROVIDE THE NUMBER OF DAYS ON THE BID SCHEDULE FOR THIS ITEM AND IT WILL BE THE SAME NUMBER OF DAYS YOU PROVIDE FOR ITEM 109.0010) | DAY |

END OF SECTION 109

SECTION 110 – WAGES, HOURS AND CONDITIONS OF EMPLOYMENT

***Add the following subsection TO THIS SECTION:***

**110.70 NORMAL WORKING HOURS**

1. The Contractor is advised that the normal working hours for City of Las Vegas employees will be **7:00 a.m. to 4:00 p.m.**, Monday through Friday except for the holidays detailed in Section 108.03.
2. The Contractor shall pay for the overtime of all employees of the City and its designated representatives, who are requested by the Contractor to perform inspection or testing, or who as a result of the Contractor’s operation, are required to perform inspections or testing beyond the normal hours of the established working day listed above. **Overtime rate for City employees and its designated representatives is $110.00 per hour, with a three hour minimum. The three hour minimum shall not apply if it is a continuation of shift.**
3. The Contractor shall not be required to pay for the overtime of employees of the City or its designated representatives who, as a result of a request by the Owner, are required to perform inspections or testing beyond the normal hours of the contract.
4. The Contractor shall not be required to pay for the wages of the employees of the City or its designated representatives who are required to work beyond the normal working hours due to work phases that require night work under NDOT encroachment permits; however, work will be restricted to a normal eight hour shift.
5. The City of Las Vegas construction project representative may not approve any portion of the work completed during his absence. The City will retain the right to insist on removal of work completed during inspector’s absence.
6. The Contractor will be required to pay for inspection of facilities not under the jurisdiction of the City of Las Vegas, performed outside of regular working hours. Payment will be at the current rates charged by the responding agency.

Note to Spec writer: Federal Projects may require payment for training. Number of hours and rate of reimbursement will be set by NDOT.

110.71 TRAINING

1. The Contractor shall provide on-the-job training aimed at developing full journeymen in the type of trade or job classification involved. The number of hours of training will be as specified in the bid proposal under bid item “Training.”
2. In the event that the Contractor subcontracts a portion of the contract work, he shall determine how many, if any, of the trainees are to be trained by the subcontractor, provided, however, that the Contractor shall retain the primary responsibility for meeting the training requirements specified. The Contractor shall also insure that this training subsection is made applicable to such subcontract. Where feasible, 25 percent of apprentices or trainees in each occupation shall be in their first year of apprenticeship or training.
3. The number of trainees shall be distributed among the work classifications on the basis of the Contractor’s needs and the availability of journeymen in the various classifications within a reasonable area of recruitment. Where feasible, the trainees or apprentices assigned to the project should reside in the general vicinity of the project limits. Prior to commencing construction, the Contractor shall submit to the Engineer for approval the number of trainees to be trained in each selected classification and training program to be used. Furthermore, the Contractor shall specify the starting time for training in each of the classifications, The Contractor will be credited for each trainee or apprentice employed by him on the contract who is currently enrolled or becomes enrolled in an approved program and will be reimbursed for such trainees as provided hereinafter.
4. Training and upgrading of minorities and women toward journeymen status is a primary objective of this training requirement. Accordingly, the Contractor shall attempt to enroll minority trainees and women to the extent that such persons are available within a reasonable area of recruitment. This training commitment is not intended, and shall not be used, to discriminate against any applicant for training, whether a member of a minority group or not.
5. No employee shall be employed as a trainee in any classification in which he has successfully completed a training course leading to journeyman status or in which he has been employed as a journeyman.
6. The minimum length and type of training for each classification will be as established in the training program selected by the Contractor and approved by the Engineer. The program should be calculated to qualify the average trainee for journeyman status in the classification concerned by the end of the training period. Furthermore, apprenticeship programs must be registered with the Nevada State Apprenticeship Council or the US Department of Labor, Bureau of Apprenticeship and Training, or other local programs approved by the Contracting Agency. Approval or acceptance of a training program shall be obtained from the Engineer prior to commencing work on the classification covered by the program. It is the intention of these provisions that training is to be provided in the construction crafts rather than clerk-typists or secretarial-type positions. Training is permissible in lower level management positions such as office engineers, estimators, timekeepers, etc., where the training is oriented toward construction applications. Training in the laborer classification may be permitted provided that significant and meaningful training is provided and approved by the Engineer. Some offsite training is permissible as long as the training is an integral part of an approved training program and does not comprise a significant part of the overall training.
7. Except as otherwise noted below, the Contractor will be reimbursed 1.40 dollars per hour of training given an employee on this contract in accordance with an approved training program. As approved by the Engineer, reimbursement will be made for training persons in excess of the number specified. This reimbursement will be made even though the Contractor receives additional training program funds from other sources, provided such other does not specifically prohibit the Contractor from receiving other reimbursement. Reimbursement for offsite training indicated above may only be made to the Contractor where he contributes to the cost of the training, provides the instruction to the trainee, or pays the trainee’s wages during the offsite training period.
8. No payment will be made to the Contractor if either the failure to provide the required training, or the failure to hire the trainee as a journeyman, is caused by the Contractor and evidences a lack of good faith on the part of the Contractor in meeting the requirements of this provision. It is normally expected that a trainee will begin his training on the project as soon as feasible after start of work utilizing the skill involved and remain on the project as long as training opportunities exist in his work classification or until he has completed his training program. It is not required that all trainees be on the project for the entire length of the contract. The Contractor will have fulfilled his responsibilities under this provision if he has provided acceptable training to the number of trainees specified. The number trained shall be determined on the basis of the total number enrolled on the contract for a significant period.
9. Trainees will be paid at least 60 percent of the appropriate minimum journeyman’s rate specified in the contract for the first half of the training period, 75 percent for the third quarter of the training period, and 90 percent for the last quarter of the training period, unless apprentices or trainees in an approved existing program are enrolled as trainees on this project. In that case, the appropriate rates approved in connection with the existing program shall apply to all trainees being trained for the same classification who are covered by this provision.
10. The Contractor shall furnish the trainee a copy of the program he will follow in providing the training. The Contractor shall provide each trainee with a certification showing the type and length of training satisfactorily completed. The Contractor will provide for the maintenance of records and furnish periodic reports documenting his performance under this provision.

110.72 MEASUREMENT

Training will be measured by the hours trainees are employed on the contract.

110.73 PAYMENT

The accepted quantities of training, measured as specified above will be paid for at the price per hour as specified in subsection 110.71 “TRAINING,” and payment will be full compensation for the work prescribed in this section.

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| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 110.0010 | TRAINING | HR |

**END OF SECTION 110**

*ADD THE FOLLOWING SECTION:*

SECTION 111 – CONTRACTOR QUALITY CONTROL ADMINISTRATION – GENERAL CONTRACTOR PROGRAM

111.01 GENERAL

* 1. The Contractor Quality Control Program includes the following Sections:
     1. Section 111 - Contractor Administration and Quality Control-General Contractor Program
     2. Section 112 - Contractor Quality Control Administration
     3. Section 113 – Contractor Quality Control Organization and Qualification of Laboratories and Technicians
     4. Section 114 – Contractor Quality Control Procedures
     5. Section 117 - Contractor Quality Control Testing
  2. Program Documents: A written program does not have to be submitted if the Contractor performs the administration, and testing in accordance with this and other referenced sections. The only submittal required for approval for the quality control program itself is the personnel qualifications as listed in Section 113, "Contractor Quality Control Organization and Qualification of Laboratories and Technicians."
  3. Federal projects require a Quality Control Coordinator (QCC) separate from the Responsible Person-in-Charge (RPC). The QCC and RPC shall be located on‑site full-time. The description of these positions are in Subsection 113.02 “Organization.” The contractor shall submit, for approval by the Engineer, an organization chart indicating the position numbers and the persons responsible.

111.02 Subcontractor Quality Control Programs

* 1. In the event a Subcontractor has a Quality Control Program, the Subcontractor Quality Control (QC) Program shall provide, at a minimum, the requirements set forth in this specification, tailored to the Subcontractor scope of work. The only point of contact for the Engineer is the Prime Contractor. Therefore, the Responsible Person-in-Charge (RPC shall be on-site during any subcontractor work.

111.03 DEFINITIONS GENERAL

* 1. The definitions given herein shall not be construed to modify the definitions given in Section 101, “Definitions and Terms,” unless specifically stated:
     1. Authorized Materials List: A list generated by the Engineer containing materials “Authorized” for incorporation into the work. Contractor may select materials from this list for submittal by using only the product name and manufacturer. The period of Authorization is indefinite, contingent upon continued execution, by the Material Source, of the Quality Control Program that has been approved by the Contracting Agency.
     2. Control Measures: All actions taken to ensure that materials are in compliance with specifications, including but not limited to submittal, testing, inspection, documentation, quantifying for testing and payment, As-Built drawings, and material tracking. The Contractor shall perform independent Control Measures from the Engineer's Quality Assurance to ensure that all elements of the project are within specifications.
     3. Inspection: A control measure utilizing visual and manualmethods shall be used to determine the quality of workmanship, material**,** or finished product. Inspections shall determine if all verifiable parts, practices, and products are in compliance with the Contract Documents. All inspections shall be documented, and any deviations from Contract Documents shall be noted therein.
     4. IQAC Materials List: A source list generated by the Interagency Quality Assurance Committee (IQAC), which contains materials requiring an abbreviated submittal prior to incorporation into the work. The period of Qualification will typically be one year or as indicated on the IQAC. Materials on the IQAC list that are removed by IQAC before or during a project shall not be incorporated into the work. This does not eliminate the testing that is to be performed at the project site or of that to a non-authorized source.
     5. Lot: One day’s production, regardless of quantity produced. One day’s production shall be considered as one continuous production run within one working day shift by the Source or Contractor from which the finished product was produced.
        1. Examples of a Lot are as follows:
           1. One “heat” or one continuous pouring from a caldron for reinforcing steel.
           2. One day’s production of a particular mix design of Asphalt Concrete regardless of tonnage quantity.
           3. One “batch” of Portland Cement or Asphalt Cement (binder).
           4. One day’s production of a particular mix design of Portland Cement Concrete.
        2. Lots may be composed of several sub-lots as provided by specification.
     6. Qualified Source: A Source that has been tested by the Contractor and approved for acceptance by the Engineer.
     7. Oversight: The Contractor’s supervisory personnel shall perform all daily, supervisory oversight, and normal worker performance verification checks during production of the work. Oversight shall be documented.
     8. Pre-Activity Meeting: A meeting to coordinate the quality control, quality assurance, and work planning for a specific activity prior to its start. This formal meeting shall resolve all outstanding issues regarding submittals, inspection, testing requirements, elevation controls, safety, and work plan.
     9. Quality Assurance (QA): Quality Assurance shall be all Control measures taken by the Engineer to verify that the Contractor Quality Control measures, materials, and workmanship comply with Contract Documents.
     10. Independent Assurance (IA): Independent Assurance verifies that Engineer's and Contractor's Quality Assurance and Quality Control measures comply with the Contracting Agency procedures and Contract Documents.
     11. Quality Control (QC): Quality Control shall be all measures taken by the Contractor to ensure that materials and workmanship are in compliance with the specification.
     12. Testable Quantity: The amount of work, material, or construction shall be quantified by the units used for the determination of testing frequency. Testing units and payment units may be different. For the purposes of this document all quantities shall be testable quantities.
     13. Source: Material manufacturing locations outside of or within the project limits. Locations outside of the limits are named “Off-Site Sources”; while within the project limits are named “On-Site Sources."
     14. Submittal: A submittal is a document that is transmitted to the Engineer in order to seek approval of a material or procedure, or as indicated in the contract documents.

111.04 SCOPE

* 1. This section establishes the specifications and references detailing the Contracting Agency Quality Assurance program and defining policies, elements, activities, and guidelines to ensure that the materials and workmanship in all construction projects conform reliably to the requirements for the approved plans and specifications. It has been developed in conformance with the criteria contained in Federal Regulation 23 CFR 637B*, Quality Assurance Procedures for Construction*.
  2. The Quality Assurance Program represents the Contracting Agency’s recognition of its responsibility and commitment to ensure a high level of confidence in the materials, material sources, field and laboratory test results reported by Quality Control laboratories, and field testing personnel performing testing activities on projects. The Contractor is expected to be familiar with all aspects of the testing, technician training, and Laboratory Qualification Program relating to their duties.

111.05 OVERVIEW

* 1. Federal Regulation 23 CFR 637B allows the traditional approach of Contracting Agency performed Quality Assurance sampling and testing for acceptance and the option of using material source or Contractor Quality Control sampling and testing results for acceptance, provided adequate verification is in place. In conformance with these regulations, the Contracting Agency Quality Assurance Program was created implementing a schedule of activities to cover construction installation, laboratory operations, testing personnel competency, source production inspection, and Material Source Quality Program with the goal of using the Contractor data for verified acceptance. The Quality Assurance program provides for four areas of assurance:
     1. Area 1: Qualifying laboratories and testing personnel.
        1. This ensures that technical personnel are capable of performing the tests properly and that the applicable testing qualifications have been met. This level also ensures that testing laboratories are properly accredited.
     2. Area 2: Independent Assurance Program (IA).
        1. This ensures that the QA and QC functions of the program conform to their respective Quality special provision sections and 23 CFR 637B. Additionally, the IA is responsible for the verification of the qualification/certification of testing personnel along with accreditation of laboratories used in the Quality Control/Quality Assurance Programs.
     3. Area 3: Material Source Quality Program.
        1. Option 1: Qualified Source - This ensures the quality of the material through acceptance sampling and testing performed by the contractor.
        2. Option 2: Authorized Source - This level ensures the quality of the materialthrough inspection and verification of the material source QC Plan and its application and/or inspection of the source facility itself by the Engineer. The Contractor performs Quality Control testing of materials placed from the Authorized Source at the project location. For **federally funded** projects, there are no Authorized Material Sources. The Contractor is required to test the material source as per Table I, Appendix X. If there is no test or frequency in Table A refer to applicable requirements in the USS.
     4. Area 4: Construction Inspection and Testing Program.
        1. Ensures the workmanship of materials incorporated into the project through testing by Contractor QC with Quality Assurance and inspection by the Engineer.
        2. The Quality Program allows for the use of QA validated Quality Control (QC) test results as part of the acceptance decision. The program also allows for the use of test results obtained by outside agencies and laboratories in the acceptance decision provided they meet the following:
           1. Qualified personnel through qualified laboratories have performed the sampling and testing.
           2. The quality of the material has been validated by verification sampling and testing.
           3. The appropriate Quality Assurance Auditing activities have been conducted in a satisfactory manner.

111.06 QC RESPONSIBILITY

* 1. The Contractor has the responsibility for the quality of all material properties and workmanship. This specification is intended to quantify the minimum requirements for acceptance of materials and establish a minimum standard for the control of quality within a project. The Contractor shall use this specification, as a minimum, for the basis of their Quality Control.
  2. The Contractor’s Quality Control shall provide evidence that all items have been submitted, tested, inspected, and accepted. Further, the Contractor shall track the usage of all materials on the project. The Contractor shall document each of these aspects independently as required herein regardless of testing, Quality Control measures, and/or Quality Assurance measures historically performed by any agency. Any testing, Quality Control measures, or Quality Assurance measures, which are performed by an agency, will not be considered as part of the Organization’s Quality Control. Compliance with the frequency of testing and Quality Control measures required in this specification shall be independent of any compliance measures taken by any agency.
  3. The Contractor is required to measure and reach agreement on “testable quantities” with the Engineer daily. “Partial” quantities and “Completed” quantities for payment purposes only, shall be agreed upon by both parties, and shall not include in part or in whole any materials which will require subsequent testing prior to acceptance.
  4. Control of Subcontractors: The Contractor has responsibility for all Quality Control Measures required for all subcontractors.
  5. Control of Material Sources: Materials produced at a Source, shall have Quality Control Measures performed by the Contractor in accordance with the Contractor’s Quality Control.
  6. Control of Elevation and Grade: The Contractor is responsible for the proper material placement for vertical and horizontal control after the Engineer has established the initial controls as indicated in the contract.

111.07 ACCEPTANCE

* 1. The Engineer will provide Quality Assurance for the verification of the Contractor Quality Control for the acceptance of the construction materials and installation.
  2. The Engineer verification may be performed on a reduced frequency.
  3. The acceptance is also based upon the program compliance and is subject to the demerits listed in section 105.71), “Payment for Contractor Quality Control Program.”

111.08 CONTRACTOR CONTRACT ADMINISTRATION – GENERAL

A. The Contractor may have internal administration of the contract that is not contained in this section. This section only specifies those contract document processes that are submitted to the Engineer for Quality Control Purposes.

111.09 ORGANIZATION – GENERAL

A. The minimum organization staffing and qualifications are described in Section 113, "Contractor Quality Control Organization and Qualification of Laboratories and Technicians” The Contractor shall submit for approval by the Engineer an organization chart indicating the position numbers and the persons responsible.

END OF SECTION 111

*ADD THE FOLLOWING SECTION:*

SECTION 112 – CONTRACTOR QUALITY CONTROL ADMINISTRATION

112.01 GENERAL

* 1. The administration of the Contractor Quality Control (CQC) shall comply with the minimum requirements as established in this section. This section includes descriptions of all the Control Measures that are applicable to the QC documentation process. A written program does not have to be submitted if the Contractor performs the administration in accordance with this and other referenced sections. The only submittal required is the personnel qualifications as listed in Section 113 “Contractor Quality Control Organization and Qualification of Laboratories and Technicians”. All documents that are required through the course of the work shall be submitted to the Engineer.

112.02 ADMINISTRATIVE OUTLINE

* 1. The Contractor shall incorporate the following outline for Quality Control administration.

112.03 ORGANIZATIONAL PROCESSES

* 1. The Contractor shall develop his minimum organizational structure, lines of communication, and reporting functions based on the minimum position descriptions as indicated in Subsection 113.02. “Organization.” The organizational structure is based on the partnering approach for conflict resolution; therefore, Quality Control issues shall be addressed at the lowest level possible.
  2. The descriptions of the positions are generalizations of requirements. Additional requirements for a given individual may be further defined in other Special Provisions to the Contract.
  3. The description sheets will suffice for an organization structure.

112.04 GENERAL DOCUMENTATION PROCESS

* 1. The Contractor is responsible for the execution and maintenance of the project file system, which shall be maintained in a location approved by the Engineer.
  2. The Contractor has the responsibility for documenting the construction process. All documentation and records generated at the field level shall be provided through the RPC or the designee. Prior to transmitting to the Engineer, the RPC shall review the following for contract compliance:
     1. Records generated by the Contractor laboratory or an outside laboratory
     2. Records generated by the QCC.
     3. Records generated by Material Sources
  3. MAINTENANCE
     1. The maintenance of the documentation shall comply with the following:
        1. Be legible, identifiable, and retrievable.
        2. Protected in a manner to prevent damage, deterioration, or loss.
        3. Readily available for review within 4 hours.
        4. Retain documents until transmitted to the Engineer at substantial completion.
        5. Also, submit on a monthly basis, all records and laboratory and field tests data to the Engineer either in a paper document or PDF files.
  4. PROJECT FILING SYSTEM
     1. The RPC or designee shall identify, with approval of the Engineer, the central location for filing and storage of all project documentation locations throughout the duration of the project.
     2. The project file system shall include, where appropriate, the following:
        1. Notification, Activity Cards with test results and QC reports attached, and Log
        2. Pre-activity meeting agenda/minutes.
        3. Deficiency Reports and Log.
        4. Sample Reports and Log.
        5. Certifications and Materials Tracking Log.
        6. Submittals and Log.
        7. Hotmix Log.
        8. Concrete Log.
        9. Audits.
        10. QC Summaries.
        11. QC Final Summary.
  5. SUBMITTAL
     1. Submittal tracking shall be performed by the RPC or designee. Submittals that are specification substitutions shall be so identified with written justification.
     2. Copies of submittals shall be filed in the RPC office throughout the review process.
     3. Copies of approved submittals shall reside in the project file.
     4. A person qualified to review the material being submitted shall review and approve the QC Submittal content and verify against specifications. Personnel qualifications are to be submitted for approval by the Engineer.
     5. Logging and Submission Process – The RPC or designee shall take the following steps:
        1. Generate a Submittal Cover Sheet.
        2. Log the submittal into the submittal log.
        3. Review the submittal for compliance with the Contract Documents.
           1. If the submittal is not in compliance with the Contract Documents, return to submitting representative for correction.
        4. Initial the log for review and transmit the submittal to the Engineer for approval.
     6. Reviewing Returned Submittals - The RPC or designee shall take the following steps:
        1. Log the submittal as returned.
        2. Determine the status of the submittal:
           1. “No exceptions taken”:

Forward copy to the RPC for distribution.

Forward a copy to the Submitting Representative, if other than the RPC.

After Final Filing, no additional action shall be required.

* + - * 1. “With Corrections Noted”:

Verify that the corrections are clear.

Forward copy to the RPC.

Forward a copy to the Submitting Representative, if other than the RPC.

After Final Filing, no additional action shall be required.

* + - * 1. “Amend and Resubmit”:

Return the Submittal to the individual who generated the Submittal initially.

These Submittals shall require “Revision” and shall be resubmitted using the same initial log ID number. The Revision number shall progress sequentially for each additional “Resubmit.”

Note that a Revision is pending on the Submittal Log.

* + - * 1. “Rejected”:

Return the Submittal to the Submitting Representative, and inform them that a New Submittal is required.

These Submittals shall be given a new log ID number and treated as a new submittal.

File a copy of the Submittal regardless of Status in the Submittal File.

* 1. DEFICIENCY TRACKING AND RESOLUTION
     1. This subsection shall define the procedures required to accurately identify, track, and resolve project deficiencies:
        1. Deficient Work - Deficient work is defined as work that is not in accordance with Contract Documents. An item of work may remain a Deficiency (and not be escalated to Non-Compliance) provided it can be readily corrected "in the field" by the project level personnel. For example, field soils density test below specification requirements.
        2. Non-Conforming Work (non-compliance) - Non-compliant work is defined as work that has a Deficiency which cannot be readily corrected "in the field," and/or shall require that a decision be made by personnel with an "authority" level higher than that which is available daily on the project site. For example, concrete compressive strengths being below specification, or Field soils density test being below specification and no longer accessible.
        3. Informational Tests - In order to control failing Quality Control inspections by the Engineer and/or testing, the Contractor may perform "informational testing." The Contractor shall explain how informational testing shall be utilized prior to requesting any acceptance inspection and/or testing from Engineer. Informational testing may be performed by the Contractor to determine the amount of effort necessary to provide work that complies with the contract documents. However, the informational testing that is performed shall be in addition to the minimum testing required by the Contract Documents. Passing informational test(s) which represent the work being performed may be submitted as part of the minimum testing required by the Contract Documents and approved Quality Control Program, only if the Engineer was given proper advance notification of the testing. Informational testing not counting toward the minimum testing required by the Contract Documents is not required to be submitted to the Engineer as part of the Quality Control documentation but shall be made available for review at the Engineer's request.
        4. Tracking Responsibility - The RPC shall review all Activity Cards daily for New and Resolved Deficiencies. Resolutions shall be approved by the Engineer:
           1. When New Deficiencies are found that were resolved on the same day, do not log them on the Deficiency Log. (No further action shall be required for these items.)
           2. When New Deficiencies are found that are not Resolved on the same day, log them on the Deficiency Log including the following information:

Sequential Deficiency Log ID Number

Reference QC Activity Card Number

Date of Deficiency

Material ID Number

Written description of the deficiency

QC Initials

* + - * 1. When Resolutions are found on the Activity Card, log them on the Deficiency Log including the following information:

Reference Activity Card Number on which the Resolution occurred.

Date of Correction

Written Description of the remitted action per conflict resolution chart

QC Initials

* + - * 1. The personnel responsible for identifying deficiencies at the project level may be any one of the following, but not limited to QA Representatives, QCC, Technician(s), RPC, and Foreman.
        2. Documentation and logging of deficiencies shall be provided by the RPC or designee.
        3. The RPC or designee is responsible for transferring deficiencies from the log to the applicable Activity cards.
        4. The RPC is responsible for tracking deficiencies.
        5. The RPC is responsible for deficiency resolution documentation. Following the resolution, the corrective action and resolution shall be documented on the deficiency log and the deficiency noted as corrected.
      1. Deficiency Reporting - The Contractor shall as a minimum take the following actions to report Deficiencies:
         1. Weekly Review.
         2. Before the Weekly Progress Meeting, review the Deficiency Tracking Log for outstanding Deficiencies.
         3. Generate a summary of outstanding deficiencies including status of each.
         4. Deliver the Summary at the Weekly Progress Meeting.
      2. Deficiency Resolution - This program does not allow a resolution to be initiated by the Engineer. The Engineer will review resolutions initiated by the Contractor and where engineering properties or design are involved, the Contractor shall have the resolution reviewed by a Nevada Professional Engineer at the Contractor’s expense. The Engineer has the right to not approve the resolution and/or propose a documented resolution after review of the Contractor’s proposal.

112.05 CONFLICT RESOLUTION PROCESS

* 1. Conflict resolution shall be accomplished in a partnering method in that there shall be levels of authority, time frames of resolution, and a correspondence between the Contractor and QA employees as outlined in the chart below. Every effort shall be made to resolve conflicts at the lowest possible level.
  2. The example chart depicts the resolution process for “deficient and non-compliant work”:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONTRACTOR NAME** | |  | **Contracting Agency Construction Management** | |
| Organization Chart Position 1  Contractor Principal Representative |  | 96 hours |  | City Engineer and/or  Construction Manager |
|  |  |
|  |  |  |  |  |
| Organization Chart Position 3  Responsible Person-in-charge |  | 48 hours |  | Construction Manager and/or  Construction Management Coordinator |
|  |  |
|  |  |  |  |  |
| Organization Chart Position 4  Quality Control Coordinator |  | 24 hours |  | Construction Project Representative |
|  |  |

* 1. The above chart is used as a process to follow whenever there is disagreement between Contractor Quality Control and Engineer Quality Assurance test results. Third party testing may be proposed under the following conditions:
     1. The third party shall be a separate independent laboratory, meeting the minimum qualifications set forth for laboratories on the project and not performing any additional work for the Engineer, Contractor, Subcontractors, and/or Suppliers on or for the project.
     2. The third party shall be agreed to by both the Contractor and the Engineer.
     3. Costs for the third party testing shall be as follows:
        1. Initial test for the disputed work shall be paid for by the Contractor.
        2. For each instance of conflict if the third party’s test results reflect Engineer results, Contractor shall pay for any additional testing performed by the third party after the initial test.
        3. For each instance of conflict if the third party’s test results reflect the Contractor results, the Engineer shall pay for any additional testing performed by the third party after the initial test.

112.06 CERTIFICATION AND MATERIAL DELIVERY AND TRACKING PROCEDURE

* 1. Logs shall be established for the purpose of tracking materials that are delivered to or generated from the project. The logs shall be executed and maintained by the RPC or designee and shall remain in the project file system at all times when not in use. The accompanying certifications shall be filed and numbered relative to the log.
  2. The RPC or designee shall be responsible for generating and completing delivery-tracking documentation. There may be instances where activity foremen shall complete the log.
  3. The documentation of the lot, or other identifiable information, relative to the item and the date of installation documented by the RPC or designee shall serve as evidence of the location of the delivered material upon incorporation into the project. For non-authorized sources, the required tests per lot shall be attached to the certificate. The RPC shall:
     1. Complete the Materials Delivery documentation.
     2. Track materials until incorporation into the work.
     3. Ensure that all materials are noted on the Materials Tracking Log.
     4. Resolve certification problems.
  4. When a certification is not presented with the delivery, the RPC shall obtain the document prior to material installation.
  5. The logs shall be executed and maintained in the project file system at all times when not in use.
  6. The sample log ID number shall be the Contract project sequential number, not an independent numbering system supplied by the laboratory. A separate column may be added for a cross-reference if a laboratory number is needed.

112.07 ACTIVITY CARDS AND CONTROL MEASURES

* 1. The RPC shall ensure that the QC activity cards are in conformance with the procedures in Section 114, “Contractor Quality Control Procedures,” and shall establish the guidelines and processes utilized with respect to Notification and QC Activity Cards. The RPC is responsible for verifying all documentation on the QC Activity and notification cards is in compliance with this program before being presented to the QA Representatives for “sign-off” and closeout of the activity.
  2. Tracking Responsibility
     1. The RPC shall be responsible for logging and tracking deficiencies on the QC Activity Card. Constant comparison against the deficiency log shall ensure no deficiency is left unresolved.
     2. The RPC shall document deficiencies that are new or have been cleared for each item relative to each activity. Every effort shall be made to resolve deficiencies as soon as possible. No work shall proceed that will negatively affect the resolution.
     3. Section 2 of the QC Activity Card is used for documenting existing deficiencies associated with the activity listed in section 1 of the QC Activity card. If no deficiencies exist or occur for the activity, the RPC shall check-off and initial this section. If deficiencies do exist, the lower area of this section shall be completed. Each material number shall be verified against outstanding deficiencies.
  3. Testing Identification Responsibility
     1. The RPC utilizing the QC testing frequencies as specified in Table I, Appendix X shall verify the test methods, frequency of the tests, and the planned number of tests to be taken for each material used in the respective activity as designated by the author of the Activity Card.
     2. The tests are subject to a testing turn-a-round time as designated in Table B, Appendix X. Check the box on the table for which tests are performed either in-house or contracted. This form is to be submitted at the beginning of the project. A deduction will be made to the contract and monthly work completion estimate of $100 per day demerit per test method when they are submitted after the durations shown in Table B.
     3. The QCC, in the appropriate space provided on the QC Activity Card, shall document the actual number of tests taken on each material. The activity card must indicate the actual quantity of tests and the testing frequency.
     4. The Quantity of Material to be tested is the numerical amount of material actually available or “ready” for testing shown in units defined in Table I relative to the frequency of the material and based on the stationing information documented on the card. For example, the testable quantity of Type II grade for compaction from station 0+00 to station 10+00, given a width of 30 feet, would be 30,000 square feet (SF). Given this example and using Table I, the minimum number of tests required for this item would be 6 total tests based on the required frequency of 1 test per 5,000 SF.
     5. The RPC or designee shall verify all necessary calculations to ensure the number of tests performed meet the required number. All minimum test numbers calculated shall be rounded up.
     6. In the event that multiple lifts of material are represented or given that the testable quantity shown on the QC Activity Card is not readily identifiable with documented stations and dimensions, appropriate documentation and/or calculations shall be provided on the QC Activity Card to facilitate easy verification of the testable quantity. This process allows the technician to show documentation for the entire amount of material represented without documenting repetitive entries.
     7. The RPC shall generally arrive at total quantities for each activity by documenting pertinent information such as stations, widths, and other miscellaneous dimensions at the beginning of the activity and comparing them against dimensions at the end of the activity. If situations arise where RPC or QCC cannot be present during all operations and would not be able to derive total quantities, the QCC shall retrieve the information from the activity Foreman and forward it to the RPC. The Materials Tracking Logs shall also be utilized in this respect.
     8. The QC Activity Cards shall reflect certain bid item payment quantities. However, the contractor shall not use them for compilation of the monthly pay estimate or for bid item payment tracking. This is due to the difference between the pay item unit of measurement and the testable quantity unit of measurement shown in the QC table(s), and also given that payable activities may take place without the presence of a QC Activity Card. (No testing or inspection)
     9. The test numbering shall be sequential for the entire project. If a test number is missing, it needs to be accounted for by the RPC or the testing consultant.

112.08 DAILY REPORTING

* 1. The Quality Control Activity cards with the inspection forms and daily reports attached plus any field tests shall be used to satisfy the requirements of this subsection. The Quality Control Activity card, completed and signed off, shall serve as the daily summary of activities on the project for the relative item(s). This shall include the transfer of any deficiency items to the tracking log.

112.09 MONTHLY REPORTING

* 1. The RPC shall be responsible for coordinating the monthly quality control summaries at the end of each calendar month and submitting to the QA within the time period allowed by agreement between the Engineer and Contractor after each calendar month. This shall include a summary of the quality control performed during the reporting period that includes the frequency of testing for each material type in accordance with table I or other agency tables.
  2. The RPC shall generate a cover letter. The cover letter shall attest that the summary has been reviewed, that any short falls in testing, sampling, or qualities have been identified, quantified, and acknowledged. Deficient items shall be acknowledged and state that resolution actions are contained in the letter and/or being resolved. A material resolution shall be reviewed and stamped by the Nevada P.E. who has responsible charge.
  3. A Nevada Professional Engineer shall certify that all field laboratory testing was performed correctly, and that the corresponding data is accurate as required by NAC 625.612. This certification shall be attached to the monthly submittal. Additional P.E. stamped letters shall accompany the monthly summary to indicate a P.E. level review and acceptance of the information provided by outside laboratories.
  4. The report may be submitted on PDF format.
  5. The summary shall be submitted in the following format:
     1. Cover letter generated by RPC and/or QCC.
     2. P.E. stamped cover letter stating review and approval of the test summary.
     3. Field Test Result Summary that shall indicate all field test procedures and results performed during the reporting period. Items and tests shall be summarized by type. The associated daily field reports for inspections and testing shall be attached behind this summary.
     4. Field Density Test Result Summary indicating all pertinent information generated during all field density testing. The associated daily field reports for test results shall be attached behind this summary.
     5. Laboratory Test Result Summary that shall indicate all laboratory test procedures and results performed during the reporting period. Items and tests shall be summarized by type. Individual test results shall be attached behind this summary.
     6. Laboratory Concrete Break Result Summary facilitating brief analysis of critical concrete strength data. Items shall be summarized by cylinder set numbers. Individual Concrete Break Results for each set of samples shall be attached behind this summary.
     7. Laboratory Aggregate and Soils Result Summary indicating all gradation test procedures performed during the reporting period. Individual test results shall be attached behind this summary.
     8. Deficiency log.
     9. Testable Quantity Summary that shall indicate total month and to-date counts of tests performed relative to the testable quantities and to-date testable quantities.
  6. The monthly QC summary report shall attach a copy of the most current AASHTO accreditation status for the laboratories referenced in the report from the AASHTO web site. The report shall also attach a list of the NAQTC certified technicians that were working at the referenced laboratories or in the field for the project during that report period.

112.10 FINAL REPORTING

* 1. A final summary report shall be generated in accordance with Subsection 112.09 and shall not be submitted until such time as all discrepancies and non-conformances have been resolved as well as a compliant close-out audit.

112.11 QC AUDITING PROCEDURES

* 1. For projects that have calendar days to complete greater than 90 days, the RPC is responsible for informal internal audits at a frequency of once per week. The RPC shall perform formal written audits on a monthly basis. QCC shall formally document monthly audits with results given to the Engineer. Formal audits shall be filed and maintained with jobsite files.
  2. Specific items or topics of the program that will be evaluated are:
     1. Advanced Notification Cards Logs - 24-hour notice being given.
     2. Pre-Activity Meetings Logs.
     3. Activity Cards Logs - accurate, correct, and complete on a daily basis.
     4. Materials tracking log.
     5. Sampling and Testing completed with tracking information and results.
     6. As-built’s are being updated monthly.
     7. QC documentation and overall program is being implemented effectively.
     8. Documentation for resolution of Deficiencies/Non-Conformances Logs correct and complete.
  3. Written documentation of the audit shall be a checklist format with space provided for comments.
  4. Items that are found to require corrective measures shall be noted in the remarks section of the audit form. The RPC shall ensure corrective measures are taken and comply with the program. A follow-up audit limited to items that need correcting shall occur within one week.
  5. Failure to submit monthly written documentation will result in the Progress Payment being withheld until this documentation is provided and accepted by the Engineer.

112.12 BLANK

112.13 BLANK

112.14 SAMPLE RETENTION

* 1. All samples are to be retained until the project is complete. The sample size shall be such that the required testing could be performed. The Contractor QCC shall be responsible for ensuring the sample is of the appropriate size and that it is stored properly at a location approved by the Engineer.

END OF SECTION 112

*ADD THE FOLLOWING SECTION:*

SECTION 113 – CONTRACTOR QUALITY CONTROL ORGANIZATION AND QUALIFICATION OF LABORATORIES AND TECHNICIANS

113.01 GENERAL

* 1. This section describes the minimum Contractor Quality Control Organization indicating chain of command and position descriptions. Depending on the size of the project, all of the positions may not be required. The contractor must submit the organization to the Engineer for approval. The information shall be submitted to the Engineer and approved prior to the beginning of the work.
  2. The Contractor Quality Control material sampling shall be obtained from an NAQTC qualified person. The Contractor shall not accept material samples from a subcontractor or material supplier unless the Contractor NAQTC technician observes and documents the sampling.
  3. The Qualifications, Scope of Work and Responsibilities, Communication, and Reporting for each position are related to the execution of the Project Quality Control Program only. Other roles, responsibilities, and reporting requirements may be required by the Engineer in the Contract specification. This Program does not address those roles or responsibilities, nor is it intended to diminish their intent.

113.02 ORGANIZATION

* 1. The minimum chain of command positions are titled as follows:
     1. Position 1 - Contractor Principal Representative.
     2. Position 2 - Professional Engineer (PE).
     3. Position 3 - Responsible Person-in-Charge (RPC).
     4. Position 4 - Quality Control Coordinator (QCC).
     5. Position 5 - Quality Control Testing Technician.
     6. Position 6 - Quality Control Laboratory Technician.
  2. Suggested formats for providing the information to submit to the Engineer are shown in Tables 1 through 6 later in this section, which reference the position titles.
  3. Qualifications and experience requirements are provided for each QC position. The minimum experience requirements for selected positions are as follows:
     1. The Responsible Person-in-charge (RPC) shall be a quality control project manager level having a minimum of 8 years experience in construction managing the type of construction implemented on the contract. The RPC shall have the ability to read and understand construction Drawings and Specifications. The RPC shall have stop work authority.
     2. For the testing QC Laboratory, the Professional Engineer who is in responsible charge of the testing shall be a Nevada State licensed Civil Professional Engineer, with a minimum of 5 years experience in construction materials. The field testing technicians shall be NAQTC and/or ACI Concrete Field Technician Grade I certified and the Laboratory testing technician shall be NAQTC and/or ACI Concrete Laboratory Testing Technician Level 1 certified.
     3. The Quality Control Coordinator (QCC) is a quality control administrator that ensures that the documents are coordinated to all levels of the project with a minimum of 2 years of experience in this type of work or have evidence in the resume of the ability to coordinate documents. The QCC shall have the same qualifications as the Quality Control Testing Technician, the ability to read and understand construction Drawings and Specifications.
  4. Resumes of all RPC, QCC, PE, inspection, and material testing personnel shall be submitted.
  5. The Contractor shall verify that qualifications of each employee match those required by the position that individual will hold and will be valid for the duration of the project. If personnel will require recertification during the contract duration, the Contractor shall indicate those personnel and the process for ensuring that the recertification is accomplished.
  6. The Contractor shall complete the Position Description Form (Tables 1 through 6) for each position including: Name, Signature, Discipline, Employer, Stop-Work Authority, Certifications, and Title as applicable and submit to the Engineer for approval. Work shall not proceed until approved by the Engineer. One form will be used per position per individual. The form will include all disciplines of work and the related certifications for which the individual is qualified.
  7. The testing staff utilized for a specific item of work may be comprised of any individual that has demonstrated competence and completed the appropriate form. Only technicians with appropriate certifications and work experience will be used for that item of work.
  8. The acceptance of the work is by the Engineer or his designated representative.

113.03 LABORATORIES

* 1. All laboratories, whether primary or subcontracted shall be AASHTO R18, AMRL/CCRL accredited including ASTM D 3666 (Asphalt Concrete and Aggregates), D 3740, C1077, effective June 1, 2012.
  2. For laboratories with multiple facilities, the Contractor shall identify the location of the lab providing the service. This lab is project specific for the actual work that will be performed.
  3. Separate laboratories may be used in conjunction with the Primary QC Laboratory. Prior to their use, the Contractor shall provide a submittal for each QC Laboratory. The approved submittal will then be added to QC program as an amendment.
  4. With the exception of “chemical testing” (i.e. binder, cement), QC Laboratory reviewing personnel in responsible charge are required to be Professional Engineers, registered in the State of Nevada, regardless of whether the QC Laboratory utilized is primary or secondary.

| **Table 1 - Contractor Principal Representative** | | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
|  | Position Number | | Position Title | | Stop-Work Authority | |
| **1** | | **Contractor Principal Representative (CPR)** | | **Yes** | |
| Name: |  | | | | |
| 1 | **Scope of Work and Responsibilities:**  Perform corporate oversight for the Quality Control.  Determine course of action for Quality Control at highest level of Conflict Resolution process.  Quality Control related issues within the Organization. | | | | | |
| 2 | **Communication - Provide direct access for the following individuals:**  RPC  Quality Control Coordinator  Professional Engineer | | | | | |
| 3 | **Communication protocol:** | | | | | |
| **To Whom** | | | **What** | | **When** |
| CLV | | | QC Conflicts | | Resolve within One Week |
| QC Professional Engineer | | | After QC Resolutions | | 1 Day |

| **Table 2 - Quality Control Professional Engineer** | | | | | |
| --- | --- | --- | --- | --- | --- |
|  | Position Number | | | Position Title | Stop-Work Authority |
| **2** | | | **Professional Engineer (PE)** | **Yes** |
| Name: |  | | | |
| 1 | **Scope of Work and Responsibilities:**  In responsible charge over Quality Control Testing, both field and laboratory testing.  Signature for all testing reports.  Liaison for the Prime Contractor for Materials and testing related issues.  Provide consultation to Prime Contractor as requested.  Aid in providing resolution in material deficiencies. | | | | |
| 2 | **Maintain open and effective communication with the following individual on a twice weekly basis:**  Testing Technician (Field & Lab)  Source / Plant Inspector (when an employee of Engineer) | | | | |
| 3 | **Maintain open and effective communication and testing oversight with the following individuals on a daily basis:**  RPC | | | | |
| 4 | **Have direct access to the following individual:**  Contractor Principal Representative  RPC | | | | |
| 5 | **Communication protocol:** | | | | |
| **To Whom** | | **What** | | **When** |
| RPC | | QC Conflicts - Investigation | | Resolve Within 1 day of Test Completion or 3 days for other material issues |
| RPC or designee | | Monthly Report of Field and Lab Results | | At time of Pay Estimate |
| Final Report of Field and Lab Results | | Within 2 weeks from “Substantial Completion” |
| Deficiencies in Lab Test Results | | Immediately upon completion of testing |
| QC Technician | | After Resolution | | 1 hour |

| **Table 3 - Responsible Person in Charge (RPC)** | | | | | |
| --- | --- | --- | --- | --- | --- |
|  | Position Number | | | Position Title | Stop-Work Authority |
| **3** | | | **Responsible Person in Charge (RPC)** | **Yes** |
| Name: |  | | | |
| 1 | **Scope of Work and Responsibilities:**  Expedite Conflict Resolution.  Educate Lead / Foreman of responsibilities to the QC Program.  Generate or advise QC coordinator to review and forward Materials Submittals.  Measurement and reporting of daily quantities. | | | | |
| 2 | **Maintain open and effective communication and testing oversight with the following individual on a daily basis:**  Principal Representative | | | | |
| 3 | **Have direct access to the following individual:**  Principal Representative  Professional Engineer | | | | |
| 4 | **Communication - Provide direct access for the following individual:**  Quality Control Coordinator  Testing Technician (Field & Lab) | | | | |
| 5 | **Communication protocol:** | | | | |
| **To Whom** | | **What** | | **When** |
| QCC | | QC Conflicts - Investigation | | Resolve within 1 day |
| Foreman | | Materials Delivery and Quantities | | Log Daily |

| **Table 4 - Quality Control Coordinator (QCC)** | | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
|  | Position Number | | | Position Title | | Stop-Work Authority |
| **4** | | | **Quality Control Coordinator (QCC)** | | **Contractor Option** |
| Name: |  | | | | |
| 1 | **Scope of Work and Responsibilities:**  Schedule inspection with the Engineer  Dispatch Testers.  Generate, close, and maintain file system for Activity Cards.  Generate, close, and maintain file system for Advance Notification Cards.  Generate, track, and maintain all Logs.  Perform the Administration for all Quality Control documentation.  Perform routine audits of Quality Control and documentation.  Review materials submittals for compliance with Contract Documents.  Review materials Testing Technician test results.  Receive, Log, and Schedule sampling of Materials Delivery and Quantities.  Measurement, Calculation, and reporting of Testable Quantities.  Report deficiencies. | | | | | |
| 2 | **Maintain open and effective communication with the following individuals on a twice weekly basis at a minimum:**  Professional Engineer | | | | | |
| 3 | **Maintain open and effective communication and testing oversight with the following individuals on a daily basis:**  RPC  Testing Technician (Field & Lab) | | | | | |
| 4 | **Have direct access to the following individuals:**  Contractor Principal Representative  Quality Assurance Coordinator | | | | | |
| 5 | **Communication - Provide direct access for the following individuals:**  RPC  Quality Control Technician | | | | | |
| 6 | **Communication protocol:** | | | | | |
| **To Whom** | | **What** | | | **When** |
| RPC | | Activity Card Close-out | | | Daily |
| Advanced Notification Cards | | | Prior to Days Work |
| Generation of Activity Card | | | Daily |
| Deficiencies | | | Immediately |
| Materials Delivery Log | | | Daily |
| Sample Log and Scheduling of Samples for Materials Delivered | | | Daily |
| Deficiency Log | | | Daily |
| Monthly QC Reports | | | With Monthly Pay Estimate |
| Final QC Report | | | End of Construction |
| QC Resolutions | | | 1 Hour |
| Activity Cards | | | Prior to Days Work |
| QC Conflicts | | | Resolve within 2 Hours |
| QC Resolutions | | | 1 Hour |
| **Table 5 - Quality Control Field Testing Technician** | | | | | | |
|  | Position Number | | | Position Title | Stop-Work Authority | |
| **5** | | | **Quality Control Field Technician (QCFT)** | **Contractor Option** | |
| Name: |  | | | | |
| 1 | **Scope of Work and Responsibilities:**  This individual is the “support” for the Quality Control Coordinator.  Verifies conformance of materials through testing.  Advisor to Quality Control Coordinator in regard to testing.  Responsible for accurately testing, sampling, and reporting of results for construction materials.  Responsible for identifying deficient or non-compliant work, as related to testing.  Responsible for notifying Quality Control and Quality Assurance of status of work, as related to testing. | | | | | |
| 2 | **Maintain open and effective communication and testing oversight with the following individuals on a daily basis:**  RPC  Professional Engineer  Quality Assurance Coordinator  Engineers Inspector | | | | | |
| 3 | **Have direct access to the following individual:**  Quality Control Coordinator  Quality Assurance Coordinator | | | | | |
| 4 | **Communication - Provide direct access for the following individuals:**  Quality Control Coordinator  Quality Control Lab Technician | | | | | |
| 5 | **Communication protocol:** | | | | | |
| **To Whom** | | | **What** | **When** | |
| QCC | | | Test results | Attach to Activity Card at the end of the Event. | |
| Deficiencies | Immediately upon failing test or observation | |
| Informational Testing | Before performing informational tests | |
| RPC | | | Test Results | Attach to Activity Card at the end of the Event. | |

| **Table 6 - Quality Control Laboratory Testing Technician** | | | | |
| --- | --- | --- | --- | --- |
|  | Position Number | | Position Title | Stop-Work Authority |
| **6** | | **Quality Control Laboratory Technician (QCLT)** | **Contractor Option** |
| Name: |  | | |
| 1 | **Scope of Work and Responsibilities:**  This individual is the “support” for the Professional Engineer.  Verifies conformance of materials and work through testing.  Advisor to Quality Control Coordinator in regard to testing.  Responsible for accurately testing, sampling, and reporting of results for construction materials.  Responsible for identifying deficient or non-compliant material, as related to testing.  Responsible for notifying Quality Control and Quality Assurance of status of work, as related to testing. | | | |
| 2 | **Maintain open and effective communication and testing oversight with the following individuals on a daily basis:**  Quality Control Coordinator  Professional Engineer | | | |
| 3 | **Have direct access to the following individual:**  Quality Control Coordinator  Quality Assurance Coordinator  Professional Engineer | | | |
| 4 | **Communication - Provide direct access for the following individual:**  Quality Control Coordinator  Professional Engineer | | | |
| 5 | **Communication protocol:** | | | |
| **To Whom** | | **What** | **When** |
| QCC | | Test results | Immediately |
| Deficiencies | Immediately Upon Failing Test or Observation |
| Professional Engineer | | Test results | Immediately |
| Deficiencies | Immediately Upon Failing Test or Observation |

END OF SECTION 113

*ADD THE FOLLOWING SECTION:*

SECTION 114 – CONTRACTOR QUALITY CONTROL PROCEDURES

114.01 GENERAL

* 1. Contractor Quality Control shall follow the Contractor Quality Control Program to ensure that materials and workmanship incorporated into the work meet the requirements of the Standard Specification, Special Provisions, and all other Contract Documents. (Add CLV manual)
  2. Oversight and test results shall be documented in accordance with the Quality Control Program requirements in Section 112, “Contractor Quality Control Administration”. Test results shall be evaluated and the acceptance determined by the Engineer.
  3. The Quality Control personnel shall be qualified as required in Section 113, “Contractor Quality Control organization and qualification of Laboratories and Technicians,” or as stated in other contract documents.
  4. Process oversight and testing of items under construction shall be performed for work activities as required in the Contract Documents and at the frequency referenced in the specifications and these special provisions. This includes, but is not limited to, qualification tests, factory fabrication and manufacturing tests, material tests, verification tests, pre-operational checks/tests, installation oversight, and construction oversight.
  5. A combination of testing and process oversight shall be performed in a systematic manner to ensure the specific requirements for control of the process and quality of the item are being achieved throughout the duration of the process.
  6. Modifications, repairs, or replacement of items subsequent to final acceptance shall be re-inspected and/or retested to verify compliance with requirements set forth in the Contract Documents.

114.02 BLANK

114.03 ORGANIZATION

* 1. The organization is based on Section 113, “Contractor Quality Control Organization and Qualification of Laboratories and Technicians," that identifies the minimum levels for communication and delegation for the Quality Control program.
  2. The Responsible Person-in-Charge (RPC) shall have the experience to manage the type of construction implemented in the Contract Documents and have the ability to read and understand construction drawings and specifications.
  3. The Contractor Quality Control Coordinator (QCC) shall have the experience to observe, document, instruct, and in general ensure that the work is installed as designed and all testing requirements have been met as stated in the contract documents.

114.04 INSPECTION PROCESS

* 1. Pre-Activity Meeting
     1. Prior to the start of any new work activity, a meeting shall be conducted with all persons involved. Each activity of work shall have a procedure approved by the Engineer containing descriptions of the processes, which address the requirements for material testing and inspection for the particular activity.
     2. It is encouraged that the information outlined below be relayed during the daily course of the project and through any periodic progress meetings to reduce the number of time consuming meetings. However, formal pre-activity meetings shall be held prior to the beginning of a new activity or prior to restarting an activity that has been delayed or stopped.
     3. It is intended that the Pre-Activity Meeting be held at the actual location of the work.
     4. The Pre-Activity Meeting shall be held within one week of the first item of work on the shift that the actual work shall begin. When working a multi-jurisdictional project such as with NDOT, 2 days' advance notice is required prior to the meeting being held.
     5. The meetings shall be held to discuss all Quality Control and operational aspects of proposed activities. All activities may not necessitate meetings. Extenuating circumstances may dictate the need for meetings on general and common activities.
     6. The meetings may be held under special requests made by the Engineer and shall also be held in the event of major personnel changes with respect to the project such as a Project Manager for the Engineer or the Contractor.
     7. The RPC shall facilitate the meetings at the project level.
     8. Documentation of the meetings shall be provided by the RPC in the form of written documentation. A copy of the documentation shall be provided to the Engineer within one shift of the meeting.
     9. The meetings shall accomplish the verification of the following items:
        1. Description.
        2. Ensure that all submittals are approved.
        3. Review Plans, Specifications, and Procedures that apply.
        4. List materials.
        5. List any mandatory procedures (i.e., Manufacturers' specifications).
        6. Review Deficiencies in prior related work and note.
        7. Verify that no outstanding deficiencies exist for work that led up to this activity.
        8. Discussion of acceptance criteria.
        9. Particular items of interest to the Engineer; QA’s expectations.
        10. List Control Measures and responsible parties, Review of Frequency of Control Measures.
        11. Discussion of off-site and on-site QC responsibilities.
        12. Discuss “What do we do when something goes wrong?”
        13. Traffic Control and Safety Issues and Notification to the Public.
        14. Reminder that the public comes first.
        15. Items requiring QC.
        16. Itemize frequency of inspection and testing.
        17. Provide list of required inspections to the Engineer
        18. Define any revision of contract Specification protocol and documentation approved by the Engineer.
     10. The following individuals are required to attend the Pre-Activity Meeting for work that they perform:
         1. Responsible Person in Charge
         2. Quality Control Coordinator
         3. Quality Assurance Inspector
         4. Responsible activity foreman
         5. Owner Project Representative
  2. Advance Notification Cards
     1. The Contractor shall utilize the Advance Notification Cards to schedule all activities.
  3. Quality Control Activity Card Process
     1. QC Activity Cards will not be required when activities do not necessitate testing or inspection to be performed on the item.
     2. The RPC is responsible for verifying all documentation on the QC Activity card is in compliance with this program before being presented to the QA Representatives for “sign-off” and closeout of the activity.
     3. The testing staff utilized for this project can be comprised of any of the technicians with appropriate certification. The RPC shall use the following guidelines for QC Activity Card identification and logging:
        1. QC Activity Card shall be issued a sequential number to uniquely identify it with the activity.
        2. QC Activity Card generated and filed shall be logged on the QC Activity card Log as described in Section 112, “Contractor Quality Control Administration.”
     4. QC Activity Card Section 1 – Actual Work Performed
        1. Used to document the actual work performed for the activities listed. Locations shall be listed to correlate with the type of work performed.
     5. QC Activity Card Section 2 – Deficiency Check
        1. Used for documenting existing deficiencies associated with the activity listed in QC Activity Card section 1 above. If no deficiencies exist or occur for the activity, the Technician shall check-off and initial this section. If deficiencies do exist, the Technician shall complete the lower area of this section. Each material number shall be verified against outstanding deficiencies.
     6. QC Activity Card Section 3 – Inspection Items
        1. Used for documenting tests associated with the activities listed in QC Activity Card section 1 above, and for documentation of QA verification testing.
        2. Each tested material utilized during the activity shall be entered. The completion of the “QC Initial/Date” section by the RPC shall serve as documentation of the Quality Control performed. There shall be instances where the QCC fills out the QC Activity Card but does not initial the QC Activity Card. In these cases, the QCC shall require the particular activity Foreman, or subcontractor Foreman/Supervisor, to initial the QC Activity Card. Electrical items shall always be initialed by the activity Foreman.
        3. Inspections and testing to be performed are listed in Table I, Appendix X.
        4. The next section “QA Initial/Date” shall be utilized for QA’s documentation of verification of the inspections listed within the section.
        5. The RPC, QCC, and/or Foreman shall give a minimum one-day advance notice to QA of required inspections to be performed by Engineer. The time that the material will be ready for inspection by the QA shall be documented in the “Time Requested for QA” section. There shall be circumstances when the work conducted has not reached a hold point for QA inspection and therefore a time cannot be determined. In these cases, this section shall have the estimated completion date of the work reaching the hold point.
     7. QC Activity Card Section 4 – Testing and Sampling Items
        1. Used for documenting field tests associated with the activities listed in Activity Card section 1 and Section 2 above.
        2. All tests shall be separated based on “Bid Item No.” and the numbering for the range of tests taken on each Bid Item need to be documented in the “Sequential Test Nos.”. Special attention shall be made to continue the sequential numbering from the last occasion testing was performed on these particular Bid Items. All tests taken throughout the entire project shall be numbered sequentially based on Bid Item No.
        3. The RPC or QCC shall indicate the “Description of Test” performed. Descriptions shall be kept constant for the tests throughout the project.
        4. The “Quantity of Material to be Tested” is the numerical amount of material actually available or “ready” for testing. The amount shall be followed by the appropriate unit (square feet, cubic yard, linear feet, etc.). Calculations shall be shown to justify the number entered, for instance, when there may be multiple lifts of trench backfill tested and documented.
        5. The “Testing Frequency” shall be determined by Table I, Appendix X and indicated by the RPC.
        6. The “Required Quantity of Tests” shall be calculated by dividing the “Quantity of Material to be Tested” by the “Testing Frequency”. All minimum test numbers calculated shall be rounded up.
        7. The final column, “Actual Tests Performed” shall be completed by the RPC or QCC and shall indicate the actual amount of tests performed during the shift covered by the QC Activity Card for each Bid Item.
     8. QC Activity Card Section 5 – Remarks
        1. Used for documentation of miscellaneous information associated with the activities listed on the card. This section shall also be used to document formulas used to calculate the number of tests required.
     9. QC Activity Card Section 6 – Quality Assurance Sign-Off
        1. Used for documentation of the QA sign-off of the QC work performed associated with the activity listed. Upon sign-off, a copy of the QC Activity Card with applicable test and inspection observation reports results shall be delivered to RPC.
  4. Sampling and Testing
     1. All sampling and testing shall be performed in accordance with Table I, Appendix X.
     2. All density testing locations shall be clearly identified by paint marking on the grade at the time the testing is performed. All trench walls or structural backfill shall have lift thickness marked in paint. This requirement will aid in the correlation testing by Quality Assurance.
  5. Final Inspection and Testing
     1. Final inspection(s) and tests shall be performed to demonstrate and verify functional operation and conformance to the contract requirements of the products, subsystems and systems constructed, fabricated, manufactured, and installed by the Contractor or its subcontractors and suppliers for the Project in accordance with the Contract Documents.
     2. Prior to final inspection(s) and tests, a review of the deficiencies identified during the in-process inspections and tests shall be performed by the RPC to verify that corrective action has been completed, verified, and documented. The final inspection or test shall demonstrate the conformance of the item to specified requirements.
  6. Material Sources
     1. On-site delivery of material items furnished by suppliers to be incorporated into the work shall be jointly inspected upon receipt by the Contractor's Quality Control personnel and the Engineer to verify conformance to specified requirements. Source inspection of items fabricated or manufactured specifically for the Project shall be performed jointly as required by the Contract Documents.
     2. The Engineer may conduct additional independent Quality Assurance and/or Independent Assurance (IA) inspection/testing and source inspections as deemed necessary. The Engineer or Engineer's representative shall coordinate these inspections and tests as required.

114.05 FIELD PROBLEM IDENTIFICATION AND REPORTING PROCESS

* 1. The following procedure outlines the identification and reporting of a deficiency:
     1. If a problem is observed by a Non-Quality Control Personnel:
        1. Locate the Quality Control Coordinator.
        2. Inform the Quality Control Coordinator of the Deficiency and any additional information details special circumstance.
     2. If a problem is observed by a Testing Technician:
        1. Your testing indicates deficient work:
           1. Record all testing data.
           2. Locate Quality Control Coordinator.
           3. Provide detail of Deficiency to Quality Control Coordinator.
        2. You observed deficient work:
           1. Locate Quality Control Coordinator.
           2. Provide detail of Deficiency to Quality Control Coordinator.
     3. If a problem is observed by the Quality Control Coordinator:
        1. Gather information from anyone with knowledge of the deficiency.
        2. Notify and discuss deficiency with QA Inspector to identify possible resolution.
        3. Quality Control Coordinator to provide possible solution, QA agrees with proper solution.
        4. If the deficiency requires a decision by personnel with an “authority” level higher than that which is available daily on the project, then it is considered non-compliant work and will need direction that is approved by the Engineer.
        5. If resolution cannot be achieved within that day, one of two courses of action needs to be taken as follows:
           1. If resolution can be achieved the following day:

Verify that the resolution was performed and that all aspects of work are now in compliance with Contract Documents.

If it is not in compliance, Notify QA immediately.

* + - * 1. If resolution cannot be achieved the following day, note in the remarks any portion of the Activity Card that has a Deficiency pending. Notify the RPC of the deficiency for tracking purposes.
      1. If work is now in compliance, note resolution in deficiency area of Activity Card, with written description of resolution, making notes in remarks which detail the resolution process then:
         1. Notify QA Inspector of Resolution.

114.06 DEFICIENCY TRACKING RESPONSIBILITY

* 1. The RPC or QCC shall be responsible for logging and tracking deficiencies on the QC Activity Card. Constant comparison against the deficiency log shall ensure no deficiency is left unresolved.
  2. The RPC shall document deficiencies that are new or have been cleared for each item relative to each activity. Every effort shall be made to resolve deficiencies as soon as possible.
  3. Section 2 of the QC Activity Card is used for documenting existing deficiencies associated with the activity listed in section 1 of the QC Activity Card. If no deficiencies exist or occur for the activity the RPC shall check-off and initial this section. If deficiencies do exist, the lower area of this section shall be completed. Each material number shall be verified against outstanding deficiencies.

114.07 TESTING IDENTIFICATION RESPONSIBILITY

* 1. The RPC, utilizing Table I, Appendix X, shall identify the test methods, frequency of the tests, and the planned number of tests to be taken for each material used in the respective activity as explained in Section 112, “Contractor Quality Control Administration.”
  2. The planned number of tests to be taken shall be documented on the Advanced Notification Card. The actual number of tests taken on each material shall be documented by the RPC in the appropriate space provided on the QC Activity Card. There may often be a large difference between the planned number of tests and actual number of tests taken. There may also be instances where a large number of planned tests were documented on the Advanced Notification Card and no actual tests were taken, given the probability of the cancellation of activities.
  3. The “Quantity of Material to be Tested” is the numerical amount of material actually available or “ready” for testing shown in units defined in Table I, Appendix X or related Agency testing of this program relative to the frequency of the material and based on the stationing information documented on the card. For example, the testable quantity of Type II grade for compaction from station 0+00 to station 10+00, given a width of 30 feet would be 30,000 square feet (SF). Given this example and using Table I, Appendix X, the minimum number of tests required for this item would be 6 total tests based on the required frequency of 1 test per 5,000 SF.
  4. The RPC shall perform all necessary calculations to ensure the number of tests performed meet the required number. All minimum test numbers calculated shall be rounded up.
  5. In the event that multiple lifts of material are represented or given that the testable quantity shown on the QC Activity Card is not readily identifiable with documented stations and dimensions, appropriate documentation and/or calculations shall be provided on the QC Activity Card Section 5 to facilitate easy verification of the testable quantity. This process allows the technician to show documentation for the entire amount of material represented without documenting repetitive entries.
  6. The RPC shall generally arrive at total quantities for each activity by documenting pertinent information such as stations, widths, and other miscellaneous dimensions at the beginning of the activity and comparing them against dimensions at the end of the activity. If situations arise where RPC cannot be present during all operations and would not be able to derive total quantities, the RPC shall retrieve the information from the activity Foreman. The Materials Tracking Logs shall also be utilized in this respect.
  7. The QC Activity Card shall reflect certain bid item payment quantities. However, the Contractor shall not use them for compilation of the monthly pay estimate or for bid item payment tracking. This is due to the difference between the pay item unit of measurement and the testable quantity unit of measurement shown in the QC table(s), and also given that payable activities may take place without the presence of a QC Activity Card. (No testing or Inspection.)
  8. REPORTING
  9. Daily Reporting
     1. The QC Activity Cards with the inspection forms, daily reports, and any field tests attached shall be used to satisfy the requirements of Daily Reporting
  10. Monthly Reporting
      1. The RPC shall be responsible for coordinating the monthly quality control summaries at the end of each calendar month and submitting to the QA within the time period allowed by agreement between the Engineer and Contractor after each calendar month.
      2. The RPC shall generate a cover letter stamped by the Nevada Professional Engineer who has responsible charge of reviewing attached material. The cover letter shall attest that the summary has been reviewed, that any short falls in testing, sampling, or qualities have been identified, quantified, and acknowledged. All deficiencies shall be acknowledged including their status on being resolved.
      3. The report may be submitted on media as follows:
         1. PDF format.
         2. Spectraqest test report printouts.
         3. Other word processor documents.
         4. Or any combination.
      4. The summary shall be submitted in the following format:
         1. Cover letter generated by RPC and/or QCC.
         2. P.E. stamp on the cover letter stating review and approval of the test summary.
         3. Field Test Result Summary that shall indicate all field test procedures and results performed during the reporting period. Items and tests shall be summarized by type. The associated daily field reports for inspections and testing shall be attached behind this summary.
         4. Field Density Test Result Summary indicating all pertinent information generated during all field density testing. The associated daily field reports for test results shall be attached behind this summary.
         5. Laboratory Test Result Summary that shall indicate all laboratory test procedures and results performed during the reporting period. Items and tests shall be summarized by type. Individual test results shall be attached behind this summary.
         6. Laboratory Concrete Break Result Summary facilitating brief analysis of critical concrete strength data. Items shall be summarized by cylinder set numbers. Individual Concrete Break Results for each set of samples shall be attached behind this summary.
         7. Laboratory Aggregate and Soils Result Summary indicating all gradation test procedures or other testing performed during the reporting period. Individual test results shall be attached behind this summary.
         8. Deficiency log.
         9. Testable Quantity Summary that shall indicate total month and to-date counts of tests performed relative to the testable quantities and to-date testable quantities.
         10. A copy of the most current AASHTO accreditation status for the laboratories referenced in the report from the AASHTO web site. The report shall also attach a list of the NAQTC certified technicians that were working at the referenced laboratories or in the field for the project during that report period.
  11. Final Reporting
      1. A final summary report shall be generated in accordance with Subsection 112.09 and shall not be submitted until such time as all discrepancies and non-conformances have been resolved as well as a compliant close-out audit if required.

END OF SECTION 114

*ADD THE FOLLOWING SECTION:*

SECTION 117 – CONTRACTOR QUALITY CONTROL TESTING

117.01 GENERAL

* 1. The testing procedures and frequency shall comply with Table I, Appendix X.
  2. For the purposes of testing, the following common structural items are hereby defined as non-structural and will only be required to meet the minimum requirement of once per week per mix design:
     1. Utility Collars.
     2. Sidewalk.
     3. CLSM.
     4. ADA ramps

117.02 TESTING EXCEPTIONS

* 1. AASHTO Test Method Modifications: Add items 1 through 3 shown below to Section 9.4.15 of AASHTO T310 In-Place Density and Moisture Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
     1. If a test fails, it is acceptable to rotate the moisture-density gauge on axis of the probe to achieve a better seating of the gauge. The process can be performed numerous times.
     2. The depth of probe shall equal the lift depth of compacted material
     3. Perform a new AASHTO T180 proctor according to the guidelines as follows:
        1. The onset of each new construction process
        2. When compaction readings are over 101 percent
        3. When the source of material changes
        4. When required at the discretion of the Engineer
  2. CONSTRUCTION
  3. Bridge Abutments
     1. The zone for structural backfill for bridge abutments is within 50 feet of the structure. Walk behind equipment must be used at the face of the walls.
  4. Concrete Plant Inspection
     1. The minimum requirement for plant inspection and field testing of concrete is set at one (1) inspection per week per mix design. The field sampling shall be performed on the same concrete placement as the plant inspection.
  5. Reinforcement Bar Testing
     1. Tensile testing of reinforcing steel is required for all structural concrete at the frequency specified in the QC tables. However, tensile testing of reinforcing steel used in non-structural items as listed in Subsection 117.01 “General” is not required.
  6. Concrete Testing
     1. The following Table 3 applies to testing for each individual mix. Frequencies apply to each mix individually. Aggregate sampling and testing is required any time a plant inspection is performed.

**Table 3 – Concrete Mix Test Frequency**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Size of Concrete Placement and Aggregate Testing** | **Any Individual Day** | | **Cumulative for the Week** | |
| Structural Concrete | Non-Structural Concrete | Structural Concrete | Non-Structural Concrete |
| Less than 3 cy | NO Tests | NO Tests | NO Tests | NO Tests |
| 3 cy. to 50 cy | YES – 1 Minimum | NO compression Tests | YES – 1Minimum | YES – 1 Minimum |
| More than 50 cy | YES & 1/100 CY Thereafter | YES & 1/100 CY Thereafter | YES & 1/100 CY Thereafter | YES & 1/100 CY Thereafter |

* 1. Soil Compaction Lifts
     1. In order to reduce the possibility that testing frequencies are not being met, the following guideline is presented.
        1. Figure 1 is an example for trenches and from Appendix X, Table 1, the frequency of testing is 1/100 Linear Feet (LF) / per Lift. The Lighter colored lifts on the Left hand side of the diagram were placed in the morning (AM). The Darker colored lifts on the Right hand side were placed in the afternoon (PM).
           1. In the AM (lighter) the following testing would be required:

The 1st Lift would require one (1) test.

The 2nd Lift would require one (1) test.

The 3rd Lift would require one (1) test.

The 4th Lift would require one (1) test.

* + - * 1. In the PM (darker), the following testing would be required:

The 1st Lift would require one (1) test.

The 2nd Lift would require two (2) tests.

The 3rd Lift would require two (2) tests.

The 4th Lift would require two (2) tests.



**Figure 1 – Trench Backfill**

END OF SECTION 117

ADD THE FOLLOWING SECTION TO DIVISION II – CONSTRUCTION DETAILS

SECTION 200 – MOBILIZATION AND DEMOBILIZATION

**DESCRIPTION**

**200.01.01 GENERAL**

A. The item of mobilization and demobilization shall consist of preparatory work and clean up operations, including, but not limited to, those necessary for the movement of personnel, equipment, supplies and incidentals to the project site, for the establishment of all offices, buildings and other facilities necessary for work on the project, as well as all other work and operations which must be performed, or costs incurred, not otherwise paid for prior to beginning work and final completion of work on the various items on the project site.

**200.01.02 PROJECT SIGN**

A. Two project signs shall be provided by the Contractor for placement near the limits of the project. Sign details are included in Appendix A of these Special Provisions. The Contractor shall erect said signs at locations as approved by the Engineer. The signs shall be erected at such time as construction activity is visible to the public.

B. The Contractor shall properly maintain said signs throughout the construction until final completion of the contract, or as directed by the Engineer. Upon completion of the project and at the direction of the Engineer, the Contractor shall remove and dispose of the project signs.

C. The Contractor’s cost for furnishing, installing, maintaining and removing these signs shall be included in the lump sum bid item for Mobilization and Demobilization and will not be measured or paid for separately.

**200.01.03 DIGITAL IMAGE RECORDING**

1. Prior to initiating construction operations and prior to final acceptance, Contractor shall perform digital image recording of the entire project, its full length and width including any adjacent properties/structures that may be impacted by the construction. The Contractor shall also include or add as necessary, any areas to be disturbed for material storage, employee parking or equipment storage.
2. The images provided in this section:
3. Are intended for use as indisputable evidence in ascertaining the extent of any damage which may occur as a result of the Contractor’s operations.
4. Are for the protection of the Contractor and the Contracting Agency.
5. Will be a means of determining whether and to what extent damage resulting from the Contractor’s operations occurred during the Contract work.
6. The video documentation shall be completed in digital format; it shall be a minimum resolution of 1920x1080 pixels, and at 60fps (frames per second). The actual date of recording shall be date-stamped within each frame of the video. Approval of the video must be obtained from the Engineer prior to the commencement of any clearing and grubbing operations.
7. Video documentation may be supplemented by still images, date stamped with image location information, to provide additional detail when necessary.
8. An external hard drive of the digital image recording shall be submitted to the Engineer.

**BASIS OF PAYMENT**

**200.05.01 PAYMENT**

A. Partial payments for MOBILIZATION AND DEMOBILIZATION shall be made in accordance with the following schedule:

1. When 5 percent of the original contract amount is earned from other bid items, 25 percent of the amount bid for mobilization, or 5 percent of the original contract amount, whichever is less, will be paid, provided the initial digital image recording has been submitted and accepted.
2. When 25 percent of the original contract amount is earned from other bid items, 50 percent of the amount bid for mobilization, or 7 percent of the original contract amount, whichever is less, will be paid.
3. When 50 percent of the original contract amount is earned, excluding the amount for mobilization, the remaining contract amount bid for mobilization, or 10 percent of the original contract amount, whichever is less, will be paid.
4. Upon completion of all work on the project, payment of any amount bid for mobilization in excess of 10 percent of the original contract amount will be paid.
5. Total sum for all payments shall not exceed the original contract amount bid for mobilization, regardless of the fact that the Contractor may have to re-mobilize his work and relocate equipment to each designated area of work.

B All payments will be made in accordance with Subsection 109.02, “Scope of Payment”.

C. Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 200.0010 | MOBILIZATION AND DEMOBILIZATION | LS |

END SECTION 200

SECTION 201 – CLEARING AND GRUBBING

**METHOD OF MEASUREMENT**

**201.04.01 MEASUREMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The quantity of CLEARING AND GRUBBING will be measured per lump sum.

**BASIS OF PAYMENT**

**201.05.01 PAYMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The accepted quantity of CLEARING AND GRUBBING will be paid for at the contract unit price of lump sum and shall conform to the requirements of Subsection 201.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 201.0010 | CLEARING AND GRUBBING | LS |

**END OF SECTION 201**

**OR IF NOT MEASURING FOR PAYMENT USE THE FOLLOWING:**

**METHOD OF MEASUREMENT**

**201.04.01 MEASUREMENT**

***DELETE THIS SUBSECTION IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:***

No direct measurement shall be made for CLEARING AND GRUBBING.

**BASIS OF PAYMENT**

**201.05.01 PAYMENT**

***DELETE THIS SUBSECTION IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:***

Unless otherwise provided in the Special Provisions, no payment will be made for CLEARING AND GRUBBING as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which CLEARING AND GRUBBING is required.

END OF SECTION 201

SECTION 202 – REMOVAL OF STRUCTURES AND OBSTRUCTIONS

**CONSTRUCTION**

**202.03.02 REMOVAL**

***DELETE PARAGRAPH H IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:***

H. In removing catch basins, and inlets, any live sewers connected to item shall be rebuilt and properly reconnected and a satisfactory bypass service shall be maintained during such construction operations. When abandoning catch basins, and inlets, they shall be thoroughly cleaned and existing pipe connections shall be plugged with concrete of the class and grade specified for structures. The portions of the structures shall then be removed to the required elevations and any necessary backfill shall be placed and compacted to specifications. All manholes shall be abandoned/removed in accordance with DCSWCS Section 3.18.2 a & c, whichever applies.

***ADD THE FOLLOWING SUBSECTIONS TO THIS SECTION:***

**202.03.70 REMOVAL OF EXISTING TRAFFIC STRIPING AND MARKERS**

A. All existing paint striping and markings to be removed from existing pavement to remain, shall be removed by sandblasting. A slurry seal emulsion shall be applied to the sand blasted areas to “blackout” the removed striping.

**202.03.71 GRINDING OF EXISTING BITUMINOUS SURFACE (ROTOMILLING)**

A. In removing bituminous pavement by the rotomilling process, the work shall be accomplished with a machine designed to remove, profile and texture the remaining surface of the pavement in one (1) operation. The milling machine shall consist of a rotating powered mandrel drum studded with conical tungsten carbide tipped bits and shall produce a reasonable smooth textured surface satisfactory to the Engineer and shall be equipped with an effective means for controlling dust and other particulate matter created by the milling action.

B. The machine shall be capable of accurately establishing profile grades (within plus or minus one quarter (1/4”) inch) by referencing from the existing pavement or from an independent grade control. It shall have a positive means for controlling cross slope elevations. At the option of the Engineer, and if the pavement warrants it, the use of the averaging ski may be discontinued.

NOTE TO SPEC WRITER: Do not use paragraph lettering for the following two subsections, Measurement and Payment. This applies to all subsequent SP sections.

**METHOD OF MEASUREMENT**

**202.04.01 MEASUREMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The quantity of REMOVE PLANTMIX BITUMINOUS SURFACE will be measured per square yard.

The quantity of REMOVE PLANTMIX BITUMINOUS PAVEMENT BY COLD MILLING METHOD (DEPTH) will be measured per square yards. Removal of bituminous surface by cold milling will be measured once, regardless of the number of passes necessary to obtain the depth specified on the plans and as approved.

The quantity of REMOVE CONCRETE SIDEWALK will be measured per square foot.

The quantity of REMOVE CONCRETE CURB AND GUTTER will be measured per linear foot.

The quantity of [FILL IN ITEM DESCRIPTION] will be measured per [UNIT].

No direct measurement shall be made for [FILL IN ITEM DESCRIPTION].

The quantity of removal of driveway, median island, sidewalk, curb and gutter to be measured for payment shall not include the following:

1. Driveway, median island, sidewalk, curb and gutter removed for construction of proposed drop inlets.
2. Driveway, median island, sidewalk, curb and gutter abutting proposed drop inlets 3 feet 6 inches, or to the nearest joint, away from either side of the inlet opening.
3. Driveway, median island, sidewalk, curb and gutter removed because of unnecessary damage during construction.

**BASIS OF PAYMENT**

**202.05.01 PAYMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The accepted quantity of REMOVE PLANTMIX BITUMINOUS SURFACE will be paid for at the contract unit price of square yard and shall conform to the requirements of subsection 202.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include removal of existing asphalt concrete pavement; removal and disposal of brush, trash and debris, loop detectors, pavement markers, pavement striping; and protection and restoration, if damaged, of all existing facilities.

The accepted quantity of REMOVE PLANTMIX BITUMINOUS PAVEMENT BY COLD MILLING METHOD (DEPTH) will be paid for at the contract unit price of square yard and shall conform to the requirements of subsection 202.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include, sawcutting and removal of existing asphalt concrete pavement; removal and disposal of brush, trash and debris, loop detectors, pavement markers, pavement striping; and protection and restoration, if damaged, of all existing facilities.

The accepted quantity of REMOVE CONCRETE SIDEWALK will be paid for at the contract unit price of square foot and shall conform to the requirements of subsection 202.05.01 of the Uniform Standard Specifications and shall include all materials, equipment and labor required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include, sawcutting where indicated on plans or at locations determined by the Engineer and removal of full panel to nearest joint; removal and disposal of base course materials, concrete, detectable tactile warning strips at sidewalk ramps, reinforcing steel and sidewalk; protection and restoration, if damaged, of all existing facilities; ; sidewalk removal to construct new storm drain, drop inlets, traffic signals, street lights and foundations, that is not shown on the drawings, to be replaced, will not be measured and paid for separately but will be considered incidental to the particular item for which the removal is required. Note to spec writer: for drop Inlets, down drains and sidewalk under drains and the like - be sure to identify these on the plans especially in sections of removal of sidewalk and have these items paid for separately and not included as incidental to sidewalk removal.

The accepted quantity of REMOVE CONCRETE CURB AND GUTTER will be paid for at the contract unit price of linear foot and shall conform to the requirements of subsection 202.05.01 of the Uniform Standard Specifications and shall include all materials, equipment and labor required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include, sawcutting and removal of existing asphalt concrete pavement; sawcutting concrete curb and gutter and removal to the nearest joint; temporary patches; removal and disposal of base course materials, concrete, curb and gutter and reinforcing steel; protection and restoration, if damaged, of all existing facilities, monumentation; protection and restoration; curb and gutter removal to construct new storm drain, drop inlets, traffic signals, street lights and foundations, that is not shown on the drawings, to be replaced, will not be measured and paid for separately but will be considered incidental to the particular item for which the removal is required. Note to spec writer: for drop Inlets, down drains and sidewalk under drains and the like - be sure to identify these on the plans especially in sections of removal of curb and gutter and have these items paid for separately and not included as incidental to curb and gutter removal. Also, make sure that permanent patches are incidental to new curb and gutter or incidental to any AC bid items for the project.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

Unless otherwise provided in the Special Provisions, no payment will be made for [FILL IN ITEM DESCRIPTION] as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which [FILL IN ITEM DESCRIPTION] is required.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 202.0005 | REMOVE PLANTMIX BITUMINOUS SURFACE | SY |
| 202.00XX | REMOVE PLANTMIX BITUMINOUS PAVEMENT BY COLD MILLING METHOD (DEPTH) | SY |
| 202.0320 | REMOVE CONCRETE SIDEWALK | SF |
| 202.0370 | REMOVE CONCRETE CURB AND GUTTER | LF |
| 202.XXXX | [ITEM DESCRIPTION] | [UNIT] |

END OF SECTION 202

SECTION 203 – EXCAVATION AND EMBANKMENT

**DESCRIPTION**

**203.01.01 GENERAL**

***ADD THE FOLLOWING PARAGRAPH TO THIS SUBSECTION:***

B. The compacted subgrade shall be maintained at optimum moisture content until placement of an aggregate base course.

C. It is expected that all excavation will require removal of various types of material. The cost for the excavation of all material encountered including, but not limited to, cemented soils and rock shall be considered as included in the unit prices bid for pay items requiring excavation and no additional compensation will be allowed.

**CONSTRUCTION**

**203.03.01 ROADWAY**

***ADD THE FOLLOWING PARAGRAPH TO THIS SUBSECTION:***

E. It is expected that roadway, trench, channel, structure, drainage and impoundment excavation will require removal of various types of material, including cemented soils and rock. The cost for the excavation of cemented soils and rock encountered shall be considered as included in the unit prices bid for pay items requiring excavation and no additional compensation will be allowed.

NOTE TO SPEC WRITER: Include the following two subsections as needed for your project.

F. Vibration monitoring by a qualified professional shall be conducted by the CONTRACTOR during excavation of cemented soils. The CONTRACTOR shall be required to conduct impact assessment tests of the equipment excavating cemented soils prior to construction. The CONTRACTOR shall submit an Impact Assessment Test Plan and Impact Assessment Test Results. The frequency and amplitude of the vibratory equipment shall be calibrated and used to measure ground velocity for conformance to the current regulatory limit of 0.5 inch per second peak ground velocity at the nearest affected structure. The measurements shall comply with the recommendations of the “Office of Surface Mining, Blasting Guidance Manual, 1987.” The cost for vibration monitoring during excavation of cemented soils shall be considered as included in the unit price bid for pay items requiring excavation and no additional compensation will be allowed. (Point this item out at Pre-Bid Conference and make sure it is included in the basis of payment for excavation items.)

G. Excavations near mapped alluvial faults shall be inspected by a qualified professional prior to RCP/RCB installation. If a fault is encountered, appropriate remedial action shall be taken by the CONTRACTOR per geotechnical recommendations. (Point this item out at Pre-Bid Conference and make sure it is included in the basis of payment for items requiring fault remediation.)

**203.03.04 BLASTING**

***DELETE THIS SUBSECTION IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:***

A. Blasting shall not be permitted.

**203.03.16 EMBANKMENT MATERIALS**

***ADD THE FOLLOWING PARAGRAPH TO THIS SUBSECTION:***

F. [FOR DETENTION BASINS, ADD PARAGRAPH ON STRUCTURAL FILL AND COMPACTED FILL SOIL REQUIREMENTS]

***ADD THE FOLLOWING SUBSECTIONS TO THIS SECTION:***

**203.03.70 OVEREXCAVATION AND BACKFILL**

NOTE TO SPEC WRITER: Consider adding an item for “Overexcavation and Backfill” in areas where unsuitable soils are expected but the trench/pavement section doesn’t call out standard overexcavation as part of the bid item

A. Where overexcavation below the depths as shown on the plans or required by the specifications is necessary to remove unsuitable material, the Engineer may require the Contractor to remove the unsuitable materials and backfill to the finished graded section with Type I aggregate base, conforming to 3-inch size per subsection 704.03.03, compacted to a minimum of 90% of ASTM D1557 Modified Proctor and in accordance with the methods in the USS.

B. Unless otherwise provided in the Special Provisions, overexcavation and backfill below the limits shown on the plans will be paid for as “Extra Work”.

**203.03.71 HAZARDOUS MATERIAL**

A. Hazardous material shall be defined as material or water contaminated with volatile organic compounds, inorganic non-metals, petroleum hydrocarbons or other contaminates as specified by the Nevada Division of Environmental Protection Agency (NDEP).

B. The Contractor shall retain a Certified Environmental Manager (CEM) for making periodic inspection of the project for potential hazardous materials. The CEM shall inspect the project a minimum of: once a quarter for all projects; once a month for projects requiring trenching and/or dewatering; and as per environmental regulatory requirements. In addition, the CEM will be available for inspection of the project as directed by the Engineer and/or NDEP should material be uncovered that may be potential hazardous material.

C. When potential hazardous material is encountered or reasonably suspected, the Contractor shall:

1. Immediately contact the CEM, Engineer and City of Las Vegas Environmental Officer.
2. Have the CEM perform the inspection of the potential hazardous material and if required perform the inspection for the removal and disposal of the hazardous material.
3. Retain a certified environmental firm to perform the required tests for hazardous materials and/or contaminants.
4. If required, perform the removal and disposal of the hazardous materials as directed by the CEM, Engineer and/or City of Las Vegas Environmental Officer in coordination with NDEP.
5. Submit a copy of the Waste Manifest(s) from contaminated or hazardous materials disposal.

D. If encountered, investigation and removal/disposal of hazardous material will be paid for as "extra work", as approved by the Engineer. Removal of contaminated soil, if encountered shall be paid per TON.

NOTE TO SPEC WRITER: Any work in Symphony Park will need to add Contaminated Soil Sections

**ADD THE FOLLOWING IF CONTAMINATED SOIL IS FOUND:**

**203.03.72 CONTAMINATED SOIL MANAGEMENT**

1. Concentrations of Volatile Organic Compounds (VOC’s) were found in XXXX as provided in the “Report Title” report dated XXX (provided for informational use only in Appendix XX).
2. The Contractor will be responsible for preparing and submitting a CEM-certified Soil and Groundwater Management Plan for approval by the City and NDEP prior to construction start.  The Plan must address the methods for identifying, handling, and disposing of any hazardous materials encountered during the construction phases of this project. The Contractor shall prepare a Health and Safety Plan (HASP) specific to the site which establishes procedures to protect worker’s health and minimizes worker’s exposure to contaminants.
3. Once approved, the Soil and Groundwater Management Plan shall be submitted to the Engineer and City of Las Vegas Environmental Officer.

**ADD THE FOLLOWING FOR DETENTION BASINS:**

**203.03.73 EXCAVATION**

A. It is expected excavation for storm drain and detention basin items will require removal of various types of material, including cemented soils and rock (i.e. caliche).

B. All costs for excavation for trenches, storm drain, culverts, pipes, and structures shall be incidental in the various Bid items. Separate payment for excavation, regardless of the type, amount, or methods required, will not be made.

C. Prior to construction, baseline distress evaluation by a qualified professional shall be conducted by the Contractor. The evaluations shall document existing distress to the structures and other improvements in the area of work.

D. Vibration monitoring by a qualified professional shall be conducted by the Contractor during excavation of cemented soils. The Contractor shall be required to conduct impact assessment tests of the equipment excavating cemented soils prior to construction. The Contractor shall submit an Impact Assessment Test Plan and Impact Assessment Test Results. The frequency and amplitude of the vibratory equipment shall be calibrated and used to measure ground velocity for conformance to the current regulatory limit of 0.5 inch per second peak ground velocity at the nearest affected structure. The measurements shall comply with the recommendations of the “Office of Surface Mining, Blasting Guidance Manual, 1987.” The cost for vibration monitoring during excavation of cemented soils shall be considered as included in the unit price bid for pay items requiring excavation and no additional compensation will be allowed.

E. The Contractor shall submit to the Owner a plan detailing his proposed excavation techniques. This excavation plan shall include the results of a seismic survey performed by a certified seismic survey firm. The plan must show all proposed locations of excavation operations utilizing methods involving headache balling, hoe ram, or other techniques. The excavation plan shall include recommendations from certified seismic survey firm for limiting ball weights, height of drop, etc. for all areas headache balls and/or hoe rams techniques are proposed. In addition, the plan must include the results of a pre-excavation survey and a seismic monitoring plan. The excavation plan shall also include as a minimum; detailed examination of adjacent structures, including video taping and installation of crack monitoring tape along existing structural cracks. The excavation plan must be approved by the Owner prior to construction.

F. If damage to structures becomes evident, the Contractor shall immediately cease his excavation operations and submit a new excavation plan detailing new or modified methods to end the adverse affects. The Contractor shall make no claims for any delay caused by the re‑submittal nor any additional expense resulting from changing his proposed excavation methods.

G. The excavation plan shall be updated and resubmitted to the Owner any time the Contractor proposes altering his methods. The plan(s) will be considered shop drawings and will be handled as such. The Contractor shall make no claim for any losses resulting from delays during the review of these submittals in accordance with the limitations detailed for shop drawings in these specifications.

H. The Contractor’s methods for excavation are solely his responsibility. Approval of the excavation plan by the Owner will in no way limit the Contractor’s liability regarding property damaged and subsurface damage beyond the excavation limits by his operations, nor will it alter the Contractor’s sole responsibility for the safety of his operations. The Contractor shall be responsible for all damage caused by his excavation operations and be responsible for answering all complaints. Provide the Owner with advance warning of the use of excavation techniques which may lead to property damage, to review the proposed techniques, to confirm general compliance with these specifications, and to allow monitoring of the excavation methods.

I. Excavations near mapped alluvial faults shall be inspected by a qualified professional prior to RCP/RCB installation. If a fault is encountered, appropriate remedial action shall be taken by the Contractor per geotechnical recommendations.

**203.03.74 COMPACTED FILL**

A. Compacted fill will consist of native material excavated, hauled, screened, placed, and compacted within the neat lines shown on the Drawings and as specified in Subsection 203.03.16.

B. All fill materials shall be placed in continuous horizontal layers in maximum 8-inch loose lifts. Each layer shall be moisture conditioned to within 2 percent of optimum moisture content and compacted by rolling with compaction equipment methods to at least 90 percent of the maximum dry density as determined by ASTM D1557.

C. The existing soil in areas to receive fill along the dam embankment shall be scarified to a minimum of 8 inches, reworked, moisture conditioned, and recompacted to at least 90 percent of the maximum density as determined by ASTM D1557. The depth of excavation, replacement, and compaction may be reduced or increased by the Owner's representative depending on his visual inspection of uncovered soils. Hard cemented soils may result in a decrease in required excavation depth while partially cemented soils or soft spongy or deleterious soils may result in an increase in required excavation depth. Any increase in depth shall comply with Subsection 203.03.70, Over-Excavation and Backfill.

**203.03.75 EMBANKMENT PROTECTION**

A. Completed excavation and embankment grading planes and other disturbed areas within the limits of construction shall be protected by soil stabilizer placed on all exposed soil surfaces. Soil stabilizer shall be applied to all disturbed soil areas not specified to be covered with riprap, decomposed granite, aggregate base, asphalt pavement or other surfacing. Unless otherwise specified in these Special Provisions, herbicide shall not be placed on any surfaces within the detention basin.

B. Apply soil stabilizer within 14 days of when no further disturbance of the surface will be made. Protect all structures, walls, landscaping, etc. from overspray. Store and handle soil stabilizer in accordance with the manufacturer’s recommendations. Do not spray when weather conditions are windy. Windy conditions are defined as a sustained wind of 8 mph or more, or any condition that may cause dispersal of material to be difficult or inaccurate. Soil stabilizer shall form a crust like barrier within 4 to 8 hours. The use of accelerators is recommended.

C. No soil stabilizer shall be used which is not on the Qualified Products List established by the Nevada Department of Transportation. Soil stabilizer shall be applied at the manufacturer’s recommended application and dilution rates.

D. Add a color pigment to the soil stabilizer at the time of application. Apply a suitable pigmentation to the soil stabilizer slurry such that is used for pigmenting concrete at an application rate of 50 pounds per acre. The color of the pigmentation shall be approved by the Engineer.

**203.03.76 QUALITY CONTROL TESTING**

A. Quality control testing will be performed for Dam Safety Permit compliance in accordance with the State Engineers Office. The testing will be performed by an independent testing laboratory.

B. The Contractor shall schedule his operations so as to allow and facilitate quality control testing by the independent laboratory.

C. The following standard tests will be used as a basis for classifying soil materials and for control testing:

|  |  |
| --- | --- |
| Test Designation | Test |
|  |  |
| ASTM C136  AASHTO T27 | Test for Sieve or Screen Analysis of Fine and Course Aggregates |
|  |  |
| ASTM D1556 | Density of Soils In-Place by the Sand-Cone Method |
|  |  |
| ASTM D1557  AASHTO T180 | Moisture-Density Relations of Soils and Soil Aggregate Mixing Using 10 Pound Rammer and 18-Inch Drop |
|  |  |
| AASHTO T310 | In-Place Density and Moisture Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth) |
|  |  |
| ASTM D4318  AASHTO T89/T90 | Plasticity Index of Soils |
|  |  |
| AWWA 4500E | Maximum Sulfate Content |
|  |  |
| Southern Nevada Amendments to the Building Code | Maximum Expansive Potential 60 psf |
|  |  |
| ASTM C117 | Test for Materials Finer than No. 200 Sieve in Mineral Aggregates by Washing |
|  |  |
| ASTM D422 | Particle-Size Analysis of Soils |

D. Two representative soil samples of imported fill will be performed at the beginning of construction. Additional tests will be conducted to classify and establish the moisture density relationship for each type of soil encountered in areas that may yield excavated materials suitable for placement in embankment. Whenever the material encountered is different from previously tested material, a new set of classification and moisture-density tests will be performed.

E. The number of locations of in-place density tests for embankment and compacted fill construction shall be sufficient to determine that each layer of material placed in embankment has been compacted adequately to obtain the density specified therefore. The minimum number of in-place density tests by ASTM D1556 and AASHTO T310 procedures will be one for each 5,000 square feet per 8-inch lift of fill.

F. The following standard tests will be used for concrete material quality control testing:

|  |  |
| --- | --- |
| Test Designation | Test |
|  |  |
| ASTM C1064 | Temperature of Freshly Mixed Portland Cement Concrete |
|  |  |
| ASTM C143 | Slump of Hydraulic Cement Concrete |
|  |  |
| ASTM C173/C231 | Air Content of Freshly Mixed Concrete |
|  |  |
| ASTM C39 | Compressive Strength of Cylindrical Concrete Specimens |
|  |  |

G. The concrete will be tested a minimum of once per day and per every 100 cubic yards placed.

H. The above frequency of tests is approximate and is provided for the Contractor’s information in planning Contractor’s work and interruptions during testing. The actual number of tests will depend on the variability of materials being placed and uniformity of the Contractor’s placement operations.

I. Quality control test data will be reviewed and submitted monthly. All quality control test data will be compiled in a final report and submitted at the completion of work for Dam Safety Permit compliance. All reports submitted to the City shall be stamped by a Nevada Registered Professional Engineer.

**203.03.76 CALICHE EXCAVATION**

A. Caliche is anticipated to be encountered on this project and is defined as a rock-like material that occurs in soil deposits erratically in thickness, hardness, and lateral extent and it is therefore difficult to predict in terms of interference with below-grade construction. Contractor shall take adequate precautions to reduce the potential for vibrational damage to adjacent or nearby structures when using heavy impact equipment during removal of caliche. In the event structures are damaged, Contractor be responsible for effecting all repairs.

B. Generation of oversized material (rocks or hard chunks greater than 6 inches nominal diameter) shall be anticipated by Contractor when excavating caliche. Oversize material shall be crushed prior to being used as structural fill, backfill, and compacted fill, or disposed of in a suitable manner.

**METHOD OF MEASUREMENT**

**203.04.01 MEASUREMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

NOTE TO SPEC WRITER: IF YOU ARE INCLUDING ROADWAY EXCAVATION AS A BID ITEM, MAKE SURE TO EXPLAIN IN DETAIL THE LIMITS OF WHAT IS COVERED BY ROADWAY EXCAVATION, INCLUDING A DETAIL IN THE PLANS THAT SHOWS THE AREAS COVERED BY ROADWAY EXCAVATION. CONSIDER REMOVING EXCAVATION FROM 613 OR SIMILAR BID ITEMS IF IT IS INTENDED TO HAVE ROADWAY EXCAVATION COVER THE ENTIRE ROADWAY PRISM.

The quantity of [FILL IN ITEM DESCRIPTION] will be measured per [UNIT].

No direct measurement shall be made for [FILL IN ITEM DESCRIPTION].

Overexcavation and backfill volumes will be measured by the average end area method of the over-excavated material in its original state. If for any reason it is impossible or impractical to measure quantities by average end areas, the Engineer will compute the quantities by a method which, in the Engineer’s opinion, is best suited to obtain an accurate determination. This quantity will include both the cost for removing the unsuitable material and the cost to replace it with suitable backfill.

**ADD THE FOLLOWING IF CONTAMINATED SOIL IS FOUND:**

The quantity of CONTAMINATED SOIL EXCAVATION AND DISPOSAL will be measured per ton.

The quantity of NON-CONTAMINATED SOIL EXCAVATION AND DISPOSAL will be measured per ton.

**ADD THE FOLLOWING FOR DETENTION BASINS:**

The quantity of DETENTION BASIN EXCAVATION will be measured per cubic yard.

The quantity of QUALITY CONTROL TESTING will be measured per lump sum.

The quantity of Compacted Fill will be measured for payment by cubic yard.

Over-excavation and backfill volumes will be measured by the average end area method of the over-excavated material in its original state. If for any reason it is impossible or impractical to measure quantities by average end areas, the Engineer will compute the quantities by a method which, in the Engineer’s opinion, is best suited to obtain an accurate determination. This quantity will include both the cost for removing the unsuitable material and the cost to replace it with suitable backfill.

The quantity of Detention Basin Soil Stabilization will be measured for payment by acre.

**BASIS OF PAYMENT**

**203.05.01 PAYMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The accepted quantity of [FILL IN ITEM DESCRIPTION ROADWAY EXCAVATION, DRAINAGE EXCAVATION, CHANNEL EXCAVATION, etc.] will be paid for at the contract unit price of cubic yards and shall conform to the requirements of subsection 203.05.01 of the Uniform Standard Specifications.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

Unless otherwise provided in the Special Provisions, no payment will be made for [FILL IN ITEM DESCRIPTION] as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which [FILL IN ITEM DESCRIPTION] is required.

The CEM retained by the Contractor will not be paid for directly, but will be included in the unit prices bid for pay items requiring excavation and no additional payment will be allowed.

Unless otherwise provided in the Special Provisions, dewatering will not be paid for directly and will be included in the unit prices bid for pay items requiring excavation and no additional payment will be allowed.

**ADD THE FOLLOWING IF CONTAMINATED SOIL IS FOUND:**

All costs for the preparation and execution of the Soil and Groundwater Management Plan and HASP are considered to be included in other items of work and no additional payment will be made therefore.

The accepted quantity of CONTAMINATED SOIL EXCAVATION AND DISPOSAL will be paid at the contract unit price per ton and shall include all materials, equipment, and labor required including, but not limited to: excavation; installation of excavation support systems, if required; onsite testing; documenting location of contaminated material; handling; costs of securing, lining and operating (including BMPs) a temporary stockpile site; temporarily stockpiling of contaminated material; sample and analyze material using certified laboratory; perform waste profile analysis for acceptance by approved landfill/recycling facility; transport of material in covered trucks or enclosed containers; delivery to an approved landfill/recycling facility; documentation including waste manifests, bills of lading, and acceptance documents including certified scale weight slips; and all other items necessary to complete the Work as shown on the plans and as specified herein. The bid price shall include all costs due to contamination of the soil that are over and above the cost of Trench Excavation and Backfill. The cost of Trench Excavation and Backfill is not paid for separately and is included in the price bid for construction of the items to which Trench Excavation and Backfill is required. Further, the cost of Trench Excavation and Backfill assumes excavation, handling, and backfill of non-contaminated material.

The accepted quantity of NON-CONTAMINATED SOIL EXCAVATION AND DISPOSAL will be paid at the contract unit price per ton for soil that was identified as potentially contaminated in the excavation and was found to be non-contaminated based on laboratory testing. The unit price per cubic yard shall include all materials, equipment, and labor required including, but not limited to: excavation; installation of excavation support systems, if required; on-site testing; documenting location of potentially contaminated material; handling; costs of securing, lining and operating (including BMPs) a temporary stockpile site; temporarily stockpiling material; sample and analyze material using certified laboratory; transport material using non-contaminated procedures to a disposal site or re-use material as fill if the material meets fill specifications, including all supervision, testing, documentation, and all other items necessary to complete the work as shown on the plans and as specified herein. The bid price shall include all costs due to contamination of the soil that are over and above the cost of Trench Excavation and Backfill. The cost of Trench Excavation and Backfill is not paid for separately and is included in the price bid for construction of the items to which Trench Excavation and Backfill is required. Further, the cost of Trench Excavation and Backfill assumes excavation, handling, and backfill of non-contaminated material.

The accepted quantity of BACKFILL OF OVEREXCAVATION will be paid at the contract unit price per cubic yard and shall include all materials, equipment, and labor required including, but not limited to: furnishing clean non-contaminated soil from off-site borrow source or from on-site excavations with non-contaminated soils. The price shall include material testing for compliance with fill specifications; excavation; hauling; temporary stockpiling, if required; and all other items necessary to complete the work as shown on the plans and as specified herein.

The quantities of CONTAMINATED SOIL EXCAVATION AND DISPOSAL, NON-CONTAMINATED SOIL EXCAVATION AND DISPOSAL, and BACKFILL OF OVEREXCAVATION were estimated as a basis for comparing bids.

**ADD THE FOLLOWING FOR DETENTION BASINS:**

The accepted quantity of DETENTION BASIN EXCAVATION will be paid for at the contract unit price per Cubic Yard and shall include all labor, equipment and materials necessary to complete the work, including but not limited to, saw cutting of existing paving; scarifying; pulverizing; grading; compaction; minor brush, trash and debris removal; all miscellaneous grading of shoulders, ditches and transitions; hauling; handling; stock piling and rehandling; screening; crushing; watering; disposal; and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer. **[IF APPLICABLE ADD: Payment for Detention Basin Excavation shall also include the cost of caliche excavation including rehandling if permitted to use as riprap, screening, watering, disposal, heavy-duty ripping, heavy-duty backhoe, headache ball, hoe-ram, rocksaw, dewatering, and all other items incidental and appurtenant to this work. Hauling excess material to the BLM site will be paid for as specified below for the item for Hauling to BLM Site. Note to spec writer: hauling to BLM site may be a requirement if BLM owns mineral rights.]**

The quantity of excavation / backfill will not be paid for directly, but will be included in the unit bid price for the respective improvements that excavation is a part. Payment for baseline distress evaluation and vibration monitoring will not be paid for directly but will be included in the unit bid price for the respective improvements that excavation is a part.

The accepted quantity of QUALITY CONTROL TESTING will be paid for at the contract unit price per lump sum and shall include all testing, labor, tools, equipment and coordination with outside testing laboratories to comply with all test requirements necessary to complete the work. Testing by the Contractor required as part of other bid items shall not be paid for under this pay item but will be considered incidental to the pay items requiring the tests.

Failure to submit a monthly report, as specified in subsection 203.03.74 “Quality Control Testing”, will be grounds for the Engineer to deduct up to ten percent (10%) of the monthly progress payment until the Contractor is in compliance.

The accepted quantity of Compacted Fill will be paid for at the Contract unit price bid per cubic yard, which shall be full compensation for providing all labor, equipment, and materials necessary to complete the work, including but not limited to, access to location within the specified construction limits, clearing and grubbing, crushing, processing, screening, hauling, placing, blending, watering, compacting, and all other items incidental, appurtenant, and necessary to complete the work as shown on the Drawings, as specified, and as directed by the Engineer.

The accepted quantity of Detention Basin Soil Stabilization will be paid for at the contract unit price bid per acre, which shall include all permits, labor, materials, equipment, and all other items incidental, appurtenant, and necessary to complete the work as shown on the Drawings, as specified herein, and as directed by the Engineer.

The CEM retained by the Contractor will not be paid for directly, but will be included in the unit prices bid for pay items requiring excavation and no additional payment will be allowed.

Unless otherwise provided in the Special Provisions, dewatering will not be paid for directly and will be included in the unit prices bid for pay items requiring excavation and no additional payment will be allowed.

Payment will be made under:

|  |  |  |  |
| --- | --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | | **UOM** |
| 203.XXXX | CHOOSE FROM:  ROADWAY EXCAVATION  DRAINAGE EXCAVATION  CHANNEL EXCAVATION  BORROW EXCAVATION  SELECTED BORROW  SELECTED BORROW EXCAVATION | | CY |
|  | V-TYPE DITCHES | | LF |
|  | ADD THE FOLLOWING FOR DETENTION BASINS:  DETENTION BASIN EXCAVATION | | CY |
|  | QUALITY CONTROL TESTING | | LS |
|  | COMPACTED FILL | | CY |
|  | DETENTION BASIN SOIL STABILIZATION | | AC |
|  | |
|  | ADD THE FOLLOWING IF CONTAMINATED SOIL IS FOUND:  CONTAMINATED SOIL EXCAVATION AND DISPOSAL | | TON |
|  | NON-CONTAMINATED SOIL EXCAVATION AND DISPOSAL | | TON |

END OF SECTION 203

SECTION 204 – ROUNDED AND TRANSITION SLOPES

**DESCRIPTION**

**METHOD OF MEASUREMENT**

**204.04.01 MEASUREMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The quantity of [FILL IN ITEM DESCRIPTION] will be measured per [UNIT].

No direct measurement shall be made for [FILL IN ITEM DESCRIPTION].

**METHOD OF PAYMENT**

**204.05.01 PAYMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall conform to the requirements of subsection 204.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include,

Unless otherwise provided in the Special Provisions, no payment will be made for [FILL IN ITEM DESCRIPTION] as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which [FILL IN ITEM DESCRIPTION] is required.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
|  |  |  |

END OF SECTION 204

SECTION 206 – STRUCTURE EXCAVATION

**DESCRIPTION**

**206.01.01 GENERAL**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

C. Where structure over-excavation below the depths as shown on the plans or required by the specifications is necessary to remove unsuitable material, the Engineer may require the Contractor to remove the unsuitable materials and backfill to the required grade with material conforming to subsection 704.03.02, compacted to a minimum of 90% of ASTM D1557 Modified Proctor and in accordance with the methods in the USS.

D. Unless otherwise provided in the Special Provisions, structure over-excavation and backfill below the limits shown on the plans will be paid for as “Extra Work”.

E. If groundwater is encountered within the excavated area, dewatering shall be performed as specified in Section 270 “Dewatering”.

ADD THE FOLLOWING SUBSECTION TO THIS SECTION:

**METHOD OF MEASUREMENT**

**206.04.01 MEASUREMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The quantity of [FILL IN ITEM DESCRIPTION] will be measured per [UNIT].

No direct measurement shall be made for [FILL IN ITEM DESCRIPTION].

No unit of measurement shall be made for Structure Excavation and Backfill.

**METHOD OF PAYMENT**

**206.05.01 PAYMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall conform to the requirements of subsection 206.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include,

Unless otherwise provided in the Special Provisions, no payment will be made for [FILL IN ITEM DESCRIPTION] as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which [FILL IN ITEM DESCRIPTION] is required.

Unless otherwise provided in the Special Provisions, no payment will be made for Structure Excavation and Backfill as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which Structure Excavation and Backfill is required.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 206.XXXX | [ITEM DESCRIPTION] | [UNIT] |

END OF SECTION 206

SECTION 207 – STRUCTURE BACKFILL

**Materials**

* + 1. **SELECTED BACKFILL**

***REVISE PARAGRAPH A TO READ AS FOLLOWS:***

A. Selected backfill shall be of a quality acceptable to the Engineer and shallconsist of suitable material from the excavation complying to Table 1 and Table 2. It shall be free from sod, frozen earth, organic materials, rubbish, or debris. If the material does not comply with Table 1, it may be used only if approved by the Engineer.

**DESCRIPTION**

**METHOD OF MEASUREMENT**

**207.04.01 MEASUREMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The quantity of [FILL IN ITEM DESCRIPTION] will be measured per [UNIT].

No direct measurement shall be made for [FILL IN ITEM DESCRIPTION].

**METHOD OF PAYMENT**

**207.05.01 PAYMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall conform to the requirements of subsection 207.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include,

Unless otherwise provided in the Special Provisions, no payment will be made for [FILL IN ITEM DESCRIPTION] as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which [FILL IN ITEM DESCRIPTION] is required.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 207.XXXX | [ITEM DESCRIPTION] | [UNIT] |

END OF SECTION 207

SECTION 208 – TRENCH EXCAVATION AND BACKFILL

**DESCRIPTION**

**208.01.01 GENERAL**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

E. Frequency of quality control field inspection and testing shall be in accordance with 203.05.02 Testing.

F. Ponding and jetting will not be allowed on City of Las Vegas projects.

**MATERIAL**

**208.02.08 CRUSHED ROCK**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

B. Unless otherwise shown in the plans, crushed rock will not be permitted as structural or trench backfill.

***ADD THE FOLLOWING SUBSECTION TO THIS SECTION:***

**208.02.70 STRUCTURAL BACKFILL**

A. Structural backfill shall consist of material conforming to subsection 207.02.02 “Granular Backfill” or subsection 207.02.01 “Selected Backfill”. Additionally, the backfill material shall be non-gypsiferous (solubility less than 4%), have an expansion potential less than 4%, shall be free of vegetation and debris and contain no rocks larger than four inches nominal diameter. Crushed rock will not be permitted as structural or trench backfill unless otherwise noted on the plans.

**CONSTRUCTION**

**208.03.01 TRENCH EXCAVATION, GENERAL**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

C. Trenching and shoring operations shall be conducted in accordance with 29 CFR (Code of Federal Regulations) Part 1926, Occupational Safety and Health Standards (OSHA) – Subpart P – Excavations (July 1, 1990).

**208.03.03 MAXIMUM TRENCH WIDTH**

***delete PARAGRAPH “b” and replace with the following:***

B. Except when otherwise specified or ordered by the Engineer, the bottom of the trench shall be excavated uniformly to the grade or depth indicated on the drawings. The maximum amount of open trench permitted in any one location shall be per Section 624 of these Special Provisions. Trench shall be considered open until backfilled to the top of subgrade. Trenches crossing streets shall be completely backfilled immediately after pipe, wire, or conduit installation.

**208.03.12 PIPE BEDDING**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

[NOTE TO SPEC WRITER: Consider showing a trench bedding and backfill detail on the plans for precast RCB’s with review by geotechnical consultant and CLV CM. If no detail is provided then add the following text:

G. For precast reinforced concrete boxes provide a minimum 2-inch sand leveling course (over native soil or 4 to 6-Inch Type II) as bedding.]

**208.03.21 CUTTING AND RESTORING STREET SURFACING**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

Q. Pavement in the area of the trench excavation shall be sawcut.

R. Cold mix patches will not be allowed.

**METHOD OF MEASUREMENT**

**208.04.01 MEASUREMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The quantity of PERMANENT PATCH will be measured per square yard, complete, in place and conforming to all requirements herein.

No direct measurement shall be made for [FILL IN ITEM DESCRIPTION].

**BASIS OF PAYMENT**

**208.05.01 PAYMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The accepted quantity of PERMANENT PATCH will be paid for at the contract unit price of square yard and shall conform to the requirements of Subsection 208.05.01 of the Uniform Standard Specifications.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall conform to the requirements of subsection 208.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include,

Unless otherwise provided in the Special Provisions, no payment will be made for [FILL IN ITEM DESCRIPTION] as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which [FILL IN ITEM DESCRIPTION] is required.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 208.0100 | PERMANENT PATCH | SY |

END OF SECTION 208

SECTION 212 – LANDSCAPING

**DESCRIPTION**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

**212.01.01 GENERAL**

***DELETE THIS SUBSECTION IN ITS ENTIRETY AND REPLACE WITH the FOLLOWING***

a. All plant material shall be under warranty and maintenance for one year from the substantial completion date.

b. This work shall consist of furnishing and planting trees and installing tree accessories where shown on the drawings or as established by the ENGINEER, all in accordance with specifications and accepted horticultural practices. This work also consists of furnishing and installing decomposed granite and decorative rocks.

***ADD THE FOLLOWING TO THIS SECTION:***

**212.01.02 SUMMARY**

A. The section includes trees, soil amendments, initial maintenance of landscape materials, and accessories required for a complete installation.

**212.01.03 REFERENCES**

1. The materials used shall be those prescribed for the several items which constitute the finished work and shall conform to the applicable requirements of Sections 201 Clearing and Grubbing, Section 203 Excavation and Embankment, Section 207 Structure Backfill of the Clark County Uniform Standard Specifications, American Nursery Association (ANA) Guidelines, and Federal Specifications: O-F-241 – Fertilizers, Mixed, Commercial.
2. The following specifications and standards of the organizations and documents listed in below form a part of the specification to the extent required by the references thereto. In the event that the requirements of the following referenced standards and specifications conflict with this specification section, the requirements of this specification shall prevail. In the event that the requirements of any of the following referenced standards and specifications conflict with each other the more stringent requirement shall prevail or as determined by the Owners Representative.
   * + 1. State of California, Department of Food and Agriculture, Regulations for Nursery Inspections, Rules and Grading.
       2. ANSI Z60.1 American Standard for Nursery Stock, most current edition.
       3. ANSI A 300 – Standard Practices for Tree, Shrub and other Woody Plant Maintenance, most current edition and parts.
       4. Arizona Nursery Association - Container Grown Tree Guide
       5. Interpretation of plant names and descriptions shall reference the following documents. Where the names or plant descriptions disagree between the several documents, the most current document shall prevail.
          1. USDA - The Germplasm Resources Information Network ([GRIN](http://www.ars-grin.gov/npgs/aboutgrin.html)) <http://www.ars-grin.gov/npgs/searchgrin.html>
          2. Manual of Woody Landscape Plants; Michael Dirr; Stipes Publishing, Champaign, Illinois; Most Current Edition.
          3. The New Sunset Western Garden Book, Oxmoor House, most current edition.
       6. Pruning practices shall conform to recommendations “Structural Pruning: A Guide For The Green Industry” most current edition; published by Urban Tree Foundation, Visalia, California.
       7. Glossary of Arboricultural Terms, International Society of Arboriculture, Champaign IL, most current edition.

**212.01.04 QUALITY ASSURANCE**

1. Regulatory Requirements, Codes, and Standards: Comply with appropriate regulatory agencies for fertilizer and herbicide composition.
2. Source Quality Control:
   * + 1. Ship landscape materials with certificates of inspection required by governing authorities. Comply with regulations applicable to landscape materials.
       2. Do not make substitutions. If specified landscape material is not obtainable, submit proof of non-availability to the ENGINEER, together with proposal for use of equivalent material.
       3. Analysis and Standards: Package standard products with manufacturer's certified analysis. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agriculture Chemists, wherever applicable.
       4. Topsoil: Before delivery of topsoil, furnish the ENGINEER with written statement giving location from which topsoil is to be obtained and an agricultural analysis of the topsoil to be used.
       5. Trees: Provide trees of quantity, size, genus, species, and variety shown and scheduled for landscape work and complying with recommendations and requirements of ANSI Z60.1 American Standard for Nursery Stock. Provide healthy, vigorous stock, grown in recognized nursery in accordance with good horticultural practice and free of disease, insects, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, or disfigurement.
       6. Label at least ten percent of trees of each variety with a securely attached waterproof tag bearing legible designation of botanical and common name.
          1. Where formal arrangements or consecutive order of trees are shown, select stock for uniform height and spread, and label with number to assure symmetry in planting.
       7. Inspection:
          1. Trees: The ENGINEER may inspect trees either at place of growth or at site before planting, for compliance with requirements for genus, species, variety, size, and quality. The ENGINEER retains right to further inspect trees for size and condition of balls and root systems, insects, injuries and latent defects, and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees immediately from project site.
3. Installer Qualifications: The installer shall be a firm having at least 5 years of successful experience of a scope similar to that required for the work, including the handling and planting of large specimen trees in urban areas. The same firm shall install planting soil (where applicable) and plant material.
   * + 1. The bidders list for work under this section shall be approved by the Owner’s Representative.
       2. Installer Field Supervision: When any planting work is in progress, installer shall maintain, on site, a full-time supervisor who can communicate in English with the Owner’s Representative. Field supervisor shall have a minimum of five years’ experience as a field supervisor installing plants and trees of the quality and scale of the proposed project.
       3. Provide submittal prior to work for firm installer qualifications and Installer Field Supervisor qualifications. Submit references of past projects and employee training certifications to support that the Contractor meets all of the above installer qualifications and applicable licensures.
4. Sole Source Responsibility: Subcontract landscape work to a single firm specializing in landscape work, licensed in the state in which work is to be performed.
5. Nursery: Firm specializing in growing and cultivating plants with minimum 5 years documented experience.
6. Tree Installer: Firm specializing in installing and planting the plants with minimum 5 years documented experience approved by nursery.
7. Coordinate with installation of underground sprinkler system piping and watering heads.

**212.01.05 SUBMITTALS**

A. The CONTRACTOR shall submit, within ten (10) calendar days after receipt of Notice to Proceed, material and equipment submittals, including manufacturer’s name and address, specific trade names, catalog and model numbers, illustrations and descriptive material, clearly marked as to proposed items for approval by the ENGINEER.

B. Approval of the submittals shall be the CONTRACTOR’S authorization to order the required material. There will be no deviation from the approved submittals without the written authorization of the ENGINEER.

C. Plant and Material Certifications:

* + - 1. Certificates of inspection required by governmental authorities.
      2. Plant growers’ certificates: Submit plant growers’ certificates for all plants indicating that each meets the requirements of the specification, including the requirements of tree quality, to the Owner’s Representative for approval. Provide submittal eight weeks before the installation of plants.
      3. Manufacturer's or vendor's certified analysis for soil amendments and fertilizer materials.
      4. Label data substantiating that trees comply with specified requirements.

1. Planting Schedule: Proposed planting schedule, indicating dates for each type of landscape work during normal seasons for such work in area of site. Correlate with specified maintenance periods to provide maintenance from date of substantial completion. Once accepted, revise dates only as approved in writing, after documentation, of reasons for delays.
2. Maintenance Instructions: Typewritten instructions recommending procedures, to be approved by the ENGINEER for maintenance of landscape work for one year. Submit prior to start of required maintenance period.
3. For materials used on the project which cannot be visually verified, submit copies of all invoices or receipts. These include, but are not limited to, backfill mix material, fertilizer, fertilizer tablets, mulches, soil stabilizers, water holding agents, herbicides, etc. All invoices or receipts must list the item, quantity, job location, date and the supplier.
4. Agricultural Soil Analysis: CONTRACTOR is to obtain an agricultural soil analysis of both the import and the on-site soil from a lab specializing in agricultural soil analysis, analyzing the items in the units specified in 212.02.01. The analysis is to recommend specific soil amendments and fertilizer applications. Submit the results to the ENGINEER for review and approval. The soil mix noted on the plans will be changed or altered according to the recommendations of the soil lab and the instructions of the ENGINEER at no additional cost.
5. Warranty period site visit record: If there is no maintenance during the warranty period, after each site visit during the warranty period, by the Contractor, as required by this specification, submit a written record of the visit, including any problems, potential problems, and any recommended corrective action to the Owner’s Representative for approval.

**212.01.06 DELIVERY STORAGE AND HANDLING**

* + - 1. Packaged Materials: Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery, and while stored at site. Adequately protect plants from drying out, exposure of roots to sun, wind or extremes of heat and cold temperatures. If planting is delayed more than 24 hours after delivery, set plants in a location protected from sun and wind. Provide adequate water to the root ball package during the shipping and storage period.
         1. All plant materials must be available for observation prior to planting.
         2. Using a soil moisture meter, periodically check the soil moisture in the root balls of all plants to assure that the plants are being adequately watered. Volumetric soil moisture shall be maintained above wilting point and below field capacity for the root ball substrate or soil.
      2. Trees and Shrubs: Do not prune prior to delivery unless otherwise approved by the ENGINEER. Do not bend or bind‑tie trees or shrubs in such manner as to damage bark, break branches, or destroy natural shape. Provide protective covering during delivery. Do not drop balled and burlapped stock during delivery.
      3. Deliver trees after preparations for planting have been completed and plant immediately. If planting is delayed more than 6 hours after delivery, set trees in shade, protect from weather and mechanical damage, and keep roots moist by covering with mulch, burlap or other acceptable means of retaining moisture.
      4. Protect soil from compaction during the delivery of plants to the planting locations, digging of planting holes and installing plants.
         1. Where possible deliver and plant trees that require the use of heavy mechanized equipment prior to final soil preparation and tilling. Where possible, restrict the driving lanes to one area instead of driving over and compacting a large area of soil.
         2. Till to a depth of 6 inches, all soil that has been driven over during the installation of plants.

**212.01.07 PROJECT CONDITIONS**

A. Utilities: Determine location of underground utilities and perform work in a manner which will avoid possible damage. Hand excavate, as required. Maintain grade stakes set by others until removal is mutually agreed upon by parties concerned.

* + 1. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify the ENGINEER before planting.
    2. It is the responsibility of the Contractor to be aware of all surface and sub-surface conditions, and to notify the Owner’s Representative, in writing, of any circumstances that would negatively impact the health of plantings. Do not proceed with work until unsatisfactory conditions have been corrected.

1. Should subsurface drainage or soil conditions be encountered which would be detrimental to growth or survival of plant material, the Contractor shall notify the Owner’s Representative in writing, stating the conditions and submit a proposal covering cost of corrections. If the Contractor fails to notify the Owner’s Representative of such conditions, he/she shall remain responsible for plant material under the warranty clause of the specifications.
2. It is the responsibility of the Contractor to be familiar with the local growing conditions, and if any specified plants will be in conflict with these conditions. Report any potential conflicts, in writing, to the Owner’s Representative.
3. This specification requires that all Planting Soil and Irrigation (if applicable) work be completed and accepted prior to the installation of any plants.
4. Planting operations shall not begin until such time that the irrigation system is completely operational for the area(s) to be planted, and the irrigation system for that area has been preliminarily observed and approved by the Owner’s Representative.
5. If it is not desired or is impractical to have a fully functional irrigation system prior to plantings, all landscape shall be hand watered based on an agreed upon schedule with the Owner Representative.

**212.01.08 SEQUENCING AND SCHEDULING**

A. Planting Time: Proceed with, and complete landscape work as rapidly as portions of site become available, working within seasonal limitations for each kind of landscape work required.

* + - 1. Plant or install materials during normal planting seasons for each type of plant material required.
      2. Correlate planting with specified maintenance periods to provide maintenance from date of substantial completion.

1. The Contractor shall coordinate with all other work that may impact the completion of the work.
2. Prior to the start of work, prepare a detailed schedule of the work for coordination with the other trades.

**212.01.09 WARRANTY**

1. The Contractor agrees to replace defective work and defective plants. The Owner’s Representative shall make the final determination if plants meet these specifications or that plants are defective. Plant warranty shall begin on the date of Substantial Completion Acceptance and continue for the following periods, classified by plant type:
   1. Trees – 1 Year
   2. Shrubs – 1 Year
   3. Ground cover and perennial flower plants – 1 Years
2. All plants shall be warrantied to meet all the requirements for plant quality at installation in this specification. Defective plants shall be defined as plants not meeting these requirements. The Owner’s representative shall make the final determination that plants are defective.
3. Plants determined to be defective shall be removed immediately upon notification by the Owner’s Representative and replaced without cost to the Owner, as soon as weather conditions permit and within the specified planting period.
4. Any work required by this Specification or the Owner’s Representative during the progress of the work, to correct plant defects, shall not be considered as grounds to void any conditions of the warranty. In the event that the Contractor decides that such remediation work may compromise the future health of the plant, the plant or plants in question shall be rejected and replaced with plants that do not contain defects that require remediation or correction.
5. The Contractor is exempt from replacing, after Substantial Completion acceptance or issuance and during the warranty period, plants/trees that are removed by others, lost or damaged due to occupancy of project, lost or damaged by a third party, vandalism, or any natural disaster. Extreme weather that is typical in any given year is not considered a natural disaster including winds up to 60 mph.
6. Replacements shall closely match adjacent specimens of the same species. Replacements shall be subject to all requirements stated in this specification. Make all necessary repairs due to plant replacements. Such repairs shall be done at no extra cost to the Owner.
7. The warranty of all replacement plants shall extend for an additional one-year period from the date of their acceptance after replacement. In the event that a replacement plant is not acceptable during or at the end of the said extended warranty period, the Owner’s Representative may elect one more replacement items or credit for each item. These tertiary replacement items are not protected under a warranty period.
8. During and by the end of the warranty period, only remove all tree wrap, ties, and guying when agreed upon by the Owner’s Representative. All trees shall be staked or remain staked, until the Owner's Representative determines that staking can be removed.
9. End of Warranty Final Acceptance – Acceptance of plants at the end of the warranty period.
   1. At the end of the warranty period, the Owner’s Representative shall observe all warranted work, upon written request of the Contractor or scheduled by the Owner. The request shall be received at least ten calendar days before the anticipated date for final observation.
   2. End of Warranty Final Acceptance will be given only when all the requirements of the work under this specification and in specification sections Planting Soil and Irrigation have been met.

**212.01.10 MAINTENANCE SERVICE**

A. Maintain plant life for one year after the Date of Substantial Completion.

B. Maintenance to include (but not limited to):

* + - 1. Cultivation and weeding tree pits.
      2. Fertilizing trees every 90 days.
      3. Applying herbicides for weed control in accordance with manufacturer’s instructions
      4. Remedy damage resulting from use of herbicides.
      5. Remedy damage from use of insecticides.
      6. Irrigating sufficient to saturate root system.
      7. Pruning, including removal of dead or broken branches. Tree pruning shall conform to ISA Best Management Practices regarding tool selection and sterilization, tree structure and biology, pruning practices, branch removal and quality of workmanship and current ANSI A300 standards.
      8. Disease control.
      9. Maintaining wrapping, guys, and stakes. Repair or replace accessories when required.
      10. Advising the Owner to make any watering schedule changes the Contractor does not have control over.

**212.01.11 PRE-ACTIVITY MEETING**

1. Schedule a pre-activity meeting with the Owner’s Representative at least seven (7) days before beginning work to review any questions the Contractor may have regarding the work, administrative procedures during construction and project work schedule.

**MATERIALS**

**212.02.01 GENERAL**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

1. Standards and measurement: Provide plants of quantity, size, genus, species, and variety or cultivars as shown and scheduled in contract documents.
   * + 1. All plants including the root ball dimensions or container size to trunk caliper ratio shall conform to ANSI Z60.1 “American Standard for Nursery Stock” latest edition, unless modified by provisions in this specification. When there is a conflict between this specification and ANSI Z60.1, this specification section shall be considered correct.
       2. Plants larger than specified may be used if acceptable to the Owner’s Representative. Use of such plants shall not increase the contract price. If larger plants are accepted the root ball size shall be in accordance with ANSI Z-60.1. Larger plants may not be acceptable if the resulting root ball cannot be fit into the required planting space.
       3. If a range of size is given, no plant shall be less than the minimum size and not less than 50 percent of the plants shall be as large as the maximum size specified. The measurements specified are the minimum and maximum size acceptable and are the measurements after pruning, where pruning is required.
2. Proper Identification: All trees shall be true to name as ordered or shown on planting plans and shall be labeled individually or in groups by genus, species, variety and cultivar.
3. Compliance: All trees shall comply with federal and state laws and regulations requiring observation for plant disease, pests, and weeds. Observation certificates required by law shall accompany each shipment of plants.
   * + 1. Clearance from the local county agricultural commissioner, if required, shall be obtained before planting trees originating outside the county in which they are to be planted.

**212.02.03 QUALITY OF PLANT MATERIALS**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

1. General: Provide healthy stock, grown in a nursery and reasonably free of die-back, disease, insects, eggs, bores, and larvae. At the time of planting all plants shall have a root system, stem, and branch form that will not restrict normal growth, stability and health for the expected life of the plant.
2. Plant quality above the soil line – Plants shall be healthy with the color, shape, size and distribution of trunk, stems, branches, buds, and leaves normal to the plant type specified. Tree quality above the soil line shall comply with the project Crown Acceptance details and the following:
   * + 1. Crown: The form and density of the crown shall be typical for a young specimen of the species or cultivar pruned to a central and dominant leader. Crown specifications do not apply to plants that have been specifically trained in the nursery as topiary, espalier, multi-stem, clump, or unique selections such as contorted or weeping cultivars.
       2. Leaves: The size, color, and appearance of leaves shall be typical for the time of year and stage of growth of the species or cultivar. Trees shall not show signs of prolonged moisture stress or over watering as indicated by wilted, shriveled, or dead leaves.
       3. Branches: Shoot growth (length and diameter) throughout the crown should be appropriate for the age and size of the species or cultivar. Trees shall not have dead, diseased, broken, distorted, or otherwise injured branches.
       4. Main branches shall be distributed along the central leader not clustered together. They shall form a balanced crown appropriate for the cultivar/species.
       5. Branch diameter shall be no larger than two-thirds (one-half is preferred) the diameter of the central leader measured 1 inch above the branch union.
       6. The attachment of the largest branches (scaffold branches) shall be free of included bark.
       7. Trunk: The tree trunk shall be relatively straight, vertical, and free of wounds that penetrate to the wood (properly made pruning cuts, closed or not, are acceptable and are not considered wounds), sunburned areas, conks (fungal fruiting bodies), wood cracks, sap leakage, signs of boring insects, galls, cankers, girdling ties, or lesions (mechanical injury).
       8. Temporary branches, unless otherwise specified, can be present along the lower trunk below the lowest main (scaffold) branch, particularly for trees less than 1 inch in caliper. These branches should be no greater than 3/8-inch diameter. Clear trunk should be no more than 40% of the total height of the tree.
3. Trees shall have one central leader. If the leader was headed, a new leader (with a live terminal bud) at least one-half the diameter of the pruning cut shall be present.
   * + 1. All trees are assumed to have one central leader trees unless a different form is specified in the plant list or drawings.
       2. All graft unions, where applicable, shall be completely closed without visible sign of graft rejection. All grafts shall be visible above the soil line.
       3. Trunk caliper and taper shall be sufficient so that the lower five feet of the trunk remains vertical without a stake. Auxiliary stake may be used to maintain a straight leader in the upper half of the tree.
4. Plant quality at or below the soil line: Plant roots shall be normal to the plant type specified. Root observations shall take place without impacting tree health. Root quality at or below the soil line shall comply with the project Root Acceptance details if shown on the plans and the following:
   * + 1. The roots shall be reasonably free of scrapes, broken or split wood.
       2. The roots system shall be reasonably free of injury from biotic (e.g., insects and pathogens) and abiotic (e.g., herbicide toxicity and salt injury) agents. Wounds resulting from root pruning used to produce a high quality root system are not considered injuries.
       3. A minimum of three structural roots reasonably distributed around the trunk (not clustered on one side) shall be found in each plant. Root distribution shall be uniform throughout the root ball, and growth shall be appropriate for the species. Plants with structural roots on only one side of the trunk (J roots) shall be rejected.
       4. The root collar shall be within the upper 2 inches of the substrate/soil. Two structural roots shall reach the side of the root ball near the top surface of the root ball. The grower may request a modification to this requirement for species with roots that rapidly descend, provided that the grower removes all stem girdling roots above the structural roots across the top of the root ball.
       5. The root system shall be reasonably free of stem girdling roots over the root collar or kinked roots from nursery production practices.
       6. At time of observation and delivery, the root ball shall be moist throughout. Roots shall not show signs of excess soil moisture conditions as indicated by stunted, discolored, distorted, or dead roots.

**212.02.06 SUBSTITUTION OF PLANTS**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

1. Submit all requests for substitutions of plant species, or size to the Owner’s Representative, for approval, prior to purchasing the proposed substitution. Request for substitution shall be accompanied with a list of nurseries contacted in the search for the required plant and a record of other attempts to locate the required material. Requests shall also include sources of plants found that may be of a smaller or larger size, or a different shape or habit than specified, or plants of the same genus and species but different cultivar origin, or which may otherwise not meet the requirements of the specifications, but which may be available for substitution.

**212.02.08 PLANTING SOIL**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

1. Planting soil as used in this specification means the soil at the planting site, or imported as modified and defined in specification Section Planting Soil. If there is no Planting Soil specification, the term Planting Soil shall mean the soil at the planting site within the planting hole.

**212.02.10 MULCH**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

1. Mulch shall be “Walk on” grade, coarse, ground, from tree and woody brush sources. The maximum size of individual pieces (largest 20% or less of volume) shall be approximately 1 to 3 inch in diameter and/or in length. Pieces larger than 3-inches or inconsistent with the overall appearance of wood mulch shall be removed.
   1. It is understood that mulch quality will vary significantly from supplier to supplier. The above requirements may be modified to conform to the source material from locally reliable suppliers as approved by the Owner’s Representative.
2. Submit supplier’s product specification data sheet and a three gallon sample for approval.

***ADD THE FOLLOWING TO THIS SECTION:***

**212.02.70 TOP SOIL**

A. Topsoil for landscape work is to be:

* + - 1. Sandy or Loamy Sand from well drained local sites
      2. Free from refuse, roots, heavy clay, stones larger than one-quarter inch in largest direction, gravel, sticks, brush, litter and other deleterious substances
      3. Less than ten percent clay content and more than 75 percent sand content
      4. Salinity – Ece no greater than four mmhos/cm
      5. Water holding capacity between 40 percent and 55 percent
      6. Boron – Less than one ppm
      7. pH – Less than 8.5

**212.02.71 soil amendments**

1. Fertilizer: FS O-F-241, Type I, Grade A; with fifty percent of the elements derived from organic sources; of proportion necessary to eliminate any deficiencies of topsoil as indicated in the soil analysis.

B. Organic soil conditioner: Gro-Power, Nutri-Mulch, Nevada Forest Products, Bio-Rem or Equal.

C. Soil Sulphur: In quantities necessary to eliminate any deficiencies of topsoil as indicated in the soil analysis.

D. Iron Sulfate: In quantities necessary to eliminate any deficiencies of topsoil as indicated in the soil analysis or as shown on the soil mix details.

E. Water: Clean, fresh and free of substances or matter which could inhibit vigorous growth of plants.

F. Herbicide: As needed.

G. Pesticide: As needed

**212.02.72 MISCELLANEOUS LANDSCAPE MATERIALS**

A. Anchors and Guys: Provide anchors and guys as shown on the drawings.

B. Decorative Rock Ground Cover: Hard, durable gravel, washed free of loam, sand, clay, and other foreign substances. Size, color and type as specified on the Plans.

**212.02.73 TREES**

1. All trees shall be single-trunk.

(NOTE TO SPEC WRITER – CLV PM to work with Brad Daseler, 4-inch caliper and 48” Box tree is standard but 3-inch caliper or 36-inch Box tree may be requested for project, alter B accordingly)

1. All trees shall be a minimum 4-inch caliper for 48” box trees and larger. If the contractor is unable to obtain 4-inch caliper trees that are acceptable to the Engineer, then minimum 3-inch caliper may be accepted by the Engineer if the trees are personally tagged and/or accepted via photograph of the specific trees to be provided. Accepted trees smaller than 4-inch caliper will be paid at a 25% reduction to the bid unit price. Section 104.02 of the Standard Specifications does not apply to the 25% reduction.
2. All trees shall have a trunk height of 5-feet measured from the root ball to the crotch.
3. The minimum canopy height shall be 7-feet from finished grade when installed and maintained for the duration of construction.
4. Quality: Provide trees of size, genus, species, and variety shown and scheduled for landscape work, grown in climatic conditions similar to those in locality of the work.

**212.02.74 SELECTION AND OBSERVATION OF PLANTS**

1. The Owner’s Representative may review all plants subject to approval of size, health, quality, character, etc. Review or approval of any plant during the process of selection, delivery, installation and establishment period shall not prevent that plant from later rejection in the event that the plant quality changes or previously existing defects become apparent that were not observed.
2. Plant Selection: The Owner’s Representative reserves the right to select and observe all plants at the nursery prior to delivery and to reject plants that do not meet any requirements as set forth in this specification. If a particular defect or substandard element can be corrected at the nursery, as determined by the Owner’s Representative, the agreed upon remedy may be applied by the nursery or the Contractor provided that the correction allows the plant to meet the requirements set forth in this specification. Any work to correct plant defects shall be at the contractor’s expense.
   * + 1. The Owner’s Representative may make invasive observation of the plant’s root system in the area of the root collar and the top of the root ball in general in order to determine that the plant meets the quality requirements for depth of the root collar and presence of roots above the root collar. Such observations will not harm the plant.
       2. Corrections are to be undertaken at the nursery prior to shipping.
3. The Contractor shall bear all cost related to any plant corrections.
4. All plants that are rejected shall be immediately removed from the site and acceptable replacement plants provided at no cost to the Owner.
5. The Contractor shall require the grower or re-wholesale supplier to permit the Owner’s Representative to observe the root system of all plants at the nursery or job site prior to planting including random removal of soil or substrate around the base of the plant. Observation may be as frequent and as extensive as needed to verify that the plants meet the requirements of the specifications.
6. For pre-purchased trees, each tree shall have a numbered seal applied by the Contractor. The seal shall be placed on a lateral branch on the north side of the tree. The seal shall be a tamper proof plastic seal bearing the Contractors name and a unique seven-digit number embossed on the seal.
   * + 1. Do not place seals on branches that are so large that there is not sufficient room for the branch growth over the period of the warranty.
7. The Owner’s Representative may choose to attach their seal to each plant, or a representative sample. Viewing and/or sealing of plants by the Owner’s Representative at the nursery does not preclude the Owner’s Representative’s right to reject material while on site. The Contractor is responsible for paying any cost for the Owner’s Representative to attach their seal to specific plants.
8. Where requested by the Owner’s Representative, submit current photographs of plants or representative samples of plants. Photographs shall be legible and clearly depict the plant specimen. Each submitted image shall contain a height reference, such as a measuring stick. The approval of plants by the Owner’s Representative via photograph does not preclude the Owner’s Representative's right to reject material while on site.

**212.02.75 ROOT BALL PACKAGE OPTIONS**

1. The following root ball packages are permitted. Specific root ball packages shall be required where indicated on the plant list or in this specification. Any type of root ball packages not specifically defined in this specification shall not be permitted.
2. Balled and burlapped plants:
   1. All balled and burlapped plants shall be field grown, and the root ball packaged in a burlap and twine and/or burlap and wire basket package.
   2. Plants shall be harvested with the following modifications to standard nursery practices.
      1. Prior to digging any tree that fails to meet the requirement for maximum soil and roots above the root collar, carefully remove the soil from the top of the root ball of each plant, using hand tools, water or an air spade, to locate the root collar and attain the soil depth over the structural roots as required. Remove all stem girdling roots above the root collar. Care must be exercised not to damage the surface of the root collar and the top of the structural roots.
      2. Trees shall be dug for a minimum of 4 weeks and a maximum of 52 weeks prior to shipping. Trees dug 4 to 52 weeks prior to shipping are defined as hardened-off. Digging is defined as cutting all roots and lifting the tree out of the ground and either moving it to a new location in the nursery or placing it back into the same hole. Tress that are stored out of the ground shall be placed in a holding area protected from extremes of wind and sun with the root ball protected by covering with mulch or straw and irrigated sufficiently to keep moisture in the root ball above wilt point and below saturation.
      3. Wire baskets may be used to support the root ball. The wire baskets shall be removed entirely prior to backfilling the tree.
      4. Twine and burlap used for wrapping the root ball package shall be natural, biodegradable material. If the burlap decomposes after digging the tree then the root ball shall be re-wrapped prior to shipping unless roots have grown to keep root ball intact during shipping.
3. Container (including above-ground fabric containers and boxes) plants:
   1. Container plants may be permitted only when indicated on the drawing, in this specification, or approved by the Owner’s Representative.
   2. Provided plants shall be established and well rooted in removable containers.
   3. Container class size, or wooden box size equivalent where applicable, shall conform to ANSI Z60.1 for container plants for each size and type of plant.

**212.02.76 PALMS**

1. Palms shall meet all the requirements of the Quality of Plant Material section, except as modified below or where the requirements are not appropriate to the specification of palms.
2. Defronding, tying, and hedging:
   1. In preparing palm trees for relocation, all dead fronds shall be removed.
   2. All remaining fronds above horizontal shall be lifted up and tied together around the crown in an upright position. Up to 2/3 of the oldest live fronds can be removed. Do not tie too tightly, bind or injure the bud. Jute binder twine shall be used in tying up the fronds; wire will not be permitted. Fronds shall be untied immediately after planting.
3. Digging the root ball:
   1. When digging out the root ball, no evacuation shall be done closer than 30” inches to the trunk at ground level and the excavation shall extend below the major root system to a minimum depth of 3.5 feet. The bottom of the root ball shall be cut off square and perpendicular to the trunk below the major root system.
4. The Contractor shall not free-fall, roll or abuse the tree or put a strain on the crown (bud area) at any time. A protective device shall be used around the trunk of the tree while lifting and relocating so as not to injure the bud, or scar or skin the trunk in any way.

NOTE TO SPEC WRITER: THE FOLLOWING TWO SECTIONS ARE ONLY FOR PROJECTS THAT INCLUDE SOIL CELLS

**212.02.77 STRUCTURAL SOIL CELL**

1. All structural soil cells will consist of an interconnected, skeletal matrix that provides void space for filling with soil media.
2. Structural Soil Cell Modules shall be engineered plastic modules designed to connect together to create a matrix, for use beneath pavements. Structural Soil Cell Modules shall be StrataVault, Silva Cell or approved equal. Strata Cell available through CityGreen, 888-999-3990, [info@citygreen.com](mailto:info@citygreen.com). Silva Cell available through Deeproot, 415-781-9700, hello@deeproot.com.
   1. 100% recycled Polypropylene (PP)
   2. No steel components-corrosion free
   3. Ultimate Load Strength 306 kpa (44.38 psi) minimum, verified by laboratory crush tests.
3. Aggregate Sub-base shall be clean aggregate 5-10 mm (0.2 - 0.4 inch) screening.
4. Heavy Grade Non-Woven Filter Fabric shall be Geocomposite 3030 or equal. Composite of a laid geogrid made of stretched, monolithic polypropylene (PP) flat bars with welded junctions and a mechanical bonded filter geotextile welded within the geogrid structure, used for reinforcement in many fields of civil engineering including road construction, landfill and hydraulic engineering.

|  |  |  |  |
| --- | --- | --- | --- |
| **Property** | **Test Method\*** | **Unit** | **30/30 Q1 151 GRK 3** |
| ***Geogrid*** | | | ***30/30 Q1*** |
| Raw material | - | - | Polypropylene (PP), white |
| Mass per unit area | EN ISO 9864 | g/m² | 200 |
| Max. tensile strength, md / cmd\*\* | EN ISO 10319 | kN/m | ≥ 30/ ≥ 30 |
| Elongation at nominal strength, md / cmd\*\* | EN ISO 10319 | % | ≤8 / ≤8 |
| Tensile strength at 2% elongation, md / cmd\*\* | EN ISO 10319 | kN/m | 12 / 12 |
| Tensile strength at 5% elongation, md / cmd\*\* | EN ISO 10319 | kN/m | 24 / 24 |
| Aperture size, md x cmd\*\* | - | mm x mm | Approx. 32 x 32 |
| Production specific elongation | - | % | O |
| ***Geotextile*** | | | ***151 GRK 3*** |
| Raw material | - | - | Polypropylene (PP), white |
| Mass per unit area | EN ISO 9864 | g/m² | ≥150 |
| Max. tensile strength, md / cmd\*\* | EN ISO 10319 | kN/m | 7.5 / 11.0 |
| Elongation at max. tensile strength, md / cmd\*\* | EN ISO 10319 | % | 40 / 30 |
| Puncture force | EN ISO 12236 | N | 1,670 |
| Displacement at static puncture strength | EN ISO 12236 | mm | 30 |
| Detector tested | - | - | Yes |
| Roll dimensions, width x length | - | m x m | 4.75 x 100 |

*\* based on, \*\* md = machine direction, cmd = cross machine direction*

1. Linear Barrier shall be Rootstop, DeepRoot, or approved equal. Linear barriers to be installed per plan. Vertical, integral ribs guide tree roots down into matrix beneath pavement.
   1. Continuous rolls to minimize joins and possible penetration.
   2. Widths to suit application and pavement depth
   3. 80mil thickness
   4. 100% High density Polyethylene. This resin meets FDA regulation 177.1520 for food packaging.
   5. Nominal physical properties:

|  |  |  |  |
| --- | --- | --- | --- |
| **PROPERTY\*** | **ASTM D** | **UNIT** | **VALUE** |
| Density | 1505 | g/cm³ | 0.952 |
| Melt Index | 1238 | g/10 min | 0.35 |
| ESCR,F₅₀ Condition B | 1693 | h | 50 |
| Tensile Yield Strength | 638 @ 50mm/min | MPa | 27 |
| Elongation at Break | 638 @ 50mm/min | % | ˃600 |
| Brittleness Temperature | 746 | °C | <-90 |
| Flexural Modulus | 790 | MPa | 1310 |
| Shore Hardness D | 2240 | - | 66 |
| Thermoforming\*\* Sheet sag |  | cm | 18-23 |
|  |  | h | ˃700 |

\* Physical properties reported herein were determined on compression molded specimens prepared in accordance with Procedure C of ASTM D 1928.

\*\* 0.61 x 1.22 x 3.2mm thick blank heated to forming temperature.

\*\*\* Test conditions: 296ml, 23g bottle, 10% fill, Orvus K Detergent.

1. Linear root/moisture barrier for use within or to line the main tree pit, where moisture or roots must be prevented from entering an external zone.
2. Granular base course shall consist of granular material meeting the standard below, or equivalent
   1. ASTM D1241-07, Type 1, Gradation B Standard Specification for Materials for Soil-Aggregate Sub base, Base, and Surface Courses.
      1. Type I mixtures shall consist of stone, gravel, or slag with natural or crushed sand and fine mineral particles passing a No. 200 sieve.

|  |  |
| --- | --- |
| Sieve | Percent Passing |
| 37.5mm (1.5”) | 100 |
| 25mm (1”) | 75-95 |
| 9.5mm (3/8”) | 40-75 |
| 4.75mm (No 4) | 30-60 |
| 2.0mm (No 10) | 20-45 |
| 425μm (No 40) | 15-30 |
| 75μm (No 200) | 5-15 |

**212.02.78 STRUCTURAL SOIL CELL soil composition**

1. Soil shall consist of fertile, friable soil of loamy character from local pits. Soil shall be free from deleterious substances such as road base, litter, refuse, toxic waste, stones larger than 1-inch in size, coarse sand, heavy or stiff clay, brush, sticks, grasses, roots, noxious weed seed, weeds, and other substances detrimental to plant, animal, and human health.
2. Planting soil must be derived from a combination of the following types of materials:
   1. Loamy soil with no more than 70% sand and 18% clay
   2. USDA Certified Organic biochar
   3. US Composting Council STA Program Approved compost
   4. Added minerals, nutrients or fertilizers following the specific job requirements
3. Topsoil shall contain materials that maintain that does not contribute to the contamination of crops, soil, or water by plant nutrients, pathogenic organisms, heavy metals, or residues of prohibited substances.
4. The quality characteristics of the planting soil must have the lab tested values shown in the following table unless written consent from the City of Las Vegas Urban Forester to accept soil with qualities outside following ranges:

|  |  |
| --- | --- |
| **Soil Characteristic** | **Planting Soil Requirement** |
| pH | 7.0-8.0 |
| Sodium | < 200ppm |
| Nitrogen | Min 50ppm |
| Phosphorus | Min 50ppm |
| Potassium | Min 50ppm |
| Calcium | Min 1,000ppm |
| Boron | < 1 ppm |
| Cation Exchange Capacity | 12-27 meq/100g |
| Soil Organic Matter-derived from biochar | 5-7% |
| Soil Organic Matter-derived from compost | 1-3% |
| Salinity/Electrical Conductivity | < 4 mmhos/cm |
|  |  |
| Physical contaminants – plastic, metal, rocks <1” | < .1% by volume |

**CONSTRUCTION**

1. **LAYOUT OF PLANTING**

***add the following to this subsection***

1. Layout individual tree locations and secure the ENGINEER’S acceptance before start of planting work.
2. When applicable, plant trees before other plants are installed.
3. It is understood plants are not precise objects and that minor adjustments in the layout will be required as the planting plan is constructed. These adjustments may not be apparent until some or all of the plants are installed. Make adjustments as required by the Owner’s Representative including relocating previously installed plants.
4. Coordinate the relocation of any irrigation lines, heads or the conduits of other utility lines that are in conflict with tree locations. Root balls shall not be altered to fit around lines. Notify the Owner’s Representative of any conflicts encountered.
5. **PREPARATION OF PLANTING AREAS**

***add the following to this subsection***

B. Excavate pits, beds, and trenches per drawings and details.

C. Dispose of excess subsoil removed from planting excavations.

D. Fill excavations for trees with water and allow water to percolate out prior to planting. If water does not percolate in 24 hours, a drainage chimney must be drilled as specified on the drawings.

1. **PLANTING**

***add the following to this subsection***

1. Planting of trees and shrubs shall be done in accordance with the following:
2. Install root barriers as indicated on drawings and details.
3. Place plants for best appearance
4. Set top of existing root-ball flush with or slightly above finish grade.
5. Set plants vertical unless otherwise specified
6. Remove wood boxes and non-biodegradable root containers.
7. Set plants in pits or beds, partially filled with prepared backfill mixture, at a minimum depth as indicated on drawings. Remove burlap, ropes, and wires from the root ball.
8. Saturate soil with water when the pit or bed is half full of topsoil and again when full.
9. Planting Season: Planting shall only be performed when weather and soil conditions are suitable for planting the materials specified in accordance with locally accepted practice. Install plants during the planting time as described below unless otherwise approved in writing by the Owner’s Representative. In the event that the Contractor request planting outside the dates of the planting season, approval of the request does not change the requirements of the warranty.
   1. Deciduous trees and shrubs – September 15 to April 15
   2. Evergreen trees and shrubs – September 15 to April 15
10. No planting shall take place during extremely hot, dry, windy or freezing weather:
    * + 1. Do not install plant life when ambient temperatures may drop below 35 degrees F or rise above 100 degrees F.
        2. Do not install plants when wind exceeds 25 mph.
11. Observe each plant after delivery and prior to installation for damage of any other characteristics that may cause rejection of the plant. Notify the Owner’s Representative of any condition observed.
12. No more plants shall be distributed about the planting bed area than can be planted and watered on the same day.
13. The root system of each plant, regardless of root ball package type, shall be observed by the Contractor, at the time of planting to confirm that the roots meet the requirements for plant root quality as specified herein. The Contractor shall undertake at the time of planting, all modifications to the root system required by the Owner’s Representative to meet these quality standards.
    1. Modifications, at the time of planting, to meet the specifications for the depth of the root collar and removal of stem girdling roots and circling roots may make the plant unstable or stress the plant to the point that the Owner’s Representative may choose to reject the plant rather than permitting the modification.
    2. Any modification required by the Owner’s Representative to make the root system conform to the plant quality standards outlined in these specifications, or other requirements related to the permitted root ball package, shall not be considered as grounds to modify or void the plant warranty.
    3. The resulting root ball may need additional staking and water after planting. The Owner’s Representative may reject the plant if the root modification process makes the tree unstable or if the tree is not healthy at the end of the warranty period. Such plants shall still be covered under the warranty
    4. The Contractor remains responsible to confirm that the grower has made all required root modifications noted during any nursery observations.
14. Container and Boxed Root Ball Shaving: The outer surfaces of ALL plants in containers and boxes, including the sides and bottom of the root ball shall be shaved to remove all circling, descending, and matted roots. Shaving shall be performed using saws, knives, sharp shovels or other suitable equipment that is capable of making clean cuts on the roots. Shaving shall remove a minimum of one inch of root mat or up to 2 inches as required to remove all root segments that are not growing reasonably radial to the trunk.
15. Excavation of the Planting Space: Excavate the planting hole into the Planting Soil to the depth of the root ball measured after any root ball modification made, and wide enough for working room around the root ball or to the size indicated on the drawing or as noted below:
    1. For trees and shrubs planted in soil areas that are NOT tilled or otherwise modified to a depth of at least 12 inches over a distance of more than 10 feet radius from each tree, or 5 feet radius from each shrub, the soil around the root ball shall be loosened as defined below or as indicated on the drawings.
       1. The area of loosening shall be a minimum of 3 times the diameter of the root ball at the surface sloping to 2 times the diameter of the root ball at the depth of the root ball.
       2. Loosening is defined as digging into the soil and turning the soil to reduce the compaction. The soil does not have to be removed from the hole, just dug, lifted and turned. Lifting and turning may be accomplished with a tracked mini excavator, hand shovels, or other approved standard process.
    2. If an auger is used to dig the initial planting hole, the soil around the auger hole shall be loosened as defined above for trees and shrubs planted in soil areas that are NOT tilled or otherwise modified.
    3. The measuring point for root ball depth shall be the average height of the outer edge of the root ball after any required root ball modification.
    4. If motorized equipment is used to deliver plants to the planting area over exposed planting beds, or used to loosen the soil or dig the planting holes, all soil that has been driven over shall be tilled to a depth of 6 inches.
16. For trees to be planted in prepared Planting Soil that is deeper than the root ball depth, compact the soil under the root ball using a mechanical tamper to assure a firm bedding for the root ball. If there is more than 12 inches of planting soil under the root ball excavate and tamp the planting soil in lifts not to exceed 12 inches.
17. Set top outer edge of the root ball at the average elevation of the proposed finish. Set the plant plumb and upright in the center of the planting hole. The tree graft, if applicable, shall be visible above the grade. Do not place soil on top of the root ball.
18. The Owner’s Representative may request that plants orientation be rotated when planted based on the form of the plant.
19. Backfill the space around the root ball with the same planting soil or existing soil that was excavated for the planting space. See Specification Section 212.02.08 Planting Soil, for requirements to modify the soil within the planting bed.
20. Brace root ball by tamping Planting Soil around the lower portion of the root ball. Place additional Planting Soil around base and sides of ball in six-inch (6") lifts. Lightly tamp each lift using foot pressure or hand tools to settle backfill, support the tree and eliminate voids. DO NOT over compact the backfill or use mechanical or pneumatic tamping equipment. Over compaction shall be defined as greater than 85% of maximum dry density, standard proctor or greater than 250 psi as measured by a cone penetrometer when the volumetric soil moisture is lower than field capacity.
    1. When the planting hole has been backfilled to three quarters of its depth, water shall be poured around the root ball and allowed to soak into the soil to settle the soil. Do not flood the planting space. If the soil is above field capacity, allow the soil to drain to below field capacity before finishing the planting. Air pockets shall be eliminated and backfill continued until the planting soil is brought to grade level.
21. Where indicated on the drawings, build a 4 inch high, level berm of Planting Soil around the outside of the root ball to retain water. Tamp the berm to reduce leaking and erosion of the saucer.
22. Thoroughly water the Planting Soil and root ball immediately after planting.
23. Remove all nursery plant identification tags and ribbons as per Owner’s Representative instructions. The Owner’s Representative’s seals are to remain on plants until the end of the warranty period.
24. Remove nursery stakes and other materials affixed to the trunk of the tree after planting.
25. **STAKING AND GUYING**

***DELETE THIS SUBSECTION IN ITS ENTIRETY AND REPLACE WITH the FOLLOWING***

1. All staking, guying, or anchoring shall take place immediately after planting, as indicated on the drawings and details. Do not stake or guy trees unless specifically required on the drawings or in the event that the Contractor feels that staking is the only alternative way to keep particular trees plumb.
   1. The Owner’s representative shall have the authority to require that trees are staked or to reject staking as an alternative way to stabilize the tree.
   2. Trees that require heavily modified root balls to meet the root quality standards may become unstable. The Owner’s Representative may choose to reject these trees rather than utilize staking to temporarily support the tree.
2. Tree guying to be flat woven polypropylene material, 3/4 inch wide, and 900 lb. break strength. Color to be Green. Product to be ArborTie manufactured by Deep Root Partners, L.P. or approved equal.
3. Stakes shall be lodge pole stakes free of knots, 3” minimum diameter and of lengths appropriate to the size of plant as required to adequately support the plant.
4. Trees that are guyed shall have their guys and stakes removed after one full growing season or at other times as required by the Owner’s Representative.
5. Tree guying shall utilize the tree staking and guying materials specified. Guying to be tied in such a manner as to create a minimum 12-inch loop to prevent girdling. Refer to manufacturer’s recommendations and the planting details for installation.
   1. Plants shall stand plumb after staking or guying
   2. Stakes shall be driven to sufficient depth to hold the tree rigid.

1. Submit manufacturer’s product data for approval.
2. **PRUNING**

***add the following to this subsection***

1. Prune plants as directed by the Owner’s Representative. Newly planted trees are required to be pruned twice annually during the warranty period of the trees, as required throughout the project, or as directed by the Owner. Only tree TCIA accredited tree contractors approved by the Owner’s Representative are permitted to perform tree pruning. Pruning trees shall follow recommendations in “Structural Pruning: A Guide For The Green Industry” published by Urban Tree Foundation, Visalia CA.
2. All pruning shall be performed by or under the supervision of an ISA Certified arborist experienced in structural tree pruning.
3. Except for plants specified as multi-stemmed or as otherwise instructed by the Owner’s Representative, preserve or create a central leader.
4. Pruning of large trees shall be done from a ladder or hydraulic lift to gain access to the top of the tree. Do not climb in newly planted trees. Do not use pole saws to prune trees. Small trees can be structurally pruned by laying them over before planting. Pruning may also be performed at the nursery prior to shipping.
5. Remove and replace excessively pruned or malformed stock resulting from improper pruning that occurred in the nursery or after.
6. Pruning shall be done with clean, sharp tools. Tools shall be cleaned with a 50/50 bleach/water solution.
7. No tree paint or sealants shall be used.
8. **WATERING**

***add the following to this subsection***

1. The Contractor shall be fully responsible to ensure that adequate water is provided to all plants from the point of installation until the date of Substantial Completion Acceptance. The Contractor shall adjust, program and inspect the automatic irrigation system to ensure proper water is provided. No plants shall be watered in excess of 6 days per week.
2. Hand water root balls of all plants to assure that the root balls have moisture above wilt point and below field capacity. Test the moisture content in each root ball and the soil outside the root ball to determine the water content.
3. **FERTILIZERS, AGRICULTURE MINERALS AND ADDITIVES**

***add the following to this subsection***

B. Before mixing, clean topsoil of roots, plants, sods, stones, clay lumps, and other extraneous materials over 1-1/2” inch diameter, and other materials harmful or toxic to plant growth.

C. Mix specified soil amendments and fertilizers with topsoil at rates specified. Delay mixing of fertilizer if planting will not follow placing of planting soil within a few days.

1. For pit and trench type backfill, mix planting soil prior to backfilling, and stockpile at site.
2. Do not apply any soluble fertilizer to plantings during the first year after transplanting unless soil test determines that fertilizer or other chemical additives is required. Apply chemical additives only upon the approval of the Owner’s Representative.
3. Controlled release fertilizers shall be applied according to the manufacturer’s instructions and standard horticulture practices.

***add the following to this section***

1. **SOIL MOISTURE**
2. Volumetric soil moisture level, in both the planting soil and the root balls of all plants, prior to, during and after planting shall be above permanent wilting point and below field capacity for each type of soil texture within the following ranges.

|  |  |  |
| --- | --- | --- |
| **Soil type** | **Permanent wilting point** | **Field capacity** |
| Sand, Loamy sand, Sandy loam | 5-8% | 12-18% |
| Loam, Sandy clay, Sandy clay loam | 14-25% | 27-36% |
| Clay loam, Silt loam | 11-22% | 31-36% |
| Silty clay, Silty clay loam | 22-27% | 38-41% |

1. Volumetric soil moisture shall be measured with a digital moisture meter. The meter shall be the Digital Soil Moisture Meter, DSMM500 by General Specialty Tools and Instruments, or approved equivalent.
2. The Contractor shall confirm the soil moisture levels with a moisture meter. If the moisture is too high, suspend planting operations until the soil moisture drains to below field capacity.
3. **ROOT BALL PACKAGES AND SPECIAL PLANTING REQUIREMENTS**
4. Balled and burlapped plants
   1. This specification assumes that most container plants have significant stem girdling and circling roots, and that the root collar is too low in the root ball.
   2. If the plant is shipped with a wire basket, remove the basket wires before the backfilling of the tree.
   3. Each root ball shall be kept intact except for any modifications required by the Owner’s Representative to make root package comply with the requirements set forth in this specification.
5. Container (includes boxed and above-ground fabric containers) plants
   1. This specification assumes that most container plants have significant stem girdling and circling roots, and that the root collar is too low in the root ball.
   2. Remove all roots and substrate above the root collar and the main structural roots according to root correction details so root system conforms to root observations detail.
   3. Using a hose, power washer or air excavation device, wash out the substrate from around the trunk and top of the remaining root ball and find and remove all stem girdling roots within the root ball above the top of the structural roots.
   4. Remove the bottom of the container or box. Perform root ball shaving on the bottom of the root ball.
   5. Remove the container or box.
   6. Perform root ball shaving.
6. **PALM PLANTING**

1. Palm trees shall be placed at grade making sure not to plant the tree any deeper in the ground than the palm trees originally stood.
2. The trees shall be placed with their vertical axis in a plumb position.
3. All backfill shall be thoroughly blended 50/50 native soil and washed concrete sand. Water-settle the back fill.
4. Do not cover root ball with mulch or topsoil.
5. Provide a watering berm at each palm. Berms shall extend a minimum of 18 inches out from the trunk all around and shall be a minimum of (6) inches high.
6. Remove twine which ties fronds together after placing palm in planting hole and securing it in the upright position.
7. **STRAIGHTENING PLANTS**
8. Maintain all plants in a plumb position throughout the warranty period. Straighten all trees that move out of plumb including those not staked. Plants to be straightened shall be excavated and the root ball moved to a plumb position, and then re-backfilled.
9. Do not straighten plants by pulling the trunk with guys.
10. **MISCELLANEOUS LANDSCAPE WORK**
11. Place decorative rock as specified under all trees. Install at least the minimum layer of decorative rock in all landscape areas within the scope of work.
12. Before placing decorative rock, compact sub-grade to 85% and apply a pre-emergent herbicide to soil. After placing rock: rake smooth, wet to entire depth, allow to dry; then lightly scarify surface with a leaf rake. Apply a secondary application of pre-emergent herbicide to top of rock. Do not allow rock to touch the trunk of any tree. Install decorative rock after the installation of plant material.
13. **PLANT MAINTENANCE PRIOR TO SUBSTANTIAL COMPLETION ACCEPTANCE**

A. During the project work period and prior to Substantial Completion Acceptance, the Contractor shall maintain all plants.

B. Maintenance during the period prior to Substantial Completion Acceptance shall consist of watering, cultivating, weeding, mulching, removal of dead material, repairing and replacing of tree stakes, tightening and repairing of guys, resetting plants to proper grades and upright position, coordinating the contracted pruning of trees as necessary and furnishing and applying such sprays as are necessary to keep plantings reasonably free of damaging insects and disease, and in healthy condition. The threshold for applying insecticides and herbicide shall follow established Integrated Pest Management (IPM) procedures. Mulch areas shall be kept reasonably free of weeds, grass.

1. **CLEANUP AND PROTECTION**
2. During installation, keep the site free of trash, pavements reasonably clean and work area in an orderly condition at the end of each day. Remove trash and debris in containers from the site no less than once a week.
   1. Immediately clean up any spilled or tracked soil, fuel, oil, trash or debris deposited by the Contractor from all surfaces within the project or on public right of ways and neighboring property.
3. Once installation is complete, wash all soil from pavements and other structures. Ensure that mulch is confined to planting beds and that all tags and flagging tape are removed from the site. The Owner’s Representative’s seals are to remain on the trees and removed at the end of the warranty period.
4. Make all repairs to grades, ruts, and damage by the plant installer to the work or other work at the site.
5. Remove and dispose of all excess planting soil, subsoil, mulch, plants, packaging, and other material brought to the site by the Contractor.
6. The Contractor shall protect planting and related work and other site work from damage due to planting operations, operations by other Contractors or trespassers as described in Tree Protection section. Maintain protection during installation until Substantial Completion Acceptance. Treat, repair or replace damaged work immediately.
7. Damage done by the Contractor, or any of their sub-contractors to existing or installed plants, or any other parts of the work or existing features to remain, including roots, trunk or branches of existing trees, soil, paving, utilities, lighting, irrigation, other finished work and surfaces including those on adjacent property, shall be cleaned, repaired or replaced by the Contractor at no expense to the Owner. The Owner’s Representative shall determine when such cleaning, replacement or repair is satisfactory.
8. **INSPECTION AND ACCEPTANCE**

A. When landscape work is completed, including maintenance, the ENGINEER will, upon request, make an inspection to determine acceptability. Landscape work may be inspected for acceptance in portions as agreeable to the ENGINEER, provided each portion of work offered for inspection is complete, including maintenance.

B. When inspected landscape work does not comply with requirements, replace rejected work and continue specified maintenance until re-inspected by the ENGINEER and found to be acceptable. Remove rejected plants and materials promptly from project site.

1. **MAINTENANCE DURING THE WARRANTY PERIOD BY PLANT INSTALLER**
2. During the warranty period, provide all maintenance for all plantings to keep the plants in a healthy state and the planting areas clean and neat.
3. General Requirements:
4. All work shall be undertaken by trained planting crews under the supervision of a foreman with a minimum of 5 years experience supervising commercial plant maintenance crews.
5. All chemical and fertilizer applications shall be made by licensed applicators for the type of chemicals to be used. All work and chemical use shall comply with all applicable local, state and federal requirements.
6. Assure that hoses and watering equipment and other maintenance equipment does not block paths or be placed in a manner that may create tripping hazards. Use standard safety warning barriers and other procedures to maintain the site in a safe manner for visitors at all times.
7. All workers shall wear required safety equipment and apparel appropriate for the tasks being undertaken.
8. The Contractor shall not store maintenance equipment at the site at times when they are not in use unless authorized in writing by the Owner’s Representative.
9. Maintenance vehicles shall not park on the site including walks and lawn areas at any time without the Owner’s Representative’s written permission.
10. Maintain a detailed log of all maintenance activities including types of tasks, date of task, types and quantities of materials and products used, watering times and amounts, and number of each crew. Periodically review the logs with the Owner’s Representative, and submit a copy of the logs at the end of each year of the maintenance agreement.
11. Meet with the Owner’s Representative a minimum of three times a year to review the progress and discuss any changes that are needed in the maintenance program. At the end of the warranty period attend a hand over meeting to formally transfer the responsibilities of maintenance to the Owner’s Representative. Provide all information on past maintenance activities and provide a list of critical tasks that will be needed over the next 12 months. Provide all maintenance logs and soil test data. Make the Contractor’s supervisor available for a minimum of one year after the end of the warranty period to answer questions about past maintenance.
12. Provide the following maintenance tasks:
13. Watering; Provide all water required to keep soil within and around the root balls at optimum moisture content for plant growth.
    * + - 1. Maintain all watering systems and equipment and keep them operational.
          2. Monitor soil moisture to provide sufficient water. Check soil moisture and root ball moisture with a soil moisture meter on a regular basis and record moisture readings. Do not over water.
14. Soil nutrient levels: Take a minimum of 4 soil samples from around the site in the spring and fall and have them tested by an accredited agricultural soil testing lab for chemical composition of plant required nutrients, pH, salt and % organic matter. Test results shall include laboratory recommendations for nutrient applications. Apply fertilizers at rates recommended by the soil test.
    * + - 1. Make any other soil test and/or plant tissue test that may be indicated by plant conditions that may not be related to soil nutrient levels such as soil contaminated by other chemicals or lack of chemical uptake by the plant.
15. Plant pruning: Schedule biannual pruning of trees as directed by the Owner’s Representative.
16. Restore plants: Reset any plants that have settled or are leaning as soon as the condition is noticed.
17. Guying and staking: Maintain plant guys in a taught position. Remove tree guys and staking after the first full growing season unless directed by Owner’s Representative.
18. Weed control: Keep all beds free of weeds. Hand-remove all weeds and any plants that do not appear on the planting plan. Chemical weed control is permitted only with the approval of the Owner’s Representative. Schedule weeding as needed but not less 12 times per year.
19. Trash removal: Remove all trash and debris from all planting beds and maintain the beds in a neat and tidy appearance. The number of trash and debris removal visits shall be no less than 12 times per year and may coincide with other maintenance visits.
20. Plant pest control: Maintain disease, insects and other pests at manageable levels. Manageable levels shall be defined as damage to plants that may be noticeable to a professional but not to the average person. Use least invasive methods to control plant disease and insect outbreaks.
    * + - 1. The Owner’s Representative must approve in advance the use of all chemical pesticide applications.
21. Plant replacement: Replace all plants that are defective as defined in the warranty provisions, as soon as the plant decline is obvious and in suitable weather and season for planting as outlined in above sections. Plants that become defective during the maintenance period shall be covered and replaced under the warranty provisions.
22. Mulch: Refresh mulch once a year to maintain complete coverage but do not over mulch. At no time shall the overall mulch thickness be greater than 4 inches. Do not apply mulch within 6 inches of the trunks or stems of any plants. Replacement mulch shall meet the requirements of the original approved material. Mulch shall be no more than one inch on top of the root ball surface.
23. Bed edging: Check and maintain edges between mulch and lawn areas in smooth neat lines as originally shown on the drawings.
24. Leaf, fruit and other plant debris removal: Remove fall leaf, spent flowers, fruit and plant part accumulations from beds and paved surfaces. Maintain all surface water drains free of debris. Debris removal shall be undertaken at each visit to weed or pick up trash in beds.
25. Damage from site use: Repair of damage by site visitors and events, beyond normal wear, are not part of this maintenance. The Owner’s Representative may request that the Contractor repair damage beds or plantings for an additional cost. All additional work shall be approved in advance by the Owner’s Representative.

NOTE TO SPEC WRITER: THE FOLLOWING SECTION IS ONLY FOR PROJECTS THAT INCLUDE SOIL CELLS

1. **STRUCTURAL SOIL CELLS**
2. Excavation: Installer to excavate the structural soil cell area accurately to the dimensions of the detailed plans, allowing 8-inches additional clearance in length and width. Side walls of excavated area to be clean, straight, and within 15° of vertical. Length, width and diagonals at base of excavated area to be measured to ensure that correct dimensions are being obtained (measurements shown on structural soil cell area detail plus 8-inches). Installer to confirm that correct depth has been provided, measuring from finished pavement level, including any drainage layers. Base of excavated area should be flat.
3. Compact Granular Collar: The top perimeter of the structural soil cell area must be further excavated to a depth of 12-inches and to a width of 10-inches, or a width sufficient to permit a narrow foot compacting plate (compacted granular collar) to be installed. Sides and base of this excavation must be clean and straight.
4. Sub-grade preparation: Base of the structural soil cell area must be free of debris and level. Installer to check CBR of the subgrade below the proposed granular pavement layers to ensure it meets the applicable pavement design criteria. Confirm the subgrade surface below the structural soil cell matrix is compacted to a minimum of 95% of maximum dry density at optimum moisture content in accordance with Standard Proctor Method (and has a minimum allowable bearing pressure of 100kpa.) Proof compact the subgrade in natural ground with a minimum of three passes of a suitable vibrating compacting machine or apply other compaction forces as needed to achieve the required subgrade compaction rate. Apply additional compaction forces at optimum water levels**.**
5. Installation of aggregate base below structural soil cell matrix. Aggregate base shall be compact to a minimum of 95% of maximum dry density at optimum moisture content, in accordance with ASTM D 698 Standard Proctor Method. Compact the subgrade with a minimum of three passes of a suitable vibrating machine or apply other compaction forces as needed to achieve the required subgrade compaction rate.
6. Assemble structural soil cell modules per manufacturer’s instructions.
7. Linear barrier: Per structural soil cell design details, a linear barrier shall by installed between the interconnected structural soil cell matrix and the side wall of the excavated area. Ensure the barrier is inserted to the full depth of the pit and is not in contact with any sharp debris or stones that may puncture the barrier. Any joints must have a 6-inch overlap and be taped both sides using external grade, moisture resistant adhesive tape over clean dry surfaces. The top edge of the root barrier should be trimmed with a sharp knife to level with the top of the interconnected structural soil cell matrix.
8. Loading matrix with filler soil**:** Ensure that all required filler soil testing and certification is complete to the satisfaction of the Owner prior to loading into the structural soil cell area. When matrix is fully assembled, with all barriers in place, the filler soil can be loaded into the matrix. Soil should be placed in the matrix using an excavator bucket and spread with rakes or shovels until the void spaces are filled. Ensure the outer trench for the compacted granular collar is kept clean and free of filler soil. Matrix is to be vibrated using plate vibration or needle vibration equipment in order to shake soil into all voids. Continue loading dry soil, raking out and vibrating, until matrix is filled. Should the filler soil constituents and moisture content not permit the voids to be fully filled, assemble the structural soil cell modules in layers and progressively fill, layer by layer.
9. Heavy Grade Non-Woven Filter Fabric: The outer trench for provision of the compacted granular collar should be cleaned and all filler soil and debris removed. Place the heavy grade non-woven filter fabric layer on the top of matrix and cut to length, ensuring that the material fully covers the top of the matrix, the upper side walls of the matrix, and the bottom of the adjacent trench for compacted granular collar. Any material joins must be straight, free of debris and over-lapped 6-inches. Pipe penetrations to be provided by means of two intersecting slits cut with a sharp knife to form a cross.
10. Compacted Granular Collar: Load the granular base course material into the base of the collar trench ensuring the heavy grade non-woven filter fabric layer is not displaced from the base of the trench. Compact the granular material in 6-inch lifts until the collar is level with the top of the matrix.
11. Tree pit opening: Confirm the exact required position of the tree pit opening from project details and with reference to survey markers. Cut heavy grade non-woven filter fabric layer and fold back to expose the tree pit opening. Position form-work to provide for poured concrete system, or other method as specified in project details**.** Place linear barrier within the tree pit opening with vertical ribs facing inwards. Ensure bottom edge of barrier is placed on the structural soil cell matrix and upper edge is at finished pavement level. Trim to suit with sharp knife. Ensure any joins are overlapped a minimum of 6-inches, are clean and dry and taped both sides with external grade, moisture resistant, adhesive tape.
12. Granular base course: Load and spread granular base course material onto the heavy grade non-woven filter fabric layer in an even depth of 4-inches. Compact this layer with a vibrating plate compactor with a mass of 1200kg – 1400kg/m² of base plate, to specified compaction levels. Continue building compacted granular layers to required levels including the compacted granular collar.

**METHOD OF MEASUREMENT**

**212.04.01 MEASUREMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The quantity of [FILL IN ITEM DESCRIPTION] will be measured per [UNIT].

No direct measurement shall be made for [FILL IN ITEM DESCRIPTION].

**METHOD OF PAYMENT**

**212.05.01 PAYMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall conform to the requirements of subsection 212.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include,

Unless otherwise provided in the Special Provisions, no payment will be made for Plant Establishment Work as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which Plant Establishment Work is required.

Unless otherwise provided in the Special Provisions, no payment will be made for [FILL IN ITEM DESCRIPTION] as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which [FILL IN ITEM DESCRIPTION] is required.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 212.XXXX | [ITEM DESCRIPTION] | [UNIT] |

END OF SECTION 212

SECTION 213 – IRRIGATION SYSTEMS

**DESCRIPTION**

**213.01.01 GENERAL**

***delete paragraph “a” of this subsection and replace with the following:***

1. This work shall consist of furnishing and installing the irrigation system including, but not limited to, the mainline piping, the lateral piping, sleeves, valves and drip irrigation systems to the lines and grades as shown on the project drawings or as established by the ENGINEER and accepted landscaping practices.

***ADD THE FOLLOWING TO THIS SECTION:***

**213.01.70 IRRIGATION SYSTEM PERFORMANCE REQUIREMENTS**

1. The irrigation design is diagrammatic only; the CONTRACTOR shall make necessary modifications to avoid plantings and obstructions such as signs, utilities, and light standards and to meet the specifications herein. No additional compensation will be made to the CONTRACTOR for modifications required to meet the requirements of these specifications. It is the CONTRACTOR’S responsibility to notify the ENGINEER immediately if the significant modifications are required to the project drawings.

**213.01.71 FLUSHING AND TESTING**

1. Notify the ENGINEER three (3) days in advance of testing. Furnish clean, clear water, pumps, labor, fittings, and equipment necessary to conduct tests or re-tests.
2. The pressure piping shall have a minimum working pressure of 150 psi, and the circuit and drain piping shall have a minimum working pressure of 100 psi.
3. Pipelines jointed with rubber gaskets or threaded connections may be subjected to a pressure test at any time after partial completion of backfill. Pipelines jointed with solvent-welded PVC joints shall be allowed to cure at least 24 hours before testing.
4. Subsections of mainline pipe may be tested independently, subject to the review of the Construction Project Representative.
5. All mainline pipes shall be flushed completely of foreign particles before placing section control valves, quick-coupler valves and hose bibs. After flushing and when valves are in place, all mainline pipes shall be tested.
6. Hydrostatic Pressure Test
7. Subject pressure piping less than 3-inches in diameter to a hydrostatic pressure test.
8. Maintain a pressure of 140 psi for two (2) hours. Leakage will be detected by visual inspection or by a drop in pressure of more than five (5) psi. Replace defective pipe, joint, valve or appurtenances. Repeat test until pipe passes. Pipe will pass if hydrostatic pressure holds for two (2) hours.
9. All joints showing leaks shall be cleaned, remade, and tested. Cement or caulking to seal leaks is prohibited.
10. Coverage Test
11. Activate each remote control valve in sequence. The ENGINEER will visually observe water applications and patterns. Adjust or move system components to correct deficiencies. Repeat test until system is acceptable to ENGINEER.
12. Signal Wire
13. Wire shall be tested for shorts in ground in accordance with manufacturer’s guidelines for acceptance. Replace defective wire, underground splices, or appurtenances. Repeat test until guidelines are met.

**213.01.72 SUBMITTALS**

1. The CONTRACTOR shall submit brochures, cut sheets or shop drawings for each accessory or fixture, and each item of hardware or equipment intended for use prior to ordering these items. Brochures shall contain pertinent dimension, finish, installation and maintenance data necessary for the proper placement or use of each item. The approval of a brochure does not constitute final approval of the item. The ENGINEER reserves the right to reject any work, material or item that does not conform to the requirements of the plans or specifications as set forth herein even though the pertinent brochure may have been approved.
2. Product Data: Pressure rating, rated capacity, settings, and electrical data of selected models for the following:
3. Backflow preventers, including test equipment.
4. Pressure regulators.
5. Valves, including general duty, underground, manual and automatic control, and quick coupler types, and valve boxes.
6. Sprinklers, including emitters, drip tubes, and devices.
7. Controls, including controller wiring diagrams.
8. Wiring.
9. Record Drawings: Record actual locations of all concealed components, piping systems, conduit and wiring.
10. Maintenance data for inclusion in Operating and Maintenance Manual.
11. Provide instructions for operation and maintenance of the system and controls, seasonal activation and shutdown, and manufacturer's parts catalog.
12. Provide schedule indicating length of time each valve is required to be open to provide a determined amount of water.

**213.01.73 WARRANTY AND MAINTENANCE**

1. Warranty all parts and labor for a period of one year from the date of substantial completion.
2. Repair damage to landscape due to settling of trenches.
3. Fill and repair depressions.
4. Repair damage to premises caused by defective components.
5. Make repairs within seven days of site inspection or notification by OWNER.
6. One year maintenance:
   * + 1. The OWNER is responsible for programming all automatic irrigation controllers. The CONTRACTOR will coordinate monthly inspection and review of irrigation programming with the OWNER’s designated representative.
       2. The OWNER shall repair all automatic controller clocks when they malfunction, and pay for all necessary materials required to complete such tasks.
       3. The CONTRACTOR shall repair any damaged sprinkler heads, drip irrigation components, nozzles, swing arms, fittings, risers, lateral lines and quick couplers, resulting from routine wear, defective parts, mower damage, etc., and shall routinely clean out sprinkler heads, drip irrigation components and lines to keep them in good operating condition at all times. All labor shall be at no cost to the OWNER. All necessary materials for repairs, including tools, shall be the responsibility of the CONTRACTOR.
       4. Repairs to the irrigation system mainline pipes, solenoids, valve wiring and valves resulting from normal wear, vandalism or damage by other means, with the exception of damage incurred due to negligence by the OWNER, shall be the responsibility of the CONTRACTOR.
       5. Irrigation water shall be carefully applied and in quantities required by the different plant species, time of the year, and other basic environmental factors. The effect of the watering program shall be checked once a week by the CONTRACTOR and any discrepancies reported to the OWNER’s designated representative.
       6. Automatic irrigation shall take place at night or early morning hours only.
       7. Watering shall be controlled to avoid excessive drainage on sidewalks, streets and play areas, creating a hazard and wasted water. Areas referred to as “slope” will require special attention due to severe grades and watering difficulties.
       8. Any areas that have manual watering systems must be watered as needed to keep plant material in healthy condition. Automatic irrigation controllers will be kept locked at all times. The OWNER or designated representative and assigned OWNER staff will have master keys to all controllers
       9. If irrigation system is inoperative for whatever reason, the CONTRACTOR **MUST** water the areas with manual sprinklers and hoses.
       10. The CONTRACTOR shall perform field observations and provide status reports to the OWNER’s designated representative. Specifically, the CONTRACTOR shall notify the OWNER in writing of the condition of the landscape area and irrigation system by station valve number and controller, as assigned by the designated representative. The irrigation system must be visually monitored a minimum of once a week to ensure the system operates at an optimum level of efficiency.
       11. Materials:
           1. All irrigation replacement parts and materials must be equal to or better than manufacturers’ original equipment, unless OWNER’s representative approves a substitute in writing.
           2. CONTRACTOR shall maintain an adequate inventory of medium and high usage stock items for repair of the irrigation system.
           3. CONTRACTOR shall implement repairs in accordance with manufacturer’s warranties.
           4. All materials are to be new and identical to existing materials, unless otherwise directed by the OWNER representative.
           5. The OWNER reserves the right to purchase materials directly and make available to the CONTRACTOR.
7. The contract documents govern replacement materials, labor, and workmanship identically as with new work. Make replacements at no additional cost to Owner.

**MATERIALS**

**213.02.02 PIPE AND FITTINGS**

***add the following to this subsection:***

1. Piping
2. Live main lines shall have a minimum cover of eighteen (24) inches (61 centimeters).
3. Other lines shall have a minimum cover of twelve (12) inches (30.6 centimeters) below finish grade.
4. All live mains located under pavement shall be placed in sleeves. Mainline and lateral pipes or section piping shall not be placed in the same trench.
5. Irrigation Piping
6. This item shall consist of supplying all materials, labor and incidentals to install all irrigation mains as shown on the project drawings or as directed by the ENGINEER. This item shall include trenching, backfill, bedding, fittings, thrust blocks and other incidentals for a complete job.
7. All piping and fittings sizes 3-inches and larger shall be Class 200 PVC quality pipe.
8. All piping and fittings sizes 2-1/2-inches and smaller shall be PVC Schedule 40 quality pipe.
9. Drip line header shall be PVC Schedule 40 quality pipe.
10. Sleeves will be required for all irrigation lines, which will be installed under sidewalks and drives as indicated on the project drawings. Sleeves shall be Schedule 40 PVC unless otherwise noted and shall be at the locations and sizes as shown on the project drawings or as directed by the ENGINEER. No additional compensation will be made to the CONTRACTOR for any sleeves. The sleeves shall be considered incidental to the irrigation pipe pay items.
    * 1. **CONTROL VALVES**

***DELETE THIS SUBSECTION IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:***

1. Remote Control Valve Assembly: Manual control valves shall be straight or angle pattern globe valves of all brass or bronze construction with replaceable compression disks. Manual control valves shall be of the same size as the pipes on which they are placed unless otherwise indicated on the plans, and shall be provided with a union connection. Manual control valves shall be capable of withstanding a cold water working pressure of 200 psi.
2. Electric control valves shall be of the diaphragm type, normally closed, 24-volt, and 60-cycle. The valve solenoids shall operate with 18-30 volts of power. Solenoids shall be completely encapsulated for positive waterproofing. The valve body and bonnet shall be of plastic or nylon threaded type. If threaded type is used it shall be provided with a union connection. The time interval between opening and closing the valve shall not be less than five (5) seconds. The solenoid plunger shall be spring loaded so the valve may operate when installed in any position and shall be constructed of stainless steel with neoprene seat. Valve bonnet shall have a bleed screw for manual operation and a manual flow control adjustment. Electric control valves shall be capable of withstanding a non-shock cold water working pressure of 200 psi.
3. Valves shall have pressure regulation module to ensure optimum performance (PRS-D).
4. Pressure Regulators: Plastic housing with corrosion resistant internal parts, and capable of controlling outlet pressure to approximately 40 psi.
5. Strainer/Filter Units: Plastic housing with corrosion resistant internal parts and 200 mesh screens.
   * 1. **QUICK-COUPLER VALVES**

***delete paragraph “a” of this subsection and replace with the following:***

1. Quick-Coupler Valves
2. The quick-coupler valve shall be of brass or bronze construction. The valve shall be of two-piece construction with removable upper body. The valve body shall be designed with a single slot to receive a single slot coupler.
3. This item shall include all items necessary to install the quick couplers as shown on the project drawings. They shall be factory fabricated; two piece assembly, with non-potable purple cap. Include coupler water seal valve with ASME B1.20.7, ¾-11.5NH threads for garden hose on outlet; and operating key. Include vandal resistant, locking feature with matching key. Isolation valves for quick couplers are to be brass angle valves with tee handles.
   * 1. **VALVE BOXES**

***delete paragraph “a” of this subsection and replace with the following:***

1. Valve Boxes shall be Christy, Carson or approved equal, concrete, rectangular heavy duty valve box with cast iron lockable lids, use “Jumbo” size valve boxes for drip valve assemblies, all valves 1½” to 3”, and adjustable extensions of length required for depth of bury of valve. Valve boxes for drip valve assemblies are to be oversized so that the entire drip valve assembly is easily accessible and removable without disturbing the valve box. There will be no additional compensation made to the CONTRACTOR for the valve boxes. The valve boxes shall be considered incidental to the valve pay items.

***ADD THE FOLLOWING TO THIS SECTION:***

* + 1. **AUTOMATIC CONTROL SYSTEM**

1. Low voltage controller system, made for control of irrigation system automatic control valves. Controller operates on 120 volts a.c. building power system, provides 24 volts a.c. power to control valves, and includes stations for at least the number of control valves indicated.
2. Control Enclosures: Weatherproof enclosure with locking cover and two matching keys. Enclosure construction complies with NFPA 70 and NEMA 250, Type 4, and includes provisions for grounding.
3. Material: Stainless steel, sheet metal.
4. Mounting: Outside wall mounting.
5. Wiring: UL 493, solid copper conductor, insulated cable, suitable for direct burial.
6. Feeder Circuit Cables: Type UF, No. 12 AWG minimum, between building and controllers.
7. Low Voltage and Branch Circuits: Type UF, No. 14 AWG minimum, common wire, white color and No. 14 AWG minimum pilot wire, color other than white.
8. Splicing Materials: Water tight fittings as recommended by wire manufacturer.
9. Pressure Gauges: ASME B40.1, 4-1/2 inch dial, with dial range of two times system operating pressure and bottom outlet.

**CONSTRUCTION**

**213.03.02 EXCAVATION**

***delete paragraph “a” of this subsection and replace with the following:***

1. Trenches shall be of sufficient width to permit snaking of all plastic pipe not connected by rubber ring-type fittings. Pipe connected with rubber ring-type fittings shall not be snaked. The top 6 inches of planting soil, when such exists, shall be kept separate from subsoil and shall be replaced as the top layer when backfill is made. Trenches shall be excavated with vertical sides and provided with bracing and shoring to be placed as designated by the ENGINEER. Trenches in rock or like material shall be excavated four (4) inches below the required depth and shall be backfilled to required depth with sand or other suitable material free from rock or stones.

**213.03.04 PIPING**

***add the following to this subsection:***

1. This item shall consist of supplying all materials, labor and incidentals to install all irrigation lines as shown on the project drawings or as directed by the ENGINEER. This item shall include trenching, backfill, bedding, fittings, thrust blocks and other incidentals for a complete job.
2. Sleeves are required for all irrigation lines, which are installed under sidewalks and drives as indicated on the project drawings. Sleeves shall be Scheduled 40 PVC unless otherwise noted and shall be at the locations and sizes as shown on the project drawings or as directed by the ENGINEER. No additional compensation will be made to the CONTRACTOR for any sleeves. The sleeves shall be considered incidental to the irrigation pipe pay items.

**213.03.07 INSTALLATION**

***DELETE THIS SUBSECTION IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:***

1. Where conduit is installed in an open trench, excavation and backfill shall conform to the provisions of Section 208, "Trench Excavation and Backfill." The conduit shall be laid in the trench to the lines and grades established by the ENGINEER. The bottom of the trench shall be graded and prepared to provide a firm and uniform bearing throughout the entire length of the conduit.
2. During backfilling operations, the sleeves shall be rigidly supported so that no movement of or damage to the sleeves or joints will result.
3. Where connection is made to existing supply lines, compression type fittings may be used.
4. Where supply lines or conduits are to be installed through existing paved areas, the sub-base, base, and paving removed shall be replaced with material of equal quality.
5. Where water lines run parallel to electrical lines, maintain a 3’-0” separation in all directions.
6. All pipe shall be cut straight and true. After cutting, the ends shall be reamed out to the full inside diameter of the pipe.
7. Foreign material shall be prevented from entering the irrigation system during installation. Immediately prior to assembly, all pipes, valves, and fittings and control tubes shall be cleaned.
8. All unattached ends of pipe, fittings, and valves shall be plugged or capped pending attachment of additional pipe or fittings. All lines shall be thoroughly flushed out prior to attachment of terminal fittings.
9. Before any portion of the pipeline is backfilled, water shall be turned into that portion of the line and maintained at full pressure for a period of not less than eight (8) consecutive hours after all air has been expelled from the line. Any leaks that develop in the portion of the system installed by the CONTRACTOR shall be repaired and all defective materials shall be replaced. The drip line header pipe shall be plugged or capped while making this test. The entire system shall then be checked for uniform and complete coverage after installing emitters.
10. All plastic irrigation pipe shall be installed and laid according to the manufacturer's instructions, and as directed by the ENGINEER. Before joints of PVC plastic pipe are made up, the plastic pipe fittings shall be exposed to the same temperature for a reasonable length of time. Pipe shall be cut with a fine-tooth hacksaw and any burrs shall be removed. The outside surface of the pipe and the inside surface of the fittings shall be cleaned and softened with an approved primer, using a dauber, brush top applicator, or paint brush about one-half the pipe diameter. A light second coat of primer shall be applied to the fitting socket. Primer shall not be allowed to run down the inside of the pipe.
11. The cement solution shall be applied to the pipe and fitting socket with an applicator having a width of approximately one-half the diameter of the pipe, using the proper cement for the size of pipe.
12. Apply a full, even layer of cement on the pipe equal to the depth of socket. Flow the cement on with the applicator; do not brush it out to a thin paint type layer. Apply a medium layer of cement to the fitting socket; avoid puddling cement in the socket. On bell end pipe do not coat beyond the socket depth or allow cement to run down in the pipe beyond the bell. Apply a second full even layer of cement on the pipe. Assemble the pipe and fitting without delay, making certain cement is wet. Use sufficient force to ensure that the pipe bottoms are in the fitting socket. Twist the pipe 1/8 to 1/4 turn as it is inserted. Hold the fitting and the pipe together until cement takes its initial set. After assembly, a joint shall have a ring or bead of cement completely around the junction of the pipe and fitting. If voids in this ring are present, sufficient cement was not applied and the joint will be considered defective. Using a rag, remove all the excess cement from the pipe and fitting including the ring or bead.
13. Avoid disturbing or moving the joint. Handle newly assembled joints carefully until initial set has taken place. Recommended setting time allowed before handling or moving is related to temperature, type of cement, and size of pipe, and shall be according to manufacturer's recommendations.
14. Old or thickened cement shall be discarded and replaced. The male pipe thread of all threaded connections on PVC plastic pipe shall be coated with a joint compound or tape suitable for use on plastic pipe.
15. Cement solution for flexible PVC shall be an approved type for joining flexible PVC to itself or to rigid PVC. All pipe shall be cut straight and true. After cutting, the ends shall be reamed out to the full inside diameter of the pipe. Polyvinyl chloride pipe trenches shall be partially backfilled between joints with small amounts of backfill material to prevent movement during the pressure test.

**213.03.12 AS-BUILT RECORD DRAWINGS**

***DELETE THIS SUBSECTION IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:***

1. The CONTRACTOR shall provide and keep up to date a complete set of as-built drawings which shall be corrected daily to show changes in controller locations, piping locations and other deviations from the original irrigation design drawings as provided to him. All isolation valve locations shall be shown with actual measurements to reference points so they may be located easily in the field.
2. The CONTRACTOR will be required to record actual locations of all concealed components, piping systems, conduit and wiring. Show two reference dimensions to all concealed components. Record drawings must be kept current. Submit a copy of current record drawings along with application for payment. Payment will be held if record drawings are not current.
3. Upon completion of the work, the CONTRACTOR shall furnish the ENGINEER with a complete set of CAD generated as-built drawings showing the irrigation system as installed. This is the responsibility of the CONTRACTOR and shall not be construed to be the responsibility of any other party.

***ADD THE FOLLOWING SUBSECTIONS TO THIS SECTION:***

**213.03.70 GATE VALVES**

1. This item shall consist of supplying all materials, labor and incidentals to install all irrigation valves as shown on the project drawings or as directed by the ENGINEER.
2. Isolation Gate Valve Assembly
3. This item shall include all items necessary to install the Isolation Gate Valve Assembly as shown on the project drawings. This work shall include but not limited to the Valve, all materials and labor for the isolation gate valve, valve boxes, fittings, material and labor for a complete job. Refer to attached details of isolation gate valve. The entire valve assembly must work as a part of the automatic irrigation system.
4. Gate valves 2-1/2 inches and smaller shall be of the same size as the pipes on which they are placed unless otherwise indicated on the plans. Service rating for non-shock cold water shall be two hundred (200) psi. These valves shall be all bronze, split wedge type, with rising stem and union bonnet. Packing shall be Teflon impregnated asbestos and the valve shall be capable of being re-packed under pressure. Hand-wheels shall be malleable iron. Gate valves 2-1/2 inches and smaller shall be the threaded type and installed with a union on either side of the valve.

**213.03.71 CONTORL VALVES**

1. Remote Control Drip Valve Assembly
2. This item shall include all items necessary to install the remote control drip valve assemblies as shown on the project drawings. Each assembly shall consist of a ball valve, remote control valve, pressure regulator and filter.
3. The valves shall be normally closed, 24 VAC, 50/60 cycle solenoid actuated globe pattern with balanced pressure diaphragm design, pressure rating of 200 psi minimum. Constructed of heavy duty glass filled UV resistant nylon with stainless studs and flange nuts. Diaphragm to be nylon reinforced rubber and shall have pressure regulating module to assure optimum performance. Internal bleed manual open/close control. Manual flow control with brass stem.

**213.03.72 DRIP LATERAL FLUSH VALVE**

1. Flush valve installation shall include all materials and labor for a complete job. Materials shall include but are not limited to: Valve box (round), ball valve, Excalibur flex hose, PVC fittings, pipe and incidentals conforming to the project drawings.

**213.03.72 QUICK COUPLING VALVE ASSEMBLY**

1. The CONTRACTOR shall ensure valve box is at finish grade with clean washed gravel sump. Rebar or pipe support shall be securely attached with stainless steel clamps. Valve box shall be purple to indicate non-potable water. The top of the quick coupler hall be 2-4 inches below the valve box.

**METHOD OF MEASUREMENT**

**213.04.01 MEASUREMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The quantity of DRIP IRRIGATION SYSTEM will be measured per lump sum.

The quantity of IRRIGATION LINE (1 INCH) will be measured per linear foot.

The quantity of PVC SLEEVE (2 INCH) will be measured per linear foot.

The quantity of IRRIGATION CONTROLLER will be measured per each.

The quantity of IRRIGATION LINE (1.5 INCH) will be measured per linear foot.

The quantity of PVC SLEEVE (3 INCH) will be measured per linear foot.

**METHOD OF PAYMENT**

**213.05.01 PAYMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The accepted quantity of DRIP IRRIGATION SYSTEM will be paid for at the contract unit price of lump sum and shall conform to the requirements of subsection 213.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include, installation of all components, sawcutting, trenching, excavation, bedding, pipe, sleeves, backfill, compaction, pressure regulators, wye strainers, filters, valves; flexible tubing; fittings, glue, cement, connectors, valve boxes; pea gravel, disposal of excess materials; fees, permits, and all incidentals required to construct a complete and operational irrigation system; necessary testing to insure the proper installation and operation of the irrigation system.

The accepted quantity of IRRIGATION LINE (1 INCH) will be paid for at the contract unit price of linear foot and shall conform to the requirements of subsection 213.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include, installation of all components, sawcutting, trenching, excavation, bedding, pipe, sleeves, backfill, compaction, pressure regulators, wye strainers, filters, mainlines; lateral lines; valves; flexible tubing; fittings, glue, cement, connectors, valve boxes; pea gravel, disposal of excess materials; fees, permits, and all incidentals required to construct a complete and operational irrigation system; necessary testing to insure the proper installation and operation of the irrigation system.

The accepted quantity of PVC SLEEVE (2 INCH) will be paid for at the contract unit price of linear foot and shall conform to the requirements of subsection 213.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include, installation of all components, sawcutting, trenching, excavation, bedding, pipe, sleeves, backfill, compaction, flexible tubing; fittings, glue, cement, connectors, pea gravel, disposal of excess materials; fees, permits, and all incidentals required to construct a complete and operational irrigation system; necessary testing to insure the proper installation and operation of the irrigation system.

The accepted quantity of IRRIGATION CONTROLLER will be paid for at the contract unit price of each and shall conform to the requirements of subsection 213.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include, installation of all components, sawcutting, trenching, excavation, bedding, backfill, compaction, conduit, wiring, pressure regulators, glue, cement, connectors, emitters; concrete pads; pea gravel, disposal of excess materials; fees, permits, and all incidentals required to construct a complete and operational irrigation system; necessary testing to insure the proper installation and operation of the irrigation system.

The accepted quantity of IRRIGATION LINE (1.5 INCH) will be paid for at the contract unit price of linear foot and shall conform to the requirements of subsection 213.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include, installation of all components, sawcutting, trenching, excavation, bedding, pipe, sleeves, backfill, compaction, pressure regulators, wye strainers, filters, mainlines; lateral lines; valves; flexible tubing; fittings, glue, cement, connectors, valve boxes; pea gravel, disposal of excess materials; fees, permits, and all incidentals required to construct a complete and operational irrigation system; necessary testing to insure the proper installation and operation of the irrigation system.

The accepted quantity of PVC SLEEVE (3 INCH) will be paid for at the contract unit price of linear foot and shall conform to the requirements of subsection 213.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include, installation of all components, sawcutting, trenching, excavation, bedding, pipe, sleeves, backfill, compaction, flexible tubing; fittings, glue, cement, connectors, pea gravel, disposal of excess materials; fees, permits, and all incidentals required to construct a complete and operational irrigation system; necessary testing to insure the proper installation and operation of the irrigation system.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 213.0030 | DRIP IRRIGATION SYSTEM | LS |
| 213.0110 | IRRIGATION LINE (1 INCH) | LF |
| 213.0120 | PVC SLEEVE (2 INCH) | LF |
| 213.0180 | IRRIGATION CONTROLLER | EA |
| 213.0210 | IRRIGATION LINE (1.5 INCH) | LF |
| 213.0220 | PVC SLEEVE (3 INCH) | LF |
|  |  |  |

END OF SECTION 213

ADD THE FOLLOWING SECTION TO DIVISION II – CONSTRUCTION DETAILS

SECTION 214 – ENGINEERED SOIL

NOTE TO SPEC WRITER: FOR STREET PROJECTS. Foundations within ESM will need additional analysis.

**DESCRIPTION**

**214.01.01 GENERAL**

A. This work shall consist of installing, furnishing, preparing, and compacting Engineered Soil Mix (ESM) on a prepared subgrade for the purpose of compaction capacity of 95% and providing ample space in which tree roots will successfully grow. This work shall also consist of related items as indicated on construction documents or as specified here within.

**214.01.02 SUMMARY**

1. The section includes Engineered Soil Mix and related items required for a complete installation.

**214.01.03 RElated work**

1. Section 212 Landscaping
2. Section 213 Irrigation Systems

**214.01.03 REFERENCES**

1. The following references are used herein:

ASTM: American Society of Testing Materials

USDA: United States Department of Agriculture

AASHTO: American Association of State Highway and Transportation Officials

AOAC: Association of Official Agricultural Chemists

**214.01.04 QUALITY ASSURANCE**

1. Qualifications of the installing Contractor shall be submitted. The Contractor shall have a minimum of 5 years of experience installing engineered soil. Submit list of projects, including contract/project name and contact information.
2. Suppliers for the Engineered Soil Mix (ESM): All Engineered Soil mixing shall be performed by an agreed upon supplier using appropriate soil measuring, mixing and shredding equipment of sufficient capacity and capability to assure proper quality control and consistent mix ratios. Mixing of engineered soil mix at the project site shall not be permitted.
3. The Engineered Soil Mix supplier shall have available at the mixing site sufficient equipment, instrumentation including qualified technicians to determine the weights and water content of the mix components immediately prior to the mixing procedure. The Contractor shall monitor these critical elements throughout the mixing process to provide adequate quality control. The supplier shall maintain a quality control log of material weight, water content and mix proportions for every 15 tons of material mixed. Maintain adequate moisture content during the mixing process. Soil and mix components shall easily shred and break down without clumping. Soil clods shall easily break down into fine crumbly texture. Soil shall not be overly wet or dry. The supplier shall measure and monitor the amount of soil moisture at the mixing site periodically during the mixing process.

**214.01.05 SUBMITTALS**

1. The Contractor shall submit within ten (10) calendar days after receipt of Notice to Proceed, material and equipment submittals, including manufacturer’s name and address, supplier’s name and address, samples, certificates, manufacturer’s literature, test results for materials specified below. No materials shall be ordered until the required samples have been reviewed by the ENGINEER.
2. There will be no deviation from the approved submittals without the written authorization by the ENGINEER.
3. Submit ½ cubic foot representative sample of clay loam; one cubic foot representative sample of crushed stone, and one cubic foot representative sample of Engineered Soil Mix for approval.
4. Submit soil test and analysis reports for sample of clay loam from an independent soil-testing laboratory.
   * + 1. Submit a mechanical analysis of the clay loam sample and particle size analysis including the following gradient of mineral content:

* + - 1. Sieve analysis shall be performed and compared to USDA Soil Classification System. Sieve analysis shall be done by a combined hydrometer and wet sieving using sodium hexametaphosphate as a dispersant in compliance with ASTM D422 after destruction of organic matter by hydrogen peroxide.

* + - 1. Submit a chemical analysis, performed in accordance with current AOAC Standards, to include pH and soluble salts.

E. Submit sample of crushed stone to be used in the production of the Engineered Soil Mix.

F. The sample of Engineered Soil Mix may be tested of the following at the discretion of the ENGINEER:

* + - 1. Compaction in accordance with ASTM D698/AASHTO T99 without removing oversize aggregate.
      2. California Bearing Ration in accordance with ASTM D1883 – soaked CBR shall equal or exceed a value of 50.
      3. Measured dry-weight percentage of stone in mixture.

G. Any deviation from the specified crushed stone and clay loam specifications shall be approved by the ENGINEER.

**214.01.06 DELIVERY STORAGE AND HANDLING**

A. Packaged Materials: Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery, and while stored at site. Do not store materials unprotected.

B. Engineered Soil Mix shall be delivered at or near optimum compaction moisture content as determined by AASHTO T99 (ASTM D 698) and shall not be placed in frozen, wet or muddy sites.

C. Protect Engineered Soil Mix from exposure from excess water and from erosion at all times. Do not allow excess water to enter the site prior to compaction. If water is introduced into soil after grading, allow water to drain to optimum compaction moisture content.

**MATERIALS**

**214.02.01 ENGINEERED SOIL MIX (ESM)**

1. The components for the ESM mix shall conform to the following specifications:
   * + 1. Crushed granite stone: ¾” to 1 ½” crushed granite quarry rock of angular, sharp texture. ASHTO #4.
          1. Stone shall be clean, sharp a free of other stone other than granite. Stone shall be angular in shape with a maximum average length, width and depth ration of 2:1:1. Stones with visible fracture lines will be rejected.
          2. Stones shall have a PH between 6.0 and 8.5.
          3. Soluble slat levels less than 300 ppm.
       2. Clay loam soil shall conform to the following requirements:
          1. Gradation Limits

Coarse sand: 10 to 15 percent

Medium sand: 15-20 percent

Fine sand: 0 to 5 percent

Silt: 25 to 35 percent

Clay 27 to 35 percent

USDA Designation Size in mm

Gravel +2 mm

Coarse Sand 0.50-2.0 mm

Medium Sand 0.25-0.50 mm

Fine Sand 0.05-0.25 mm

Silt 0.002-0.05 mm

Clay minus 0.002 mm

* + - * 1. Chemistry Limits

pH between 5.5 and 8.5

Soluble salt levels less than 300 ppm.

* + - 1. Hydrogel: coated potassium propenoate-propenamide copolymer, acceptable to Engineered Soil Mix manufacturer.
         1. Amereq, 800-832-8788
         2. Broadleaf P4, 949-631-8184
         3. Or approved equal.

1. Mix Proportions:
   * + 1. Approved proportion of materials in Engineered Soil shall be as follows:

|  |  |  |
| --- | --- | --- |
| *Component* | *By units of weight* | *By percentage* |
| Crushed Granite Stone | 100 dry weight | 70.97-74.97 |
| Clay Loam Soil | 18 – 21 dry weight | 25 – 29 |
| Hydrogel | 0.03 dry weight | 0.03 |
| Water | 10 ± (includes water in other ingredients) |  |
| Other amendments | As recommended by test analysis | |

1. Filter fabric: Non-woven continuous filament polyester fabric.
   * + 1. Weight 4.0 oz per square yard minimum.
       2. Grab strength 100 lbs. water flow rate 105 gpm/sq ft.
       3. Delivered in 15- foot wide roles minimum.
2. Water: Clean, fresh and free of substances or matter which could inhibit vigorous growth of plants.

**CONSTRUCTION**

1. **PREPARATION**

A. Identify locations for Engineered Soil Mix in field and secure ENGINEER’s acceptance before start of work. Make minor adjustments as may be required.

1. **PROJECT AND UNDERGROUND CONDITIONS**
2. Utilities: The Contractor shall locate and confirm the location of all underground utilities and structures prior to the start of any excavation. Perform work in a manner which will avoid possible damage. Hand excavate, as required. Maintain grade stakes set by others until removal is mutually agreed upon by parties concerned.
3. All areas to receive ESM shall be inspected by the installing contractor prior to the start of work. All defects such as incorrect grading, compaction, and inadequate drainage shall be reported to the ENGINEER prior to beginning the work.
4. The Contractor shall repair any underground utilities or foundations damaged during the progress of this work.
5. **MIXING PROTOCOL**
6. Mixing of the Engineered Soil Mix (ESM) at the project site is not permitted.
7. Spread the crushed stone on a paved surface to maximum depth of six (6) inches. Mix the Hydrogel and sufficient water into slurry and spray over the crushed stone. After the stone is uniformly wetted by the slurry, spread the clay loam evenly over the crushed stone. Spray the remaining water over the soil and mix with a loader of other device until the mix obtains an even consistency. Do not over mix or over wet. If the mix begins to form balls or pellets of soil around the aggregate, discard the batch. Any palletized soil will be rejected.
8. ESM may alternatively be mixed in a commercial pug mill or other equipment approved by the Engineer.
9. Mixing should include any required soil amendments to alter soil fertility including, soil sulfur, iron sulfate, lime, fertilizers for pH adjustment, etc., as indicated to reduce deficiencies in soil analysis.
10. After completion of the mixing and prior to installation, protect the ESM stockpiles(s) from rain and mix separation through erosion and excessive vibration during handling and placement. Cover the stockpile at all times with plastic sheeting.
11. Contractor shall procure sufficient quantities of ESM in advance of the time needed at the job site to allow adequate time for final quality control testing as required by the progress of the work. ESM shall be stored in piles no larger than 400 cubic yards and each pile shall be numbered for identification and quality control purposes. Storage piles shall be protected from drying out, rain and erosion by covering with plastic sheeting.
12. **DELIVERY STORAGE AND HANDLING**
13. Prior to any delivery of ESM, Contractor shall hold a preconstruction meeting with the Engineer, mixers and operators and submit a logistics plan to discuss schedules, methods and techniques for mixing, delivery and installation of material.
14. Do not deliver or place soils in wet, muddy or frozen conditions.
15. Materials shall be delivered at or near optimum compaction moisture content as determined by ASTM D 698 (AASHTO T 99).
16. Do not delivery or place materials in an excessively moist condition (beyond 2% above optimum compaction moisture content as determined by ASTM D698 (AASHTO T 99). Protect ESM from drying out, absorbing excess water and from erosion at all times. Do not store materials unprotected from large rainfall events.
17. Do not allow excess water to enter site prior to compaction. If water is introduced into material after grading, allow material to drain or aerate to optimum compaction moisture content.
18. ESM stored longer than two (2) days shall be inspected for water content, rehydrated and remixed as required to meet optimum compaction moisture content.
19. **SITE PREPARATION**
20. Do not proceed with installation of ESM material until all subsurface drain lines, walls, curb footings, irrigation lines and/or utility work in the area have been installed. For site elements dependent on ESM for foundation support, postpone installation until immediately after the installation of ESM. All subsurface drainage systems shall be operational prior to the installation of ESM.
21. Excavate and compact the proposed sub-grades to depths, slopes and widths as shown on drawings. Maintain all required angles of repose of the adjacent materials as shown on the drawings. Do not over excavate compacted subgrades of adjacent pavement or structures. Confirm that the subgrade is at the proper elevation and compacted as required. Subgrade elevations shall slope parallel to the finish grade or toward subsurface drain lines.
22. Excavate existing native soil so that the finish grade of the bottom of the structural soil will be the same grade as the bottom of the planted tree or minimum depth as shown on drawings, whichever depth is deeper. Contractor to verify with tree nursery the depths of the proposed tree rootballs, submit average depths of rootballs to Engineer so that final depth of excavation can be determined.
23. Dispose of excess subsoil removed from excavations. Clear the site of all construction debris, trash, rubble and any foreign material. In the event that fuels, oils, concrete washouts silts or other material harmful to plants have been spilled into the subgrade material, excavate the soil sufficiently to remove the harmful material. Fill any over excavation with approved fill and compact to the required subgrade compaction.
24. Protect adjacent walls, walks and utilities from damage or staining by soil. Clean up all trash and any soil or dirt spilled on any paved surface at the end of each working day. Any damages to the paving or architectural work caused by the installation of ESM shall be repaired or replaced by the Contractor at no additional cost. Maintain silt and sediment control devices and provide adequate methods to assure that trucks and other equipment do not track soil from the site.
25. **INSTALLATION OF ENGINEERED SOIL MIX**
26. Install ESM in 6-inch lifts and compact every 12” to 18” as required. Compact all materials to 95% peak dry density as defined by ASTM D 698 (standard AASHTO compaction curve AASHTO T 99). Hand tamp as necessary to protect utilities, irrigation lines and other subsurface features. Compaction testing procedures and equipment shall be calibrated for non-cohesive soils. No compaction shall occur when moisture content exceeds maximum as listed therein. Delay compaction 24 hours if moisture content exceeds maximum allowable and protect ESM during delays in compaction with plastic or plywood.
27. The ESM shall be able to maintain drainage of water at 0.75 inches per hour after completion of compaction. Test the completed installation with a minimum of one random percolation test per 300 square feet of area as follows: Dig a hole in the compacted ESM 10 inches in diameter and 10 inches deep. Fill with water and let it drain completely. Immediately refill with water and time the rate of fall of the water in the hole. The water shall recede at a minimum rate of 0.75 inch per hour. All testing shall be done in the presence of the Engineer. In the event that the installation fails to percolate at the required rate, the soil in the area shall be re-tested to determine if it meets the particle size distribution specified. Material that does not meet the specifications shall be removed at no extra cost to the Owner.
28. Bring ESM to finished grades as shown on the drawings. Immediately protect the ESM material from contamination by toxic materials, trash, debris, water containing cement, clay, silt or material that will alter the particle size distribution of the mix. After the ESM is installed, do not significantly delay, schedule or phase the progress or installation of the next layer of paving and planting above/in the ESM.
29. The Engineer may periodically check the material being delivered and installed at the site for color and texture consistency with the approved sample provided by the Contractor as part of the submittal for ESM. In the event that the installed material varies significantly from the approved sample, the Engineer may request that the Contractor test the installed ESM. Any soil that varies significantly from the approved testing results, as determined by the Engineer, shall be removed and new ESM installed that meets these specifications.
30. **FINE GRADING**
    * 1. After the initial placement and rough grading of the ESM but prior to the start of fine grading, the Contractor shall request review of the rough grading by the Engineer. The Contractor shall set sufficient grade stakes for checking the finished grades. Adjust the finish grades to meet field conditions as directed. Provide smooth transitions between slopes of different gradients and direction. Fill all dips and remove any bumps in the overall plane of the slope. The tolerance for dips and bumps in the ESM areas shall be a 3-inch deviation from the plane in 10 feet. All fine grading shall be inspected and approved by the Engineer prior to the installation of other items to be placed on the ESM.
31. **INSTALLATION OF FILTER FABRIC**
32. After the installation is completed and reviewed by the Engineer, install Filter Fabric on top of ESM in all areas that will be located below paving. Cut off excess fabric at the edge of the Engineered Soil.
33. Upon completion of ESM installation, clean areas. Remove all excess fill soils, mix stockpiles and legally dispose of all waste materials trash and debris. Sweep do not wash, all paving and other exposed surfaces of dirt and mud until the final paving has been installed over the mix. Avoid washing the area until all paving has been completed.
34. **INSTALLATION OF STREET TREES IN ENGINEERED SOIL MIX**
35. After the installation of the ESM and Filter Fabric is completed and adjacent pavement has cured and been approved by the Engineer, the street trees can be installed.
    * + 1. Do not excavate planting holes until irrigation and drainage systems are tested and approved by Engineer.
        2. Locate planting holes in the center of tree well as shown on the plans or required by the Engineer. Notify any conflicts with underground utility lines to the attention of the Engineer.
        3. Excavate holes to diameter and depth shown on plans. Avoid over excavating or contaminating ESM with native soil.
        4. Stockpile excavated ESM to use as backfill. Cover with plastic sheeting to protect stockpile from contamination and drying out. ESM stockpiled longer than two (2) days shall be inspected for water content, rehydrated and remixed as required to meet optimum compaction moisture content.
36. Prior to planting, test drainage of plants pits by filling with water twice in succession. Conditions permitting the retention of water in tree pits for more than 12 hours shall be brought to the attention of the Engineer.
37. Handle the tree carefully. Set rootball on bottom of pit and center it in tree well opening in the sidewalk. Backfill with ESM and settle with watering. Raise rootballs that settle below accepted finish grade.
38. **CLEAN UP**
39. During soil work, keep pavements clean and work area in an orderly condition.
40. Upon completion of ESM and tree installation, clean all affected areas. Remove all excess fills, soils, and mix stockpiles and legally dispose of all waste materials, trash and debris. Removal l tools, and equipment and provide a clean and clear site. Sweep do not wash, all paving and other exposed surfaces of dirt and mud until the paving has been installed over the structural soil material. Do not wash hardscape until the structural soil has been covered by the finished surface(s) per plans.
41. **INSPECTION AND ACCEPTANCE**
42. When structural ESM work is completed, ENGINEER will, upon request, make an inspection to determine acceptability. Structural soil work may be inspected for acceptance in portions as agreeable to ENGINEER, provided each portion of work offered for inspection is complete.
43. When inspected work does not comply with requirements, replace rejected work and have re-inspected by ENGINEER until found to be acceptable.

**METHOD OF MEASUREMENT**

**214.04.01 MEASUREMENT**

1. The quantity of ENGINEERED SOIL MIX will be measured per cubic yard based upon the total number cubic yards installed and accepted by the Engineer.
2. The quantity of FILTER FABRIC will be measured per square feet based upon the total number square feet installed and accepted by the OWNER.

**BASIS OF PAYMENT**

**214.05.01 PAYMENT**

The accepted quantity of ENGINEERED SOIL MIX will be paid for at the contract unit price of cubic yards and shall include all materials, equipment, labor, water and disposal required to perform this work and all work as shown on the drawings, as specified herein and as directed by the Engineer. The above payment shall also include loading; trucking; placing; excavation; soil; soil amendment; crushed stone; Hydrogel; compaction; fees; costs and permits as may be required and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the ENGINEER.

The accepted quantity of FILTER FABRIC will be paid for at the contract unit price of square feet and shall include all materials, equipment, labor, and disposal required to perform this work and all work as shown on the drawings, as specified herein and as directed by the Engineer. The above payment shall also include loading; trucking; placing; fees; costs and permits as may be required and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the ENGINEER.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 214.0010 | ENGINEERED SOIL MIX | CY |
| 214.0020 | FILTER FABRIC | SF |

**END OF SECTION 214**

SECTION 216 – HORIZONTAL DIRECTIONAL DRILLING

**DESCRIPTION**

**METHOD OF MEASUREMENT**

**216.04.01 MEASUREMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The quantity of XX INCH CONDUIT (DIRECTIONAL DRILL) will be measured per linear foot.

**METHOD OF PAYMENT**

**216.05.01 PAYMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The accepted quantity of XX INCH CONDUIT (DIRECTIONAL DRILL) will be paid for at the contract unit price of linear foot and shall include all materials, equipment and labor required including, but not limited to, all piping and equipment required for the horizontal directional drilled installation of product pipe, complete and in place. Payment will also include all related excavation; shoring and bracing; compaction; post video of all sewer and storm facilities; restoration of damaged facilities; testing; disinfecting; and connections to existing lines or works and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 216.XXXX | XX INCH CONDUIT (DIRECTIONAL DRILL) | LF |

**END OF SECTION 216**

ADD THE FOLLOWING SECTION TO DIVISION II – CONSTRUCTION DETAILS

SECTION 270 – DEWATERING

**DESCRIPTION**

**270.01.01 GENERAL**

Note to spec writer: Temporary permits are for groundwater discharge less than 250gpm and the verbiage below applies since the contractor will get the permit. If the discharge is more than 250gpm, or if there are pollutants in the groundwater, CLV will have to get a permit to discharge in either the storm drain or the sanitary sewer and verbiage below has to be modified as such.

A. This work shall consist of furnishing all materials, labor, equipment and supervision to design, install, operate, remove dewatering systems and to lower the water table sufficient to prevent ground water from entering excavations.

B. The work shall also consist of, but is not necessarily limited to, the proper disposal of groundwater removed by a dewatering system **in accordance with local, state, and federal regulations**. Prior to discharging groundwater the Contractor shall be responsible for obtaining the groundwater discharge permit from the Nevada Division of Environmental Protection, comply with the conditions of the permit and pay all costs associated with the permit requirements such as permit fees, laboratory analysis and treatment of the discharge water, if required. The permit application can be downloaded at: ndep.nv.gov/BWPC. Sampling and laboratory analysis shall be completed by Nevada Certified Environmental Manager and Certified Laboratory.

C. Dewatering shall conform to the requirements of Section 208 “Trench Excavation and Backfill” and Section 502 “Concrete Structures” unless otherwise specified herein.

**MATERIALS**

**270.02.01 GENERAL**

A. At or prior to the preconstruction conference, the Contractor shall submit the dewatering plan showing method of dewatering, piping locations, discharge points, sewer and storm drainage facilities utilized and estimated discharge quantities.

**CONSTRUCTION**

**270.03.01 GENERAL**

A. Dewatering for structures and pipelines shall commence when groundwater is first encountered and shall be continuous until such times as water can be allowed to rise in accordance with the following provisions. Dewatering shall be conducted such that no concrete footings or floors or pipelines are placed in water nor shall water be allowed to rise over them until the concrete or mortar has set at least eight (8) hours. Water will not be allowed to rise in pipeline trenches or drained excavations until pipelines or facilities are backfilled or restrained to prevent flotation.

B. The Contractor shall remove all dewatering equipment and materials at the completion of the work or as otherwise directed by the Engineer.

C. The dewatering system shall be kept in operation until all work in the excavation is backfilled and properly compacted to a point three (3) feet above the existing water table elevation.

D. The Contractor shall arrange for and provide all necessary utilities to operate the dewatering system.

**270.03.02 POINT OF DISCHARGE**

A. The Contractor shall dispose of groundwater removed by the dewatering system in accordance with local, state and federal regulations.

**METHOD OF MEASUREMENT**

**270.04.01 MEASUREMENT**

The quantity of DEWATERING will be measured per lump sum.

**BASIS OF PAYMENT**

**270.05.01 PAYMENT**

The accepted quantity of DEWATERING will be paid for at the contract unit price per lump sum and shall include all permits, testing, system design, water treatment, materials, labor, equipment, supervision, ditching and appurtenant work required for dewatering.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 270.0005 | DEWATERING | LS |

**END OF SECTION 270**

**OR IF NOT MEASURING FOR PAYMENT USE THE FOLLOWING:**

**METHOD OF MEASUREMENT**

**270.04.01 MEASUREMENT**

No direct measurement shall be made for Dewatering.

**BASIS OF PAYMENT**

**270.05.01 PAYMENT**

Unless otherwise provided in the Special Provisions, no payment will be made for Dewatering as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which Dewatering is required.

END OF SECTION 270

ADD THE FOLLOWING SECTION TO DIVISION II – CONSTRUCTION DETAILS

SECTION 271 – BIAXIAL GEOGRID BASE REINFORCEMENT

**DESCRIPTION**

**271.01.01 GENERAL**

A. This work shall consist of furnishing and placing geogrid reinforcement of base course and/or subgrade reinforcement as shown in the plans.

**MATERIALS**

**271.02.01 GENERAL**

A. Geogrid shall be one of the following structure types:

1. A structure comprised of punched and drawn polypropylene (PP) or high-density polyethylene (HDPE) sheet integrally formed into a grid.

2. A structure comprised of high-density polyethylene (HDPE) or polypropylene (PP) extruded to form a grid.

**271.02.02 PROPERTIES**

A. The geogrid shall be biaxial, having high tensile strength and modulus in both principal directions, perpendicular to each other. The geogrid polymer shall be inert to all naturally occurring alkaline and acidic soil conditions. The geogrid shall also conform to the following requirements:

B. The geogrid shall be an integrally-formed, polypropylene grid structure meeting all of the following characteristics:

|  |  |  |  |
| --- | --- | --- | --- |
| ***Property*** | ***Test Method*** | ***Units*** | ***Type 2 (MARV)*** |
| Junction EfficiencyIDH\_FT19 | GRI-GG2-87 | % | 93 |
| Flexural RigidityIDH\_FT20 | ASTM D1388-96 | mg-cm | 750,000 |
| # of layersIDH\_FT17 | Physical inspection | N/A | Single layer |
| Traffic Benefit Ratio (TBR) | AASHTO PP46-01 | N/A | Ranges btwn. 3-5, depending on R-value. See Design Chart. |

.

C. For Geogrid Materials not meeting the material properties shown above, submit the following to the Owner for review per Special Provision 100 at least 10 days prior ordering:

1. Full-scale laboratory and in-ground testing of pavement structures reinforced with the specific alternate geogrid material that quantifies a TBR meeting or exceeding that of the design geogrid.

2. Independent certified test results stating that the specific alternate geogrid exhibits an aperture stability modulus at 20cm-kg, when testing in accordance with the “Grid Aperture Stability In-Plane Rotation” test, of 3.2 cm-kg/deg for Type 1 or 6.5 cm-kg/deg for Type 2 geogrid.

3. A list of 5 comparable projects that are similar in terms of size and application, are located in the United States, and where the results of using the specific alternate geogrid material can be verified after a minimum of 1 year of service life.

4. A sample of the alternate geogrid material and certified specification sheets.

5. Additional information as requested by the Engineer to fully evaluate the product.

6. Geotextile materials will not be considered as an alternate to geogrid materials.

D. Geogrid shall be installed in accordance with the installation guidelines provided by the manufacturer or as directed by the Engineer.

E. Geotextile materials will not be considered as an alternate to geogrid materials for subgrade improvement or base/sub-base reinforcement applications. A geotextile may be used in the cross-section to provide separation, filtration or drainage; however, no structural contribution will be attributed to the geotextile.

**CONSTRUCTION**

**271.03.01 SHOP DRAWINGS**

A. The Contractor shall submit the following for the Engineer’s approval:

1. Geogrid product sample approximately 4 inches by 7 inches or larger.
2. Geogrid product data sheet and certification from the Manufacturer that the geogrid product supplied meets the requirements of Subsection 271.02.02.
3. Manufacturer’s installation instructions and general recommendations.

B. The contractor shall obtain the material approval from the Engineer prior to ordering, delivery to the project site, or placement of the product.

**271.03.02 DELIVERY, STORAGE, AND HANDLING**

A. The Contractor shall follow the following guidelines for storage and protection of the biaxial geogrid material:

1. Prevent excessive mud, wet concrete, epoxy, or other deleterious materials from coming in contact with and affixing to the geogrid materials.

2. Store at temperatures above -20 degrees F (-29 degrees C).

3. Rolled materials may be laid flat or stood on end.

4. Geogrid materials should not be left directly exposed to sunlight for a period longer than recommended by the manufacturer.

**271.03.03 SITE PREPARATION**

A. Grade the area to receive the geogrid to an even, smooth surface that is free of cavities, large stones or other debris capable of puncturing or tearing the geogrid. Remove and dispose of unsuitable materials in accordance with Subsection 107.14. Properly backfill excavated areas formed by removing unsuitable material with an approved material.

**271.03.04 PLACEMENT**

A. Any equipment used for installation shall be capable of laying the geogrid smoothly, without wrinkles or folds. The equipment used shall comply with manufacturer’s recommendations, or as approved.

B. Unroll and place the geogrid parallel to the roadway alignment. Place geogrid in intimate contact with the underlying soil without wrinkles or folds. Join adjacent geogrids sheets and roll ends by overlapping a minimum of 2 feet. Overlap up slope sheets over down slope sheets. Maintain a minimum 5 foot offset between adjacent overlapped geogrid roll ends.

C. Use care to insure that the geogrid is not damaged by installation procedures. Place the geogrid so that backfilling operations do not excessively stretch, deform, or tear the geogrid.

**271.03.05 FILL PLACEMENT OVER GEOGRID**

A. Granular fill material or base material shall be placed, spread, and compacted in such a manner that minimizes the development of wrinkles in the geogrid and/or movement of the geogrid.

B. A minimum loose fill thickness of 6 inches is required prior to operation of tracked vehicles over the geogrid. Turning of tracked vehicles should be kept to a minimum to prevent tracks from displacing the fill and damaging the geogrid. Rubber-tired equipment may pass over the geogrid reinforcement at slow speeds (less than 10 mph).

C. Place overlying material by dumping from the edge of the geogrid, or from a previously placed material lift. Do not drop aggregate base from a distance higher than 3 feet above the geogrid during placement. Before covering, inspect the condition of the geogrid to determine that no rips, tears, folds, or wrinkles are present. Repair or replace any defects found. Repair rips or tears by placing a new layer of geogrid extending beyond the defect at least 3 feet in all directions.

**271.03.06 INSPECTION**

A. The Engineer may randomly inspect geogrid before, during and after (using test pits) installation.

B. Any damaged or defective (i.e. damaged coating, separated junctions, separated layers, tears, etc.) geogrid will be repaired/replaced in accordance with section 271.03.07

**271.03.07 REPAIR**

A. Any roll of geogrid damaged before, during and after installation shall be replaced by the Contractor at no additional cost to the Owner.

B. Proper replacement shall consist of replacing the affected area +3ft (1m) of geogrid all around side of the affected area.

**METHOD OF MEASUREMENT**

**271.04.01 MEASUREMENT**

The quantity of BIAXIAL GEOGRID BASE REINFORCEMENT will be measured per square yard of surface covered. No allowance will be made for material overlap.

**BASIS OF PAYMENT**

**271.05.01 PAYMENT**

The accepted quantity of BIAXIAL GEOGRID BASE REINFORCEMENT will be paid for at the contract unit price per square yard and shall include all labor, equipment and materials, including but not limited to delivery; storage; handling; site preparation; fine grading and shaping; placement; material overlap; anchors or pins; removal of unsuitable or rejected material and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 271.0010 | BIAXIAL GEOGRID BASE REINFORCEMENT | SY |

END OF SECTION 271

***ADD THE FOLLOWING SECTION TO DIVISION II – CONSTRUCTION DETAILS***

SECTION 272 – GEOTEXTILE SEPARATION FABRIC

**DESCRIPTION**

**272.01.01 GENERAL**

A. This work shall consist of [Fill in].

**MATERIALS**

**272.02.01 GENERAL**

A. The materials shall conform to [Fill in].

**CONSTRUCTION**

**272.03.01 GENERAL**

A. The construction requirements shall consist of [Fill in].

**METHOD OF MEASUREMENT**

**272.04.01 MEASUREMENT**

The quantity of GEOTEXTILE SEPARATION FABRIC will be measured per square yard.

**BASIS OF PAYMENT**

**272.05.01 PAYMENT**

The accepted quantity of GEOTEXTILE SEPARATION FABRIC will be paid for at the contract unit price per square yard and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 272.0010 | GEOTEXTILE SEPARATION FABRIC | SY |

END OF SECTION 272

SECTION 302 – AGGREGATE BASE COURSES

**DESCRIPTION**

**302.01.01 GENERAL**

***Add the following to thIS SUBSECTION:***

B. Pursuant to NRS 338.0118 the City of Las Vegas Department of Public Works provides for the use of recycled aggregate in public road construction projects. Substitution by the Contractor of recycled aggregate for new aggregate will follow the procedures in Sections 2.10 of the General Conditions and 105.03 of the Special Provisions and the following:

1. Recycled asphalt material will be considered only in the roadway pavement section.
2. In order to encourage the use of recycled materials these substitutions will be considered to have demonstrable benefit to the City whether or not they result in a cost savings to the City or a reduction in Contract time.
3. No substitutions will be considered unless submitted by the Contractor within 10 days of the Contract award date.
4. No additional Contract time or cost will be granted for these substitutions.

(Note to Spec Writer – this is only if needed if a Type II access road is part of project)

**MATERIALS**

***Add the following to thIS SUBSECTION:***

**302.02.02 MODIFIED TYPE II ACCESS ROAD**

1. To meet Air Quality requirements, a modified Type II access road may be utilized meeting the standards set forth below that replace Table 8 in USS 704 and follow standards per Table 9 in USS 704 Base Aggregates:

|  |  |
| --- | --- |
| Sieve Size | Percent Passing |
| 1-Inch | 100 |
| ¾-Inch | 90-100 |
| No. 4 | 35-65 |
| No. 16 | 15-40 |
| No. 200 | 2-6 |

**METHOD OF MEASUREMENT**

**302.04.01 MEASUREMENT**

***Add the following to thIS SUBSECTION:***

The quantity of TYPE II AGGREGATE BASE will be measured per cubic yard.

The quantity of MODIFIED TYPE II ACCESS ROAD will be measured per cubic yard.

The quantity of TYPE II AGGREGATE BASE will be measured in all areas to receive bituminous pavement. Measurement does not include the area under sidewalks, cross-gutters, driveways, sidewalk ramps, curb and gutters, Portland cement concrete pavement, median pavements, permanent patches, trench backfill for drainage structures or other underground facilities.

**BASIS OF PAYMENT**

**302.05.01 PAYMENT**

***Add the following to thIS SUBSECTION:***

The accepted quantity of TYPE II AGGREGATE BASE will be paid for at the contract unit price of cubic yard and shall conform to the requirements of subsection 302.05.01 of the Uniform Standard Specifications and shall include all materials, equipment and labor required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of MODIFIED TYPE II ACCESS ROAD will be paid for at the contract unit price of cubic yard and shall conform to the requirements of subsection 302.05.01 of the Uniform Standard Specifications and shall include all materials, equipment and labor required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer.

Note to Spec Writer: the following paragraph is not applicable to projects where there are separate payment items for excavation:

The above payment shall also include, all excavation; grading; compaction, subgrade preparation and watering and re-compacting the subgrade.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 302.0030 | TYPE II AGGREGATE BASE | CY |
| 302.0050 | MODIFIED TYPE II ACCESS ROAD | CY |
|  |  |  |

END OF SECTION 302

SECTION 308 – ASPHALT EMULSION FULL DEPTH RECLAMATION (FDR) AND GRANULAR BASE STABILIZATION (GBS) AND EMBANKMENT

**DESCRIPTION**

**308.01.01 GENERAL**

A. Asphalt emulsion full depth reclamation (FDR) and granular base stabilization (GBS) consists of reclaiming the existing road with a reclaimer to obtain the width and depth specified in the plans. Asphalt emulsion will be added to the blend of materials; water will be added as needed. The material will be spread and compacted, resulting in a finished bituminous base in accordance with the plans and these specifications. This specification applies to a road that has had a site selection and material evaluation performed by the Agency or its representative.

**MATERIALS**

**308.02.01 aSPHALT EMULSION**

1. The properties of the asphalt emulsion to be used shall be determined by the mix design in order to meet the requirements in Table 1.

**308.02.02 aGGREGATE**

1. The amount and type of added aggregate or recycled asphalt pavement, if any, will be determined by the mix design in order to meet the requirements in Table 1.

**308.02.03 RECLAIMED MATERIAL**

1. A mix design is required before the start of the project. The reclaimed material at the recommended emulsion content shall meet the properties in Table 1. Based on road variability, more than one design may be required. The properties and quantity of asphalt emulsion, additional aggregate and water shall be determined by the mix design. The Contractor shall submit the mix design to the Engineer for approval prior to the start of the project.

**308.02.03 other additives**

1. If necessary, additives may be used to meet the requirements in Table 1. In the case that an additive is used, the type and allowable usage percentage must be described in the submitted design recommendation.

|  |  |
| --- | --- |
| **Table 1** | Minimum Requirement |
| Marshall Stability, Cured Specimen: AASHTO T 245 104ºF (min) | 1250 lb |
| Marshall Retained Stability, AASHTO T 245, 104ºF based on Moisture Conditioning on Cured Specimen (min) | 70% |
| Aggregate Coating, % | 50 |

**CONSTRUCTION**

**308.03.01 MIX DESIGN PROCEDURE**

1. Sampling and Processing
   1. Based on data from auger borings (ASTM D 1452), cores, and / or other determinations (i.e. pavement records, FWD deflection data, etc.), determine if more than one design shall be performed. In addition, FDR projects with more than a 2-inch difference in bituminous surface between sections shall have separate designs performed.
   2. If cores or slabs are received, determine the individual and average thickness values. Also, measure the density of four cores or two slabs (if possible) if the bituminous materials are the primary component of the mix design (for emulsion rate calculations later).
   3. Crush bituminous materials to the gradation below before blending with the aggregate. If bituminous materials consist of a chip seal only, then the only requirement is that it is crushed to 100% passing the 1-inch sieve.

|  |  |
| --- | --- |
| Sieve Size | Gradation |
| 1.25 in. (31.25 mm) | 100 |
| 1 in. (25 mm) | 90 to 100 |
| ¾ in. (19 mm) | 80 to 97 |
| No. 4 (4.75 mm) | 30 to 55 |
| No. 30 (0.6 mm) | 5 to 15 |

* 1. Specimens prepared for mix design shall have a maximum size passing the 1.25 in. (31.25 mm) screen for all material components.

1. Material Evaluation
   1. The base rock shall have a washed gradation (ASTM C 117 and C 136) and sand equivalent (ASTM D 2419, method B) performed and reported. RAP shall have a dry or washed gradation and sand equivalent performed. Report the washed gradation and sand equivalent on the blend.
   2. Perform Modified Proctor compaction according to ASTM D 1557, Method C to determine optimum moisture content (OMC) at peak dry density. OMC shall be defined by a best-fit curve from a minimum of four points. Material containing 20% or more passing No. 200 shall be mixed with target moisture, sealed, and set aside a minimum of 12 hours. All other material shall be set aside a minimum of 3 hours. If a material contains less than 4 percent passing No. 200, then this testing is not required.
2. Selection Of Water Content For Design
   1. Water content of specimens, not including water in the emulsion, shall be:
      1. 50 to 75 percent of OMC if SE ≤ 30
      2. 40 to 65 percent of OMC if SE > 30

Sand equivalent value (SE) is from the combined materials.

* 1. If a material contains less than 4 percent passing No. 200 or if no peak develops with the OMC curve, then fix the moisture content between 2 and 3 percent. Specimens shall be mixed with the required amount of water before the addition of emulsion. Specimens shall be mixed with the appropriate amount of water and allowed to sit sealed according to the same guidelines as used for Modified Proctor specimens.

1. Number Of Specimens/Mixing
   1. Samples shall have a weight before addition of water and emulsion to produce 70 to 80 mm tall compacted specimens.
   2. Choose four emulsion contents that will bracket the design emulsion content.
   3. Four specimens at each of four emulsion contents shall be produced for the strength and retained strength tests.
   4. Two specimens shall be produced for maximum specific gravity.
   5. A laboratory mechanical mixer designed for the blending of aggregate, reclaimed asphalt pavement (RAP), water, and asphalt shall be used.
   6. Aggregate material and emulsion shall be mixed at a temperature of 20 to 26°C. Water shall be mixed for 60 seconds. Emulsion shall be mixed for 60 seconds.
   7. If other materials are added, such as lime or cement, then they shall be introduced in a similar manner as they will be on the project. For example, if lime is incorporated a day or more before emulsion addition, then it shall be added to the wet aggregate a day or more before mixing with emulsion. If lime is incorporated as a slurry, then it shall be incorporated as a slurry in the laboratory.
2. Curing Before Compaction
   1. Loose specimens shall be cured individually in plastic containers of 4 to 7 inches (100 to 180 mm) height and 6 inches (150 mm) diameter. Specimens shall be cured at 40°C for 30 to 45 (± 3) minutes. No further mixing or aeration shall occur during this time.
3. Compaction
   1. For Specimens to be tested in the modified Marshall stability test, use standard Marshall forming molds. Place the first mold assembly on the compaction pedestal in the mold holder and apply 50 blows with the compaction hammer. Apply the same number of blows to the face of the reverse specimen.
4. Curing After Compaction
   1. Specimens will be cured for 1 day at room temperature, with molds on their edge for equal ventilation on both ends. After curing, specimens for dry strength shall be tested at the same time as moisture-conditioned specimens.
   2. Specimens for maximum specific gravity shall be cured at the same conditions as the compacted specimens.
5. Volumetric Measurements
   1. Perform bulk specific gravity of the specimens according to ASTM D 6752. Keep specimens in bags until testing or vacuum saturation is performed. ASTM D 2726 (one minute soak) can be performed if absorption is less than 2 percent.
   2. Perform maximum specific gravity measurements according to ASTM D 2041 with the supplemental dry-back procedure. Determine maximum specific gravity at the other emulsion contents, corrected for the residue of the emulsion.
   3. Determine air voids at each emulsion content.
6. Emulsion Content Selection
   1. The emulsion content selected shall result in the mixture meeting the requirements of Table 1.
7. Report
   1. The mix design report shall have the following information:
      1. The name of the road and other pertinent project information
      2. Penetration of the emulsion residue used in the mix design
      3. A general description of the materials received, their locations, and how samples were obtained
      4. Average thickness of bituminous materials. Report density if Proctor testing was not performed.
      5. Thickness to be reclaimed
      6. Washed gradation of the separate and blended material(s). If RAP was crushed in the laboratory, then the gradation of the RAP shall be reported, and the combined washed gradation of the blend shall be reported.
      7. Sand equivalent value of the separate and blended materials
      8. Density and OMC from Proctor compaction
      9. The moisture content used in mix design
      10. Range of emulsion contents
      11. Density, Gmm, and air voids at each emulsion content (average values)
      12. Stability strength values at each emulsion content (average values)
      13. Level of saturation and conditioned indirect tensile strength at each emulsion content (average values)
      14. Design emulsion content as a percent, in gallons per square yard, and in gallons per foot (with assumed width reported)

**308.03.02 EQUIPMENT**

1. All equipment for asphalt emulsion FDR / GBS described below used on the project shall be in proper working condition and approved by the Engineer.
2. The self-propelled reclaimer shall be capable of fully reclaiming the existing road to the depth required, incorporate the asphalt emulsion and water, and mix the materials to produce a homogeneous material. The recommended minimum power of the reclaimer is 400 hp. The machine shall be capable of reclaiming up to 12-inches deep in each pass. The reclaimer shall have a system for adding asphalt emulsion with a full width spray bar consisting of a positive displacement pump interlocked to the machine speed so that the amount of emulsion being added is automatically adjusted with changes in machine speed. The additive system shall be capable of incorporating up to 7 gallons per square yard of emulsion. Individual valves on the spray bar shall be capable of being turned off as necessary to minimize emulsion overlap on subsequent passes.
3. A motor grader for pre-shaping, aerating, spreading and final shaping of the material is necessary. The motor grader shall have a cross slope indicator.
4. A vibratory padfoot roller with 84 inch wide drum and 10 ton minimum weight is required; a blade is recommended for back-dragging. A pneumatic tire roller with 20 ton minimum weight with water spray system is required. A double drum vibratory steel roller with 10 ton minimum weight with water spray system is required.If the reclamation depth is 4 inches or less, then a padfoot roller is optional. If no padfoot roller is used, then the pneumatic roller shall be 25 ton minimum weight with water spray system.
5. A water truck for supplying water to the reclaimer or road for addition of moisture, as required, during the FDR / GBS operation shall be used. The water truck shall be capable and set up for a controlled spray on the road before compaction.

**308.03.03 CONSTRUCTION METHODS**

1. FDR / GBS work shall not proceed in the rain. The weather forecast shall not call for freezing temperatures for seven days. The historical weather database shall not call for freezing temperatures within 7 days of the end of the project; this shall be based on 50 percent reliability. Any deviation from these requirements requires the written authorization of the Engineer.
2. Pre-Shaping - The road shall be shaped by the reclaimer and / or motor grader to correct for profile, crown, and contour, according to the plans, before the addition of emulsion. Water and add rock can be added during this operation. The material shall then be compacted to support equipment and / or traffic and to provide depth control during reclaiming; compaction with a steel roller should be sufficient unless otherwise determined by the Engineer.
3. Reclaiming - Moisture content before emulsion addition shall be within 1 percent from the mix design recommendation and as measured in Subsection 308.04; aerate if too wet and add water if too dry. The amount of asphalt emulsion used shall be as recommended from the mix design. The required depth of reclamation shall be monitored regularly. Prior to spreading and compacting, the material shall have a gradation meeting the requirement of Section 308.04.
4. The entire operation of reclaiming the existing road, incorporating add rock, water, and asphalt emulsion can be completed in one pass if adequate mixing is achieved.
5. If the entire operation cannot be completed in one pass, then the existing road shall be reclaimed to the depth on the plans, and during this first pass, water and add rock shall be added; pre-shaping can also be accomplished at this time. After completion of the first pass, the road shall be shaped with a motor grader and compacted with a steel roller to provide better depth control. A second pass of a reclaimer shall be completed with the required amount of asphalt emulsion added.
6. Initial compaction – The breakdown roller (padfoot or pneumatic) shall not be behind the reclaimer by more than 500 feet. The padfoot roller, applying high amplitude and low frequency, or the pneumatic roller shall perform initial compaction at enough passes until it walks out of the material. Walking out for the padfoot roller is defined as light being clearly evident between all of the pads at the material–padfoot drum interface and being no more than 3/16 inch deep. Walking out for the pneumatic roller is defined as no significant wheel impressions being left on the surface.
7. Shaping - After the completion of padfoot rolling, any remaining pad foot marks shall be removed and the material spread using a motor grader cut no deeper than necessary to remove the padfoot marks. Desired slope and shape shall be achieved. After the first day of emulsion addition, the reclaimed base shall not be shaped or significant chunking will result.
8. Intermediate and Final Compaction - The vibratory double-drum steel roller and pneumatic roller shall compact the bladed material. The best combination of number of passes and order of rollers shall be used to meet compaction requirements. Do not finish roll in vibratory mode. A light spray of water may aid in final compaction density and appearance.
9. Proof roll the compacted material according to Engineer’s approval. It is recommended that proof rolling represent the type of traffic expected on the road. If deformation does not occur, moving truck traffic can be allowed on the reclaimed base. If deformation does occur, truck traffic should be kept off until the reclaimed material is firm enough. It is expected that the reclaimed base can support moving car traffic after finish rolling has occurred.
10. Before placing any surfacing, the reclaimed base shall be allowed to cure until the moisture content in the material is reduced to 50 percent or less of the optimum moisture content (from the mix design) or 2.5 percent or less, or at the discretion of the Engineer. Sample to the depth of recycling and in a way that represents the length of the road. The reclaimed base shall be surfaced before winter.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Emulsified Recycling Agent Requirements - Table 2 | | |  | |
| Test | Test Method | Requirement | | |
| Minimum | | Maximum |
| Tests on emulsion: | | |  | |
| Sieve test, % of weight sample | AASHTO T 59 | --- | | 0.1 |
| Residue by distillation, % | AASHTO T 59 | 60 | |  |
| RAP Coating Test (min) | AASHTO T 59 b | Good | | |
| Tests on residue by distillation: | | |  | |
| Penetration at 25°C, 100 g / 5 sec | AASHTO T 49 | 40 | | 120 |
| Absolute Viscosity at 60°C, Pascal second  (x10-1) (TV)a | AASHTO T202-10 | Report Only | | |

a Modify AASHTO T 59 - distillation temperature of 350ºF with a 20 minute hold.

**QUALITY CONTROL**

**308.04.01 GENERAL**

A. Supervisory personnel of the Contractor and crew and the testing laboratory shall meet a representative(s) of the Agency at a mutually agreed time prior to the start of the project to discuss methods of accomplishing all phases of the project. If needed, a representative of the asphalt emulsion supplier shall be present to discuss handling of emulsions and delivery issues.

B. The Contractor shall be responsible for quality control (QC) of the FDR / GBS process and the completed reclaimed base. Quality control shall include the following activities, and the results of the QC reported daily in writing to the Engineer.

**308.04.02 ASPHALT EMULSION**

1. A representative from the asphalt emulsion supplier will check the mixing and setting properties as needed and will make adjustments to the asphalt emulsion formulation if necessary. Changes shall comply with Table 2. The FDR/GBS Engineered Emulsion shall be certified and meet the requirements in Table 2.

**308.04.03 ADDITIONAL AGGREGATE**

1. If the mix design requires the addition of crushed aggregate, the spread rate of this material shall be checked and conform to the quantity required by the mix design. The type of material used shall conform to the type used in the mix design. Rates shall be checked by yield at a frequency to be decided by the Engineer.

**308.04.04 MAXIMUM MATERIAL SIZE**

1. If Samples of the reclaimed material shall be obtained before beginning compaction and sieved over the sieves to determine compliance with the following maximum particle size requirements:

|  |  |
| --- | --- |
| Sieve Size | Percent Passing |
| 2.0 in. (50 mm) | 100 |
| 1.75 in. (44 mm) | 97-100 |

Sample size shall be 40 pounds. Sampling frequency shall be at the Engineer’s discretion.

**308.04.05 MOISTURE CONTENT**

1. Prior to emulsion addition, moisture content shall be checked by microwave oven according to ASTM D 4643 or equivalent procedure. Other suitable methods are acceptable, such as a nuclear gauge, direct heating or infrared. Minimum sample size recommended is 700 grams for the microwave procedure after screening through a ¾ inch sieve. Check the moisture content on the same day that emulsion will be added. If rain has occurred after testing and before emulsion addition, re-check the moisture content. If the average moisture content is not within 1 percent of the mix design recommendation, then it shall be adjusted by moisture addition (water truck) or by aeration. If the moisture content has been manipulated, it shall be re-checked. The sample shall be to the depth of reclamation by any suitable method; make sure the sides of the sample hole are perpendicular to the road surface. Keep samples sealed until they are ready for testing. The moisture content shall be checked on at least each of three reclaimer passes on the first day of FDR / GBS. Moisture content sampling frequency shall be at the Engineer’s discretion after the first day.

**308.04.06 EMULSION CONTENT**

1. The amount of asphalt emulsion used shall be as recommended from the mix design. Any changes in asphalt emulsion content must be approved by the Engineer. The percentage of emulsion added shall be checked by determining the amount used by meter readings or truck weight tickets and by estimating the quantity of road reclaimed – depth, width, length, and estimated in-place density by Proctor density (mix design or field check) or nuclear density. On the first day of FDR / GBS, emulsion content shall be determined at a minimum on the first emulsion transport. Adjustments in equipment calibration shall be made if necessary. If adjustments are made, emulsion content shall be checked again. Thereafter, emulsion content shall be determined at a sampling frequency at the Engineer’s discretion.

**308.04.07 DEPTH CONTROL**

1. The reclaiming depth during all operations shall be monitored regularly to determine compliance with the plans. The depth shall be determined on each side of the reclaimer pass and shall be adjusted immediately as necessary.

**308.04.08 COMPACTION**

1. It is recommended that moisture and emulsion contents be checked and established before determination of reference density.
2. Refer to ASTM D 1557, Method C or equivalent for determination of the modified Proctor reference density; the 6 inch diameter mold is required. Sample for the Proctor density at the same location as the nuclear gauge reading. Obtain the samples to the depth of reclamation before rolling and store in a sealed container or sealable bag for no longer than one hour before Proctor compaction. Place the mold on a firm surface during compaction. Determine wet density and correct for the moisture content to determine dry density. Moisture contents on the material shall be obtained by microwave oven or equivalent procedure (Section 5.4). Use the mix design Proctor density, if needed, until field density values are determined.
3. After checking the nuclear density gauge on the standardizing block, prepare the test area for nuclear density testing by creating a surface free of loose material and deformations. Test the nuclear density, generally following ASTM D 2950 (direct transmission mode); this will measure a wet density. Make sure the depth of the hole is 2 inches greater than the reclamation depth. Measure the density at the same depth as the FDR depth. Correct to dry density by direct moisture measurement (microwave oven or equivalent – Section 5.4) of a sample from the nuclear gauge testing location. In-place material shall be compacted to a minimum of 97 percent reference density of the Modified Proctor reference density. Use the sand cone apparatus (ASTM D 1556) to check the nuclear density results, if necessary or at the discretion of the Engineer.
4. The number and frequency of density measurements should be determined by the Engineer. It is recommended that at a minimum, for Proctor and nuclear density testing, four locations be measured the first day, representing various locations. Thereafter, at a minimum, two to four nuclear density measurements should be obtained per day. It is permissible to use an average of the Proctor density values from the first day if materials and moisture contents do not change significantly.

**308.04.09 RECLAIMED BASE CONTOUR AND PROFILE**

1. The contour and profile and their methods and tolerances shall be as indicated on the plans or as required by the Engineer.

**308.04.10 MOISTURE CONTENT BEFORE OVERLAY**

1. Prior to placing the overlay or seal, moisture content shall be checked by microwave oven according to ASTM D 4643 or equivalent procedure. Other suitable methods are acceptable, such as direct heating. Minimum sample size recommended is 700 grams for the microwave procedure. If rain has occurred after testing and before the overlay, re-check the moisture content. The sample shall be taken to the depth of reclamation by any suitable method; make sure the sides of the sample hole are perpendicular to the road surface. Keep the samples sealed until they are ready for testing. Ensure that the average of three measurements per day of paving meet the requirements of Section 4.8 or the discretion of the Engineer.

**METHOD OF MEASUREMENT**

**308.05.01 MEASUREMENT**

The method of measurement for ASPHALT EMULSION AGGREGATE BASE STABILIZATION shall be the number of square yards.

The method of measurement for ASPHALT EMULSION FOR AGGREGATE BASE STABILIZATION shall be the number of tons of the quantity required to treat the base at the rate prescribed on the plans or directed by the Engineer.

**BASIS OF PAYMENT**

**308.06.01 PAYMENT**

The accepted quantity for ASPHALT EMULSION AGGREGATE BASE STABILIZATION, shall be paid for at the contract unit price bid per square yard, which price shall be full compensation for the labor, material and equipment required to construct the specified untreated base, hauling, mixing, spreading, compacting, trimming and curing the treated material as shown on the plans and as directed by the Engineer.

The accepted quantity for ASPHALT EMULSION FOR AGGREGATE BASE STABILIZATION, shall be paid for at the contract unit price bid per ton, which price shall be full compensation for the labor, material and equipment required to supply and incorporate the specified material at the rate prescribed on the plans, or directed by the Engineer.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 308.0010 | ASPHALT EMULSION AGGREGATE BASE STABILIZATION | SY |
| 308.0020 | ASPHALT EMULSION FOR AGGREGATE BASE STABILIZATION | TON |

END OF SECTION 308

SECTION 401 – PLANTMIX BITUMINOUS PAVEMENTS - GENERAL

**DESCRIPTION**

**401.01.01 GENERAL**

***Add the following to thIS SUBSECTION:***

C. Pursuant to NRS 338.0118 the City of Las Vegas Department of Public Works provides for the use of recycled bituminous pavement in public road construction projects. Substitution by the Contractor of recycled bituminous pavement for new bituminous pavement will follow the procedures in Sections 2.10 of the General Conditions and 105.03 of the Special Provisions and the following:

1. In order to encourage the use of recycled materials these substitutions will be considered to have demonstrable benefit to the City whether or not they result in a cost savings to the City or a reduction in Contract time
2. No substitutions will be considered unless submitted by the Contractor within 10 days of the Contract award date.
3. No additional Contract time or cost will be granted for these substitutions.

**MATERIALS**

**401.02.01 COMPOSITION OF MIXTURES**

***ADD The following To this subsection:***

Note to Spec Writer: ¾” mix is typical pavement for major roadways; however, consider specifying on plans to use a ½” mix for residential streets and parking lots.

O. All permanent Plantmix Bituminous surfaces shall be PG76-22CC asphalt.

**401.02.02 AGGREGATES**

***ADD The following To this subsection:***

B. Aggregate Type 3 shall be used for pavements less than 2 inches in total thickness.

C. Aggregate Type 2 shall be used for pavements 2 inches or greater in total thickness.

**METHOD OF MEASUREMENT**

**401.04.01 MEASUREMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The quantity of Plantmix Bituminous Surface will be measured in accordance with section 402 “Plantmix Bituminous Surface”.

**BASIS OF PAYMENT**

**401.05.01 PAYMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The accepted quantity of Plantmix Bituminous Surface will be paid for in accordance with section 402 “Plantmix Bituminous Surface”.

END OF SECTION 401

SECTION 402 – PLANTMIX BITUMINOUS SURFACE

**METHOD OF MEASUREMENT**

**402.04.01 MEASUREMENT**

***delete this subsection in its entirety and replace with the following:***

The quantity of (X-INCH) PLANTMIX BITUMINOUS SURFACE will be measured per square yard.

**BASIS OF PAYMENT**

**402.05.01 PAYMENT**

***DELETE PARAGRAPH ”A” OF THIS SUBSECTION AND REPLACE WITH THE FOLLOWING:***

The accepted quantity of (X-INCH) PLANTMIX BITUMINOUS SURFACE will be paid for at the contract unit price of square yard and shall include all materials, equipment and labor required including, but not limited to, asphalt cement; mixing; loading; hauling; placing; compacting; tack coat; prime coat and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 402.XXXX | (X-INCH) PLANTMIX BITUMINOUS SURFACE | SY |

END OF SECTION 402

SECTION 403 – PLANTMIX BITUMINOUS OPEN-GRADED SURFACE

**MATERIALS**

**403.02.02 COMPOSITION OF MIXTURE**

***Add the following to this subsection:***

K. The grade of asphalt to be used for Plantmix Bituminous Open-graded surface shall be PG-76 as specified in Subsection 703.03.02.

**METHOD OF MEASUREMENT**

**403.04.01 MEASUREMENT**

***Add the following to this subsection:***

The quantity of 3/4-INCH PLANTMIX BITUMINOUS OPEN-GRADED SURFACE will be measured per square yard.

**BASIS OF PAYMENT**

**403.05.01 PAYMENT**

***Add the following TO this subsection:***

The accepted quantity of 3/4-INCH PLANTMIX BITUMINOUS OPEN-GRADED SURFACE will be paid for at the contract unit price of square yard and shall include all materials, equipment and labor required including, but not limited to, asphalt cement; mixing; loading; hauling; placing; compacting and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 403.0030 | 3/4-INCH PLANTMIX BITUMINOUS OPEN-GRADED SURFACE | SY |

END OF SECTION 403

SECTION 405 – TACK COAT

**MATERIAL**

**405.02.01 BITUMINOUS MATERIAL**

***DELETE PARAGRAPH “A.1” AND REPLACE WITH THE FOLLOWING:***

1. 1. The grade may be changed by the Engineer during construction and no additional compensation will be allowed.

**CONSTRUCTION**

**405.03.02 WEATHER LIMITATIONS**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

B. Application of bituminous material shall be in accordance with subsection 401.03.05 "Weather Limitations".

**405.03.03 PREPARATION OF SURFACE**

***delete paragraph “a” of this subsection and replace with the following:***

A. The existing surface shall be patched and cleaned and be free of irregularities to provide a smooth and uniform surface to receive the treatment. The edges of existing pavements shall be sawcut to full depth, in a neat line and shall be cleaned prior to the application of a tack coat.

**405.03.04 APPLICATION OF ASPHALTIC EMULSION**

***DELETE PARAGRAPH “C.1” AND REPLACE WITH THE FOLLOWING:***

C. 1. Tack coat shall be applied to no greater area in any one day than is planned to be covered by plantmix during the same day.

**METHOD OF MEASUREMENT**

**405.04.01 MEASUREMENT**

***DELETE THIS SUBSECTION IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:***

No direct measurement shall be made for Tack Coat.

**BASIS OF PAYMENT**

**405.05.01 PAYMENT**

***DELETE PARAGRAPHS “A”, “B” AND “E” OF THIS SUBSECTION AND ADD THE FOLLOWING PARAGRAPH:***

Unless otherwise provided in the Special Provisions, no payment will be made for Tack Coat as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which Tack Coat is required.

END OF SECTION 405

SECTION 406 – PRIME COAT

**DESCRIPTION**

**406.01.01 GENERAL**

***Add the following to this subsection:***

B. Prime coat shall be applied to aggregate base courses when the thickness of the plantmix bituminous pavement is less than five inches (5"). Plantmix bituminous pavements five inches (5") and greater shall not require the application of a prime coat.

**MATERIAL**

**406.02.01 BITUMINOUS MATERIAL**

***Add the following to this subsection:***

C. The type and grade of bituminous material shall be SS-1h liquid asphalt emulsion.

**CONSTRUCTION**

**406.03.02 WEATHER LIMITATIONS**

***Add the following to this subsection:***

B. Application of bituminous material shall be in accordance with subsection 401.03.05 "Weather Limitations".

**METHOD OF MEASUREMENT**

**406.04.01 MEASUREMENT**

***DELETE THIS SUBSECTION IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:***

No direct measurement shall be made for Prime Coat.

**BASIS OF PAYMENT**

**406.05.01 PAYMENT**

***DELETE THIS SUBSECTION IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:***

When sand blotter is not included in the proposal and it is needed to protect the work or public traffic, sand blotter shall be considered subsidiary to other items of work and no additional compensation will be allowed.

The Contracting Agency reserves the right to increase or to omit all or any part of the estimated amount of blotter material or bituminous material to be used and no adjustment in unit price will be allowed by reason of such increase or decrease.

When an item for prime coat does not appear in the proposals, but is shown on the plans or Standard Drawings, prime coat will be considered as incidental to the subsequent paving and compensation shall be included in the contract prices for other items of work.

Unless otherwise provided in the Special Provisions, no payment will be made for Prime Coat as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which Prime Coat is required. Also included as incidental: furnishing the material, mixing, loading, hauling, placing, and incidentals necessary for doing all of the work involved in placing prime coat and sand blotter as shown on the plans or established by the Engineer.

END OF SECTION 406

SECTION 407 – SEAL COAT

NOTE TO SPEC WRITER: please note that seal coat is primarily used for parking lots and trails.

**METHOD OF MEASUREMENT**

**407.04.01 MEASUREMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

No direct measurement shall be made for Seal Coat.

**METHOD OF PAYMENT**

**407.05.01 PAYMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

Unless otherwise provided in the Special Provisions, no payment will be made for Seal Coat as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which Seal Coat is required.

END OF SECTION 407

SECTION 409 – PORTLAND CEMENT CONCRETE PAVEMENT

**MATERIALS**

**409.02.03 CONCRETE PROPERTIES AND TESTS**

***DELETE PARAGRAPH “A” AND REPLACE WITH THE FOLLOWING:***

A. The Portland cement concrete pavement shall have a minimum flexural strength of 600 psi at 28 days when tested in accordance with ASTM C-78.

**CONSTRUCTION**

**409.03.01 CLASSIFICATION AND PROPORTIONS**

***ADD THE FOLLOWING PARAGRAPH TO THIS SUBSECTION:***

C. The Portland cement concrete shall be proportioned to meet the requirements of subsection 701.01.01 for 1.0 to 1.5 percent soluble sulfates in subgrade soils.

**409.03.11 PROTECTION OF PAVEMENT**

***DELETE PARAGRAPH “F” OF THIS SUBSECTION AND REPLACE WITH THE FOLLOWING:***

F. No traffic or Contractor's equipment, except for sawcutting equipment or subgrading equipment, will be permitted on the pavement before the concrete has developed a modulus of rupture of at least 550 psi, as determined by ASTM C 78.

**METHOD OF MEASUREMENT**

**409.04.01 MEASUREMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The quantity of PORTLAND CEMENT CONCRETE PAVEMENT (INCHES), will be measured per square yard.

No direct measurement shall be made for performed joint filler, joint sealer, tie bars, dowel bars, and saw cuts.

**BASIS OF PAYMENT**

**409.05.01 PAYMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The accepted quantity of PORTLAND CEMENT CONCRETE PAVEMENT (INCHES), will be paid for at the contract unit price of square yard and shall include all materials, equipment and labor required including, but not limited to, Portland cement; water; mixing; hauling; placing; finishing; forming; sawcutting; joint filler; joint sealer; tie bars; curing materials; tools and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 409.XXXX | PORTLAND CEMENT CONCRETE PAVEMENT (INCHES) | SY |

END OF SECTION 409

***ADD THE FOLLOWING SECTION TO DIVISION II – CONSTRUCTION DETAILS***

SECTION 410 – CRACK SEALANT

**DESCRIPTION**

**410.01.01 GENERAL**

A. This work shall consist of the application of rubber-asphalt crack sealant to an existing bituminous surface.

**MATERIAL**

**410.02.01 RUBBER-ASPHALT CRACK SEALANT**

A. The bituminous material shall meet the applicable requirements of Section 703, “Bituminous Material”. The sealant is to be a hot-melt, rubber-asphalt crack sealant formulated to be a stiff, non-tracking, flexible, sealant. The sealant is to be a thin, free flowing fluid which easily penetrates fine cracks and self-levels at application temperatures. The sealant shall be melted and applied to pavement using a pressure feed applicator units.

**410.02.02 HERBICIDE**

A. Pramitol 25E herbicide (distributed by Universal Cooperatives, Inc. Minneapolis, MN 55440) or an equal product approved by the Engineer, shall be applied to all cracks containing vegetation. The approved herbicide shall have an added color dye. The Contractor shall be responsible for all training or licensing of personnel related to the application of this product.

**CONSTRUCTION**

**410.03.01 EQUIPMENT**

A. Sealant placement equipment shall use circulation hot oil heat transfer for heating the product. No direct heat transfer units may be used. Maximum product tack capacity of sealant placement equipment shall not exceed 500 gallons unless approved by the Engineer. Squeegee equipment shall consist of an interchangeable dense rubber strike-off blade to assist with a flush surface application.

**410.03.02 WEATHER**

A. Sealant material shall not be placed at air temperature below 40 degree F or above 100 degrees F. Application of crack sealant will not be permitted when the surface to be treated is damp or wet, when weather conditions are unsuitable, or when the surface temperature is below 40 degrees F.

**410.03.03 PREPARATION OF SURFACE**

1. The work shall consist of applying an acceptable herbicide to all cracks containing vegetation at least two weeks prior to cleaning and sealing the cracks.
2. All cracks ¼-inch or greater in width shall be cleaned to the bottom of the crack or 1-1/2 inches, whichever is less. All vegetation, loose particles, dust, moisture, and other deleterious substance in cracks shall be removed by the use of compressed air immediately prior to applying the crack sealing material. When compressed air will not adequately remove vegetation and other deleterious substances, routing power brush, heat lance or other means approved by the Engineer, shall be used. At the direction of the Engineer pavement cracks containing excessive amounts of dust and debris shall be cleaned by the vacuum method. Hot air blasters may be used to dry the surface.

**410.03.04 APPLICATION OF CRACK SEALANT**

1. Sealing shall be done only after inspection and approval of prepared surface by the Engineer. Sealant manufacturer’s instructions on application temperature shall be observed. Material that has been overheated in excess of 30 degrees F above the manufacturer’s recommended maximum temperature for one hour, or 60 degrees F for one-half hour shall be wasted at the Contractor’s expense. Material below the manufacturer’s recommended minimum application temperature shall not be used.
2. A log of product tank temperatures shall be kept on one hour, ±10 minute intervals, and kept available for inspection by the Engineer. The operator shall have available at all times an operating ASTM-11-F thermometer with an intact mercury column or a certified, calibrated digital pyrometer, electronic thermometer, or equivalent direct reading temperature measurement device capable of reading within ±5 degrees F from 200 degrees F to 600 degrees F. Uncalibrated tank mounted temperature gauge readings are not acceptable.
3. Cracks shall be filled flush or may be overfilled and squeegeed. The squeegeed material shall be centered on the cracks and shall not exceed 3 inches in width and be flush with the surface of the existing pavement. Pavement cracks to be sealed on arterial roadways with a right-of-way width greater than 60 feet shall be filled flush or slightly under filled, no surface banding is allowed. All cracks ¼-inch to ¾-inch in width shall be filled. Cracks exceeding ¾-inches in width shall not be sealed.
4. Sealant material placed at asphalt/concrete joints shall not lap more than 1-inch into the concrete surface and be placed in a straight, uniform line.

**410.03.05 MAINTENANCE**

1. Sealant material picked up or pulled out by traffic or construction equipment will be replaced at the Contractor’s expense.

**410.03.06 ASPHALT OVERLAY**

1. Crack filling shall be completed a minimum of seventy-two hours prior to application of a slurry seal or asphalt overlay.

**410.03.07 MATERIAL INVENTORY CONTROL**

1. Prior to commencement of work, the Contractor will coordinate with the Engineer to establish a suitable method of inventory control. All materials shall be stored at the Contractor’s yard in a secure location. Materials will be inventoried by the Engineer in the presence of the Contractor. All subsequent removals by the Contractor will be made only in the presence of the Engineer.
2. No crack sealing material will be used in the work or considered for payment unless it is first delivered to and subsequently released from said storage yard inventory. Shipping invoices with gross and net weight shall be furnished to the Engineer for each shipment received.

**METHOD OF MEASUREMENT**

**410.04.01 MEASUREMENT**

No direct measurement shall be made for Crack Sealant.

**BASIS OF PAYMENT**

**410.05.01 PAYMENT**

Unless otherwise provided in the Special Provisions, no payment will be made for Crack Sealant as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which Crack Sealant is required.

END OF SECTION 410

SECTION 412 – PAVEMENT SURFACE TREATMENTS – SLURRY SEAL/MICRO-SURFACING

**CONSTRUCTION**

**412.03.01 SLURRY SEAL/MICROSURFACING MIXTURES**

***delete PARAGRAPH “G.4” and replace with the following:***

* + - 1. The aggregate manufacturer shall produce and stockpile each specified gradation of aggregate in 1,200‑ton lots. The first lot of material shall be sampled and tested by the Engineer.

***delete PARAGRAPH “G.6” and replace with the following:***

* + - 1. Each successive lot of 1,200 tons shall be sampled and tested once.
         1. When the “job target gradation” has been tested and accepted, the Contractor shall continuously manufacture the aggregate until the total estimated quantity is produced, tested, and accepted.
         2. The Contractor shall not receive compensation for unused aggregate.
         3. The approved lots of aggregate shall be stockpiled in a secured area, protected from contamination, and reserved for use on this contract.

**412.03.02 PREPARATION OF SURFACE**

***delete PARAGRAPH “C.3” and replace with the following:***

* + - 1. All surface debris from the crack cleaning process shall be thoroughly cleaned prior to placement of slurry seal.

***delete PARAGRAPH “D.2.b” and replace with the following:***

* + - * 1. The mandrel shall be studded with a minimum of 128 cutter bits to provide a pavement texture acceptable to the Engineer.

**412.03.03 MIXING UNIT**

***delete PARAGRAPH “C.4” and replace with the following:***

* + - 1. Equipped with a hydraulically controlled steel pugmill gate for positive discharge operations. Discharge from the pugmill shall be controlled by a metal diverter chute or other suitable mechanical device.

***ADD the following TO PARAGRAPH“D” of this subsection:***

* + - 1. Calibrations will not be accepted if City staff is not present to observe the calibrations.

**412.03.06 APPLICATION**

***delete PARAGRAPH “C” and replace with the following:***

C. The slurry seal shall be placed in accordance with the following:

|  |  |
| --- | --- |
| **Aggregate** | **Application Rate**  **(pounds per square yard)** |
| Type I | 10-12 |
| Type II | 13-20 |
| Type III | 19-30 |

***delete PARAGRAPH “e.2” and replace with the following:***

* + - 1. A report indicating the percentage of emulsion used to dry aggregate used and the application rate in pounds of aggregate applied per square yard of area covered. This report will verify compliance with the mixture of materials to the mix design and the specified aggregate application rate.

***ADD THE FOLLOWING TO PARAGRAPH “F” TO THIS SUBSECTION:***

* + - 1. The emulsion supplier shall attach a tag on the tanker lid and another on the valve.
      2. The Contractor shall remove the tags under the supervision of the Engineer unless otherwise directed.
      3. The Contractor shall attach the tags to the bill of lading and submitted to the Engineer.
      4. If the tags have been tampered with or removed or the delivery tags numbers do not match the bill of lading, the shipment will be rejected

***ADD THE FOLLOWING PARAGRAPHS TO THIS SUBSECTION:***

I. Application rates adjusted for tight or rough pavement surface textures may be applied outside of the specified ranges for each type of gradation, with prior authorization from the Engineer.

J. The ranges specified are estimated to be representative of the City of Las Vegas roadway network.

**412.03.08 PRODUCTION**

***delete SUBSECTION IN ITS ENTIRETY AND REPLACE WITH following:***

A. The Contractor’s average daily production shall be between 25,000 and 40,000 square yards of material, in place, each working day for work performed within the public right-of-way.

B. At the direction of the Engineer, parking lot applications, heavy application rates, and areas not feasible to close entirely are excluded from the required production rate.

C. The maximum daily production, without prior authorization from the Engineer, shall be 40,000 square yards.

D. Any deviation from the required average production rate shall be authorized by the Engineer prior to commencement of the work and by reflected on a revised progress schedule.

**412.03.11 CURING**

***delete PARAGRAPH “D” and replace with the following:***

D. Areas that are damaged within 15 days of application of slurry or prior to moving to new work locations and the completion of the punch list items shall be repaired by the Contractor at his expense.

**412.03.16 STORAGE OF EQUIPMENT AND MATERIALS**

***ADD THE FOLLOWING PARAGRAPHS TO THIS SUBSECTION:***

C. On-site emulsion storage tanks shall be empty and cleaned of all residual asphalt prior to delivery of the first load of approved emulsion.

**412.03.17 CLEANUP**

***ADD THE FOLLOWING PARAGRAPHS TO THIS SUBSECTION:***

C. Excessive raveling, as determined by the Engineer, shall be swept by the Contractor at no additional cost to the City.

**METHOD OF MEASUREMENT**

**412.04.01 MEASUREMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The quantity of SLURRY SEAL will be measured per square yard.

No direct measurement shall be made for Surface Preparation.

No direct measurement shall be made for Ravel Sweeping.

**BASIS OF PAYMENT**

**412.05.01 PAYMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The accepted quantity of SLURRY SEAL will be paid for at the contract unit price of square yard and shall conform to the requirements of subsection 412.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor, and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include: developing the mix design; furnishing the material; mixing; hauling; loading; placing; rolling; surface preparation; crack cleaning; ravel sweeping; surface grinding; test sections; protection of existing facilities; cleanup; and all other items necessary to complete the work as shown on the Plans, as specified herein, and as directed by the Engineer. The work shall include sealing of cracks in pavement prior to applying the slurry mix.

All striping and marking within limits of area to be slurry sealed shall be removed prior to sealing. Removal of existing striping and marking within areas to be crack and slurry sealed shall be incidental to the cost of slurry seal work and shall be full compensation for all labor, materials, equipment, and services necessary to remove the existing markings by means of sandblasting.

The accepted quantity of cleaning of motor oil deposits from pavement shall be incidental to the slurry seal work and shall be full compensation for all labor, material, equipment, and services necessary to clean by heat lance or other means approved by the Engineer, motor oil deposits from the surface of the Asphalt prior to the placement of the Crack and Slurry Seal. It shall be the contractors responsibility to insure that the surface is suitable for the proper adhesion of Slurry Seal when complete.

Unless otherwise provided in the Special Provisions, no payment will be made for Surface Preparation as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which Surface Preparation is required.

Unless otherwise provided in the Special Provisions, no payment will be made for Ravel Sweeping as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which Ravel Sweeping is required.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 412.0000 | SLURRY SEAL | SY |

END OF SECTION 412

SECTION 413 – PLANTMIX BITUMINOUS GAP-GRADED SURFACE (UTACS)

**METHOD OF MEASUREMENT**

**413.04.01 MEASUREMENT**

***DELETE THIS SUBSECTION IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:***

The quantity of UTACS BONDED WITH A PMM, S3 GRADATION (1-INCH) will be measured per square yard.

**BASIS OF PAYMENT**

**413.05.01 PAYMENT**

***Add the following TO this subsection:***

The accepted quantity of UTACS BONDED WITH A PMM, S3 GRADATION (1-INCH) will be paid for at the contract unit price of square yard and shall conform to the requirements of subsection 413.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment includes demobilization or mobilization required to comply with application weather requirements of Subsection 413.03.06.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 413.0120 | UTACS BONDED WITH A PMM, S3 GRADATION (1-INCH) | SY |

END OF SECTION 413

SECTION 501 – PORTLAND CEMENT CONCRETE

**DESCRIPTION**

**501.01.01 GENERAL**

***Add the following to this subsection:***

C. All cement used on the work shall be standard brand Portland cement conforming to the "Specifications for Portland Cement" (ASTM C150), Type V, in accordance with requirements contained in Section 701 of the USS.

**MATERIALS**

**501.02.03 ADMIXTURES**

***ADD The following to this subsection:***

Q. The use of calcium chloride shall not be permitted.

**CONSTRUCTION**

**501.03.04 CLASSIFICATION AND PROPORTIONS**

***ADD The following PARAGRAPH to this subsection:***

F. Concrete shall be composed of cement, admixtures (when approved), aggregates and water. These materials shall be as specified. The exact proportions in which these materials are to be used for different parts of the work shall be determined by the Contractor and submitted to the Engineer for review prior to use in the work. In general, the mix shall be so designed as to produce concrete capable of being deposited so as to obtain maximum density and minimum shrinkage and, where deposited in forms, to have maximum smoothness of surface. Mix designs where sand represents more than 41 percent of the total weight of fine and coarse aggregate shall not be permitted. The proportions shall be changed whenever necessary or desirable in the opinion of the Engineer. Concrete mixes shall be designed by a Registered Professional Engineer in the State of Nevada representing a qualified independent testing laboratory and approved in advance by the Engineer. Concrete mixing operations shall conform to ASTM C 94. Water shall not be added to concrete after leaving the batch plant unless specifically authorized by the Engineer.

**501.03.10 WEATHER LIMITATIONS**

***ADD THE FOLLOWING PARAGRAPH TO “PART A: GENERAL” OF THIS SUBSECTION:***

4. All exposed concrete surfaces shall be sprayed liberally with an evaporation retarder when the ambient air temperature is greater than 100 degrees F.; or when the ambient air temperature is above 90 degrees F. and the wind speed is above 20 mph; or as directed by the Engineer. Evaporation retarders shall be per the Qualified Products List established by the Nevada Department of Transportation. Spraying shall be per manufacturer’s recommendation and shall occur immediately upon completion of the finish.

***ADD THE FOLLOWING PARAGRAPH TO “PART B: COLD WEATHER – GENERAL” OF THIS SUBSECTION:***

7. Concrete shall not be placed on frozen ground, nor shall it be placed when atmospheric temperature is below 40 F. and within 24 hours of the time that the concrete is to be placed, except with the written permission of the Engineer and only after such precautionary measures for the protection of the concrete have been taken as the Engineer may direct.

***ADD THE FOLLOWING PARAGRAPH TO “PART D: HOT WEATHER” OF THIS SUBSECTION:***

9. When the temperature is 90 F. or above, or is likely to rise above 90 F. within the 24-hour period after concrete placement; or when there is any combination of high air temperature, low relative humidity and wind velocity which would impair concrete strength or quality, follow the recommendations of ACI 305R and the following:

1. Keep concrete as cool as possible during placement and curing
2. Do not allow concrete temperature to exceed 90° F. at placement.
3. Prevent plastic shrinkage cracking due to rapid evaporation of moisture.
4. Dampen subgrade and forms with cool water immediately prior to placement of concrete.

Protect the concrete with temporary wet covering during any appreciable delay between placement and finishing.

1. Take appropriate precautions per ACI 305R when the actual or anticipated evaporation rate equals or exceeds 0.2 pounds per square foot per hour as determined from ACI 305R, Figure 2.1.4.

***Add the following subsections TO this SECTION:***

**501.03.70 CORROSION PROTECTION REQUIREMENT**

A. Pipe, conduit, dowels and other ferrous items required to be embedded in concrete construction shall be so positioned and supported prior to placement of concrete that there shall be a minimum of two inches clearance between said items and any part of the concrete reinforcement. Securing such items in position by wiring or welding them to the reinforcement shall not be permitted.

**501.03.71 PREPARATION OF SURFACES FOR CONCRETING**

A. Native material surfaces shall be thoroughly wetted by sprinkling, prior to the placing of any concrete, and these surfaces shall be kept moist by frequent sprinkling up to the time of placing concrete thereon. The surface shall be free from standing water, mud and debris at the time of placing concrete.

B. Concrete surfaces upon or against which concrete is to be placed, where the placement of the old concrete has been stopped or interrupted so that, in the opinion of the Engineer, the new concrete cannot be incorporated integrally with that previously placed, are defined as construction joints. The surfaces of horizontal joints shall be leveled with a wooded float to provide a reasonably smooth surface. A surface consisting largely of coarse aggregate shall be avoided. The joint surfaces shall be cleaned of all laitance, loose or defective concrete, and foreign material.

C. No concrete shall be placed until all form work, installation of parts to be embedded, and preparation of surfaces involved in the placing have been approved by the Engineer.

**501.03.72 EXCLUSION OF WATER**

A. No concrete shall be placed in any structure until all water entering the space to be filled with concrete has been properly cut off or has been diverted by pipes, or other means, and carried out of the forms, clear of the work. No concrete shall be deposited under water without the explicit permission of the Engineer and then only in strict accordance with the Engineer’s directions, nor shall the Contractor, without explicit permission from the Engineer, allow still water to rise on any concrete until the concrete has attained its initial set. Water shall not be permitted to flow over the surface of any concrete in such manner and at such velocity as to injure the surface finish of the concrete. Pumping or other necessary dewatering operations for removing groundwater, if required, shall be subject to the approval of the Engineer and shall be the responsibility of the Contractor. Said items shall be considered incidental to construction and no additional compensation shall be made.

**501.03.73 TAMPING AND VIBRATING**

A. As concrete is placed in the forms or in excavations, it shall be thoroughly settled and compacted, throughout the entire depth of the layer which is being consolidated, into a dense, homogenous mass, filling all corners and angles, thoroughly embedding the reinforcement, eliminating rock pockets, and bringing only a slight excess of water to the exposed surface of concrete during placement.

**501.03.74 CARE AND REPAIR OF CONCRETE**

B. The Contractor shall protect all concrete against injury or damage from excessive heat, lack of moisture, overstress, or any other cause until final acceptance by the Owner. Particular care shall be taken to prevent the drying of concrete and to avoid roughening or otherwise damaging the surface. Any concrete found to be damaged, or which becomes defective at any time prior to the final acceptance of the completed work, or which departs from the established line or grade, or which for any other reason does not conform to the specifications, shall be removed and replaced at the Contractor's expense.

END OF SECTION 501

SECTION 502 – CONCRETE STRUCTURES

**DESCRIPTION**

NOTE TO SPEC WRITER: RCB projects should include consideration of limiting the project to pre-cast only based on project schedule limitations, traffic control considerations, trench width constraints resulting from existing utilities and pavement restoration costs. If a decision to exclude cast-in-place RCBs is made, it is strongly suggested that a memo to file and the to the funding agency be drafted documenting that the above considerations reasonably appear to outweigh possible economic benefits from including cast-in-place as an option.

**502.01.01 GENERAL**

***ADD The following to this subsection:***

D. This work shall also include construction of headwalls, wingwalls, connection and transition/splitter structures, and pre-cast concrete box culverts. This shall include the construction of temporary head walls necessary to support the travel lanes and/or work adjacent to the excavation for the reinforced concrete box culvert and roadway.

E. Pre-cast reinforced concrete box culvert sections shall conform to Section 509 of the Uniform Standard Specifications.

F. The precast units scheduled for attachment to cast-in-place improvements shall be furnished with exposed No. 4 reinforcement steel on 12-inch spacings. The No. 4 reinforcement steel shall be cast a minimum of 18 inches into the pre-cast section and extended 18 inches into the cast-in-place improvements.

G. Reinforcing bars crossing construction joints shall be epoxy coated.

NOTE TO SPEC WRITER: Include H below only if you are specifying Pre-Cast RCB on your project

1. All reinforced box culverts shown on the plans between Sta. XXX to Sta. XXX shall be precast.

**CONSTRUCTION**

**502.03.09 CONCRETE DEPOSITED UNDER WATER**

***ADD The following to this subsection:***

G. It groundwater is encountered on this project, the Contractor will dewater the excavated area and subbase for the concrete structures improvements in such a manner that the concrete will not be placed in any standing water.

***ADD The following subsections TO this SECTION:***

**502.03.70 TEMPORARY HEAD WALL**

A. The Contractor may utilize the temporary head walls for support of the required travel lane(s) and/or work areas adjacent to open excavation. If the Contractor chooses to utilize temporary head walls, the Contractor shall provide theEngineerwith design plans and calculations for such head walls and/or supports. The design plans shall be in detail, showing all information as required by the Engineer, and shall bear the seal of a Nevada Registered Engineer.

**502.03.71 INSPECTION**

NOTE TO SPEC WRITER: Make sure video inspection is incidental to the RCB.

Note to Spec Writer – Section 693 is to be used on all projects with new sewer and storm drain pipelines and structures, rehabilitated manholes, and rehabilitated sewer lines.

A. All RCB joints and lengths shall be 100 percent inspected. Inspection and Testing shall be performed by the Contractor during and after installation to ensure proper performance. Installation of bedding and backfill materials, as well as their placement and compaction, shall adhere to the requirements of this and other applicable sections. Errors in line and grade, as well as any improper assembly or backfill techniques, shall be corrected prior to placing significant backfill or trench fill. Joints shall be installed per manufacturer’s recommendations to prevent the infiltration of soil fines. Shallow cover installations shall be checked to ensure the minimum cover level is provided.

B. Internal Video Inspection. Internal video inspection shall be performed by the Contractor a minimum of 30 days after final backfill has been placed and prior to final acceptance by the Contracting Agency. The line shall be cleaned and inspected per Section 693 “Internal Inspection of Sewer and Storm Drain Facilities” in these Special Provisions. Cracks in RCBs that are less than 0.10 inch in width are generally considered non-structural flaws and need not be repaired. Cracks that are equal to or exceed 0.10 inch in width shall require an evaluation by a Nevada licensed Professional Engineer provided by the Contractor. The Contractor’s Engineer shall provide a recommendation regarding removal or repair subject to approval by the Contracting Agency. RCB joints and length that do not meet the specification shall be repaired or RCB replaced at the Contractor’s expense. All inspection results shall be submitted and approved by the Contracting Agency before final payment. Any replacement RCB shall also be subject to the same testing. All inspection and testing results shall be submitted to the Engineer for approval.

**METHOD OF MEASUREMENT**

**502.04.01 MEASUREMENT**

***ADD The following to this subsection:***

The quantity of SIZE Reinforced Concrete Box will be measured per linear foot along the centerline of the box.

The quantity of [FILL IN ITEM DESCRIPTION] will be measured per [UNIT].

No direct measurement shall be made for [FILL IN ITEM DESCRIPTION].

**BASIS OF PAYMENT**

**502.05.01 PAYMENT**

***ADD The following to this subsection:***

The accepted quantity of SIZE Reinforced Concrete Box will be paid for at the contract unit price of linear foot and shall include all materials, equipment and labor required including, but not limited to, removal of patches (temporary and permanent); temporary patches; permanent patches; all excavation; over-excavation and backfill; trench excavation; compaction and recompaction; dewatering; disposing of excess material; grading; scarification; shaping; shoring; subgrade preparation; bedding; drain backfill; drain rock; granular backfill; selected backfill; structural fill; trench backfill (granular, select or Controlled Low-Strength Material); Type II Aggregate Base; access ladders; backer rod; bolted/slotted lid with reinforced manhole collar; bolts; cast-in-place connections and/or transitions; concrete collars; concrete; contraction joints; curing compound; cutoff walls; dowels; epoxy dowels; epoxy; expansion joints; forming and curing concrete; gaskets; grout; joint filler; joint sealant; joint water proofing; manhole mounting; mortar; ready-mix flowable fill; reinforcing steel; removal of temporary steel piles; temporary closure wall (if applicable); temporary head walls; tools; potholing to determine the location of existing utilities; protection and restoration, if damaged, of all existing facilities and improvements required to remain in place including survey monuments, landscaping and irrigation systems, except where provided for elsewhere in these Special Provisions; support and protection of all utilities; delivery; handling; installation; placement; tie-in to existing concrete structures; tie-in to existing reinforced concrete box; internal video inspection; and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall conform to the requirements of subsection 502.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include,

Unless otherwise provided in the Special Provisions, no payment will be made for [FILL IN ITEM DESCRIPTION] as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which [FILL IN ITEM DESCRIPTION] is required.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 502.XXXX | SIZE REINFORCED CONCRETE BOX | LF |
| 502.XXXX | [CONCRETE STRUCTURE] | [UNIT] |

END OF SECTION 502

SECTION 505 – REINFORCING STEEL

**MATERIALS**

**505.02.01 GENERAL**

***add The following to this subsection:***

F. At selected locations as indicated on the Contract Drawings, reinforcing steel shall be galvanized (zinc coated), in accordance with ASTM A767 or epoxy-coated.

G. At the expansion joint locations shown on the Contract Drawings or as directed by the Engineer, reinforcing steel shall be sprayed, coating the entire circumference of the bar, with a zinc-rich formulation conforming to ASTM A767.

**METHOD OF MEASUREMENT**

**505.04.01 MEASUREMENT**

***delete this subsection in its entirety and replace with the following:***

No direct measurement shall be made for Reinforcing Steel.

**BASIS OF PAYMENT**

**505.05.01 PAYMENT**

***delete this subsection in its entirety and replace with the following:***

Unless otherwise provided in the Special Provisions, no payment will be made for Reinforcing Steel as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which such Reinforcing Steel is required.

END OF SECTION 505

***ADD THE FOLLOWING SECTION TO DIVISION II – CONSTRUCTION DETAILS***

SECTION 570 – CONCRETE MASONRY UNIT WALLS

**DESCRIPTION**

**570.01.01 GENERAL**

A. This work shall consist of constructing concrete masonry unit (CMU) walls, retaining walls and footings, complete and in place, at locations as shown in the plans and as required in the specifications, in conformity with the lines, grades, dimensions and locations as shown in the plans and as determined by the Engineer.

**MATERIALS**

**570.02.01 CONCRETE MASONRY UNITS**

A. Hollow load bearing units shall conform to ASTM C90 with F’m=1500 psi, and be tested in accordance with ASTM C140. Concrete masonry units for non-earth retaining block wall shall be light-weight units of 105 or more pounds per cubic foot. Concrete masonry units for earth retaining block wall shall be normal weight units of 125 or more pounds per cubic foot.

B. Concrete masonry units used to extend or repair existing block walls or retaining walls shall be of identical color, size, and configuration to match the existing wall material.

**570.02.02 MORTAR**

A. Mortar shall be Type M-2500 psi and shall conform to ASTM C270. Type M mortar shall have proportions of 1 part Portland cement, 1/4 part hydrated lime, and 3‑1/2 parts sand by volume.

B. Mortar shall be freshly prepared, uniformly mixed, and be of spreadable, workable consistency.

C. Mortar shall be retempered with water as required to maintain high plasticity. Retempering on mortar boards shall be done only by adding water within a basin formed with the mortar and the mortar worked into the water. Any mortar which is unused after 1‑1/2 hours from the initial mixing time shall not be used.

D. After all ingredients are in the batch mixer, they shall be mechanically mixed for not less than 3 minutes.

E. The use of fire clay, rock dust, dirt, and other deleterious materials is prohibited in mortar.

F. Sand mortar shall conform to ASTM C144.

**570.02.03 GROUT**

A. Grout shall conform to ASTM C476 and shall have a minimum strength of 2,000 psi.

B. Fine grout shall be proportional by volume of 1 part Portland cement and 2‑1/4 to 3 parts sand. Coarse grout shall be proportioned by volume and shall consist of 1 part Portland cement, 2‑1/4 to 3 parts sand, and 1 to 2 parts coarse aggregate.

C. Laboratory design mixes are acceptable in lieu of the above proportions and are required if the minimum strength is more than 2,000 psi. Grout shall be of fluid consistency with proper proportions of sand to gravel for pouring and pumping.

D. Aggregate for masonry grout shall conform to ASTM C404.

**570.02.04 LIME**

A. Hydrated lime shall conform to ASTM C207. Quick lime shall conform to ASTM C5.

**570.02.05 AGGREGATE**

A. All aggregate for mortar and grout shall be sharp, clean, well graded, and free of injurious amounts of dust, lumps, shale, alkali, surface coatings, and organic matter.

**570.02.06 ADMIXTURES**

A. The use of admixtures shall not be permitted in mortar or grout unless approved by Engineer.

**570.02.07 WATER**

A. Water shall be free of deleterious quantities of acids, alkalis, and organic materials and shall come from domestic supply.

**CONSTRUCTION**

**570.03.01 CONCRETE MASONRY WORKMANSHIP**

A. In general, masonry construction shall conform to Section 2104 of the International Building Code. Masonry shall not be started when the horizontal and vertical alignment of the foundation is out of plumb or line 1-inch or more.

B. Care shall be taken to prevent grout and mortar stains. Keep wall continually clean; if grout does run over, clean immediately.

C. All masonry shall be laid true, level, and plumb in accordance with the drawings.

D. The masonry units shall be cut accurately to accommodate utilities, and all holes are to be neatly patched.

E. No construction support shall be attached to the wall except where specifically permitted by the Engineer.

F. The top surface of the concrete foundation shall be clean and the aggregate exposed before starting masonry construction.

G. Where no bond pattern is shown, the wall shall be laid up in straight, uniform courses with regular half or running bond. All work, bond patterns, or special details as shown on the Drawings shall be accurately and uniformly executed.

**570.03.02 CONCRETE MASONRY UNITS**

A. All masonry units shall be sound and free of cracks or other defects that would interfere with the proper placing of the unit or impair the strength of construction. Minor cracks incidental to the usual method of manufacture, or minor chipping resulting from customary methods of handling, shipping, and delivery shall not be deemed grounds for rejection.

B. All masonry units shall be stored on the job-site so that they are kept off the ground and protected from the elements. Wetting of units shall not be permitted.

C. Where masonry unit cutting is necessary, all cuts shall be neat and true.

**570.03.03 CONCRETE MASONRY JOINTS**

A. The starting joint on foundations shall be laid with full mortar coverage on the bed joints except that the area where the grout occurs shall be free from mortar so that the grout will be in contact with the foundation.

B. Mortar joints shall be straight, clean, and uniform in thickness.

C. Unless otherwise specified, all joints shall be tooled with a concave surface. Tooling shall be done when the mortar is partially set and still sufficiently plastic to bond. All tooling shall be done with a tool that compacts the mortar.

**570.03.04 CONCRETE MASONRY REINFORCING**

A. Provide and install reinforcing steel in accordance with Section 505.

B. Reinforcing bars shall be straight except for bends around corners and where bonds or hooks are detailed on the Drawings.

C. Horizontal reinforcing shall be laid on the webs of bond beam units and shall be solidly grouted in place. Reinforcing in channel units shall be spaced off the bottom of the unit.

D. Vertical reinforcing shall have a minimum clearance of 1/4 inch from the masonry.

**570.03.05 CONCRETE MASONRY GROUTING**

A. Reinforcement shall be in place before grouting starts. Mortar droppings shall be kept out of grout spaces. All grout shall be puddled or vibrated in place. Vertical cells to be filled shall have vertical alignment to maintain a continuous unobstructed cell area not less than 2 inches by 3 inches. Cells containing reinforcement shall be solidly filled with grout, and pours shall be stopped 1 inch below the top of a course to form a key or joints. Maximum height of grout pour shall be 6 feet.

**570.03.06 SURFACES FINISHES**

A. Provide concrete masonry unit walls with surface finishes that will match the color and texture of the existing adjacent walls. Prior to construction, the Contractor shall submit samples of materials to be used for approval by the City. Allow 10 working days for approval.

**570.03.07 TEMPORARY FENCING REMOVAL**

A. Temporary fencing, as required in Section 202 in association with block wall removal to maintain the integrity of fencing around private property until construction of replacement block walls, shall be removed and disposed of by Contractor when the new walls are provided as specified in this Section.

**METHOD OF MEASUREMENT**

**570.04.01 MEASUREMENT**

The quantity of CMU Wall (XX-Feet High) will be measured per linear foot, along the face of the wall.

The quantity of CMU Retaining Wall (XX-Feet High) will be measured per linear foot, along the face of the wall.

The quantity of [FILL IN ITEM DESCRIPTION] will be measured per [UNIT].

No direct measurement shall be made for [FILL IN ITEM DESCRIPTION].

**BASIS OF PAYMENT**

**570.04.01 PAYMENT**

The accepted quantity of CMU Wall (XX-Feet High)will be paid for at the contract unit price of linear foot and shall include all materials, equipment and labor required including, but not limited to, excavation; shoring; grading; shaping; dewatering; aggregate base materials; granular backfill; drain rock; drain tile; compaction; block; concrete; footings; replacement finishes to match adjacent wall; mortar; grout; reinforcing steel; dowels; water proofing; temporary fencing and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of CMU Retaining Wall (XX-Feet High) will be paid for at the contract unit price of linear foot and shall include all materials, equipment and labor required including, but not limited to, excavation; shoring; grading; shaping; dewatering; aggregate base materials; granular backfill; drain rock; drain tile; compaction; block; concrete; footings; replacement finishes to match adjacent wall; mortar; grout; reinforcing steel; dowels; water proofing; temporary fencing and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

Unless otherwise provided in the Special Provisions, no payment will be made for [FILL IN ITEM DESCRIPTION] as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which [FILL IN ITEM DESCRIPTION] is required.

All payments will be made in accordance with Subsection 109.02, “Scope of Payment”.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 570.XXXX | CMU WALL (XX-FEET HIGH) | LF |
| 570.XXXX | CMU RETAINING WALL (XX-FEET HIGH) | LF |

END OF SECTION 570

***ADD THE FOLLOWING SECTION TO DIVISION II – CONSTRUCTION DETAILS***

SECTION 580 – PREFABRICATED STEEL PEDESTRIAN BRIDGE

**DESCRIPTION**

**580.01.01 GENERAL**

A. The work shall consist of furnishing, designing, fabricating, transporting, and erecting prefabricated steel pedestrian bridge superstructure, including bearings and anchorages, as shown in the plans and described herein.

B. The intended usage is[choose all that apply]: *pedestrian; bicycle; occasional slow moving maintenance or emergency vehicles; other.*

C. These specifications shall be regarded as minimum standards for design and construction.

D. Substructures and concrete bridge deck are not included in this item.

**MATERIALS**

**580.02.01 GENERAL**

A. All members of the truss and deck system shall be fabricated from square/rectangular hollow structural sections (HSS), with the exception that floor beams may be wide flange (W) shapes. Open ends of end posts and floor beams shall be capped. Open shaped (non-tubular) stringers will be allowed only when the Contractor warranties the stringer design for 50% overload.

B. Steel material shall be atmospheric corrosion resistant high-strength (Fy=50,000 psi) low-alloy material meeting ASTM A588, A606, A709 and/or A847 with a minimum corrosion index of 5.8 per ASTM G101.

C. Where water collection inside of structural tubing is possible during construction or service, weep holes shall be provided at low points.

D. Non-shrink grout, when applicable, shall meet ASTM C-1107, 7000 psi minimum.

E. Materials not specified shall conform to applicable ASTM or AASHTO specifications.

**580.02.02 STEEL SURFACE TREATMENT**

A. All steel shall be as specified below [CHOOSE ONE OF THE FOLLOWING – UNPAINTED AND SELF-WEATHERING OR PAINTED]:

1. ***Unpainted and self-weathering.*** All exposed surfaces, defined as those surfaces seen from the deck and from along side the structure, shall be blast cleaned in accordance with Society for Protective Coatings specification SSPC-SP7, Brush Off Blast Cleaning, latest edition.

1. ***Painted.***
   1. The paint system shall be a three coat system suitable for the intended use as recommended by the paint manufacturer and approved by the Engineer.
   2. Application shall be in accordance with the recommendations of the paint manufacturer.
   3. Applicator shall be certified by the paint manufacturer for the approved paint system.
   4. Color of the finish coat shall be determined by the Engineer.
   5. All painted surfaces shall be blast cleaned in accordance with Steel Structures Painting Council Surface Preparation Specifications No. 7, latest edition, (SSPC-SP10) Near White Blast Cleaning.
   6. Painted bridges shall be configured such that all surfaces and connections are either fully sealed or allow access for adequate paint coverage.
   7. Sealing shall be accomplished by welding except that long continuous seams may be sealed with caulk prior to painting.
   8. All surfaces shall be painted, with the exception of expansion joint cover plates, teflon surfaces, bolted connections, and faying surfaces.
   9. All painted structures shall be placed at ground level for a minimum of 48 hours for Owner to pre-inspect and approve prior to erecting. Contractor is responsible to secure the pre-inspection storage location.
   10. After installation contractor shall make provisions for inspection of areas where paint may have been damaged during installation, including connection points, lifting locations, etc.
   11. Touch up paint shall be provided to paint outer surfaces of bolted splices and areas of damaged paint.

**580.02.03 HARDWARE**

A. All hardware (other than type 3 high strength) shall be hot-dip galvanized in accordance with ASTM A153.

B. Expansion bearings shall include teflon or stainless steel sliding surfaces in accordance with AASHTO requirements or elastomeric pads. Consideration of dead load rotation is required in all cases.

**580.02.04 HANDRAILS**

A. Handrails shall be not be required.

**580.02.05 DECKING**

A. The bridge deck shall be as specified below [CHOOSE ONE OF THE FOLLOWING FOUR]:

1. ***Transverse Douglas Fir planks.*** Planks shall be nominal 3” (minimum) Coastal Region Douglas Fir, graded as Select Structural in accordance with the Western Wood Products Association (WWPA) or the West Coast Lumber Inspection Bureau (WCLIB). Treatment shall be as per the American Wood Preservers Association (AWPA) Standard P5. The preservative utilized shall be Ammoniacal Copper Zinc Arsenate (ACZA) to a total absorption of 0.40 pounds per cubic foot of wood. Planks shall be placed tight together with no gaps. To resist warping forces, deck tie-down systems shall be designed to resist an uplift force of 500 lbs per plank per tie-down location, assuming wet service conditions. Deck tie-downs shall be provided at plank ends and intermediate points as required such that tie-down spacing does not exceed actual plank thickness multiplied by 50. Edge tie-downs shall be made with a continuous steel angle member above the planks.

1. ***Transverse Ipe wood planks.*** Ipe wood (Tabebuia spp.-lapacho group) shall be nominal 2-inch (minimum), all heartwood (no sapwood), clear (no knots), straight grained, with no worm holes, shall be surfaced 4 sides and eased 4 edges, and be air dried to no more than 20% moisture content prior to installation. Planks shall be placed tight together with no gaps. To resist warping forces, deck tie-down systems shall be designed to resist an uplift force of 500 lbs per plank per tie-down location, assuming wet service conditions. Deck tie-downs shall be provided at plank ends and intermediate points as required such that tie-down spacing does not exceed actual plank thickness multiplied by 50. Edge tie-downs shall be made with a continuous steel angle member above the planks. Material shall be untreated. Ends of members shall be sealed with a clear aqueous wax water sealer. Sealing products shall be suitable for the intended application and applied in accordance with the manufacturers recommendations.

1. ***Dowel-laminated panel-lam.*** Panel-lams shall be nominal 4” (minimum)Coastal Region Douglas Fir. Preservative treatment of timber shall be by the pressure process in accordance AWPA Standards and AASHTO Designation M 133. Preservative shall be Copper Naphthenate in AWPA P9 Type A Hydrocarbon Solvent. Unless otherwise directed by the Engineer the material shall be graded prior to treatment. Material shall be accepted after treatment on the basis of its condition prior to treatment, on the basis of inspection of the treatment procedure substantiated by plant records, on the condition of the material after treatment and on absorption, penetration and visual inspection. So far as practicable all adazing, boring, chamfering, framing, gaining, mortising, surfacing, general framing and so forth shall be done prior to treatment. If cut after treatment, coat cut surfaces according to AWPA M4. All Douglas Fir and other species that are difficult to penetrate shall be incised prior to treatment. Panel-lams shall be shop fabricated with ring-shank dowels in a press capable of simultaneously driving all the dowels with equal force. Panels shall be interconnected with shiplap joints. Panels placed longitudinally shall be continuous over as many floor beams as is practical. A wear course of 2” asphalt shall be included. The deck shall have edge strips to contain the wear course.

1. ***Normal weight reinforced concrete.*** The bridge shall be furnished with 20 gauge (minimum) stay-in-place galvanized metal decking with steel side and end dams suitable for placing a separate concrete bridge deck. Metal decking shall be secured with fasteners or welds as recommended by the decking manufacturer. Metal forms shall be designed for the dead load of wet concrete and a construction live load of either 20 psf or a 200 lb point load. Dead load deflection due to wet concrete shall be limited to L/180 and 3/4".

**CONSTRUCTION**

**580.03.01 GENERAL**

A. The construction requirements shall consist of design, shop drawing submittal and approval, fabrication, delivery and installation of prefabricated steel pedestrian bridge in accordance with these special provisions.

**580.03.02 MANUFACTURER QUALIFICATIONS**

A. The Contractor’s Bridge Manufacturer shall be currently certified by the American Institute of Steel Construction to have the personnel, organization, experience, capability, and commitment to produce fabricated structural steel for Major Steel Bridges as set forth in the AISC Certification Program.

Pre-approved Prefabricated Steel Pedestrian Bridge Manufacturers:

|  |  |  |
| --- | --- | --- |
| Wheeler Lumber, LLC  9330 James Avenue South  Bloomington, MN 55431  (800) 328-3986  [www.wheeler-con.com](http://www.wheeler-con.com) |  | Big R Manufacturing, LLC  PO Box 1290  Greely, CO 80632  (970) 356-9600  [www.bigrmfg.com](http://www.bigrmfg.com) |
|  |  |  |
| Contech Engineered Solutions  8301 State Hwy 29 N  Alexandria, MN 56308  (800) 328-2047  [www.conteches.com](http://www.conteches.com) |  | Echo Bridge, Inc  PO Box 89  Elmira, NY 14902  (607) 734-9456  [www.echobridgeinc.com](http://www.echobridgeinc.com) |
|  |  |  |
| Excel Bridge Manufacturing  12001 Shoemaker Avenue  Santa Fe Springs, CA 90670  (800) 548-0054  [www.excelbridge.com](http://www.excelbridge.com) |  | The Ohio Bridge Corp/US Bridge  PO Box 757  Cambridge, OH 43725  (740) 432-6334  www.usbridge.com |
|  |  |  |
| Arizona Structure Technologies 1945West Broadway Road  Phoenix, AZ 85041  (602) 288-1471  [www.azst.net](http://www.azst.net) |  | Stinger Bridge & Iron  4248 N. Hwy 87  Coolidge, AZ 85128  (520) 723-5383  [www.stingerbridgeandiron.com](http://www.stingerbridgeandiron.com) |

B. Written request by the Contractor for acceptance of any proposed Bridge Manufacturer who is not pre-approved must be presented to the Engineer for approval and shall include the following:

1. Proof of AISC certification
2. Proof of a minimum ten (10) years experience in fabricating steel pedestrian bridges.
3. Representative design calculations
4. Representative drawings
5. Splicing and erection procedures
6. Welding process
7. References and list of projects

C. The Engineer will evaluate and verify the accuracy of the submittal. If the Engineer determines that the qualifying criteria have not been met, the Contractor's proposed Bridge Manufacturer shall be rejected.

* + 1. **SHOP DRAWINGS**

A. The Contractor’s Bridge Manufacturer shall design the prefabricated bridges and prepare shop drawings in accordance with these minimum requirements. All calculations and shop drawings shall be sealed by a Professional Engineer licensed in the State of Nevada.

B. Unless otherwise noted, the Contractor shall submit to the Engineer, for approval six (6) sets of checked drawings. The Contractor shall prepare and submit shop drawings and structural calculations for approval at least fifteen (15) days before the intended start of fabrication and no material shall be fabricated until the plans have been fully approved by the Engineer. Shop drawings shall be unique drawings prepared to illustrate the specific portion of the work to be done. All relative design information including but not limited to governing codes, design parameters, member sizes, bridge reactions, shop and field connection details, deck details, paint system, dimensions related to substructures and general notes shall be clearly specified on the drawings. Shop drawings shall be accurately prepared by skilled drafters to be complete in every respect. Drawings shall have cross-referenced details and sheet numbers.

C. The Engineer reserves the right to refuse prints of shop drawings which are not clear and legible. The shop drawings as approved by the Engineer shall become a part of the contract (this contradicts subsection 101.75 of the new USS); provided, however, that any substitution of sections contemplated by the shop drawings different from sections shown on the plans shall be made only when approved by the Engineer and in such case, additional costs resulting from such substitution shall be borne by the Contractor.

D. After approval, there shall be no deviation from the shop drawings or changes made thereon without the prior approval of the Engineer.

E. Approval of shop drawings shall be understood to be an acceptance of the character and sufficiency of the details and not a check of any dimensions. Checking shop drawings is intended as a means of facilitating the work and avoiding errors, but it is expressly understood that it will not relieve the Contractor from the responsibility in regard to errors or omissions on said shop drawings.

* + 1. **DESIGN CRITERIA**

A. Design shall be governed by the current design specifications of the American Association of State Highway and Transportation Officials (AASHTO), supplemented with the current edition of American Institute of Steel Construction (AISC) including the Design Specification for Steel Hollow Structural Sections, further supplemented with the current edition of American Welding Society (AWS) D1.1 Structural Welding Code, as modified and further supplemented herein.

B. Structural members shall be designed in accordance with recognized engineering practices and principles.

C. In addition to dead load, pedestrian load, and wind load as specified by AASHTO, the bridge shall be designed to accommodate the following loads:

1. Point Load: 1000 lbs plus impact, applied at a single point.
2. Vehicle Load:
   1. AASHTO H-5 vehicle for clear deck width of 10 feet or less.
   2. AASHTO H-10 vehicle for clear deck width greater than 10 feet.

D. When pedestrian usage is specified, the following shall apply:

1. The vibration design for this bridge shall be a level one design.
2. For level one design, the frequency of the first harmonic for the unloaded bridge shall be no less than 3.0 Hz except when the weight of the structure with no live load exceeds 180 x exp(-0.35xFreq).
3. Peak acceleration shall, in all cases, be computed based on a constant force of 92 pounds and a damping ratio of 0.01.
4. Peak acceleration of the truss and of deck systems may be computed independently without consideration of a combined effect.
5. Peak acceleration in deck systems shall be computed with consideration of the combined effect of longitudinal components and floor beams.

E. Wind deflections of the truss, as measured at deck level, shall be limited to L/500. Deflections in planks due to point or truck load shall be limited to L/300 or 0.1". Impact shall be included in deflection checks as applicable.

F. Deflection of the truss due to uniform live load shall be limited to L/500. The load may be reduced based on loaded area to no less than 65 psf. Deflections in longitudinal deck members due to uniform live load shall be limited to L/500.

* + 1. **BRIDGE AND TRUSS**

A. The truss type shall be [CHOOSE ONE]: parallel chord with vertical ends; parallel chord with sloped ends; bow truss (bowstring truss, truss arch); bowstring arch (tied arch, with vertical hangers only); lenticular; [OTHER] with a web member style [CHOOSE ONE]:of Pratt; of Howe; of Vierendeel; of Warren, (with verticals / without verticals / with or without verticals); of crossed diagonals, (with verticals / without verticals / with or without verticals); as depicted in the Plans.

B. Pratt or Howe style trusses with an odd number of bays shall have crossed diagonals in the middle bay. Any crossed diagonals shall be of equal dimension. Unless specified otherwise, multiple spans or bridges within a project shall have a consistent style, multi-span bridges shall maintain a constant depth, and any bridge depiction shown in the Plans is conceptual only.

C. Overhead (portal) bracing is to be used only when required.

D. Span lengths, deck widths, and any geometry limitations of the bridge or truss are as shown on the Plans.

E. The bridge shall be cambered to offset the calculated dead load deflection and provide a maximum of a 5% grade. Multiple span bridges shall follow a smooth continuous profile after dead load deflection, and when a percentage camber is specified, the camber is computed as a percentage of the total bridge length and applied at the midpoint of the entire bridge.

* + 1. **FIELD SPLICE**

A. Field splices shall be fully bolted slip critical connections, utilizing tension indicating washers. Tack welding of high strength hardware is prohibited.

B. Splices not immediately at or adjacent to panel points shall be designed for 100% of the member bending moment capacity for primary compression members, and 75% for bracing members or tension members subject to load reversal, including slip resistance, and slip resistance shall further meet the same AASHTO required strength as with other failure modes.

C. Splices for truss members, bracing, and floor beams, when used, shall be made with ASTM A325 or A490 high strength bolts. Type 3 bolts shall be used when the truss is required to be of weathering steel. Other splices shall be made with the above mentioned material or ASTM A307.

* + 1. **HORIZONTAL SAFETY RAIL SYSTEM**

A. The horizontal safety rail system shall prevent a sphere with a diameter of 4” from passing through, up to a minimum height of 54”. The horizontal safety rail system shall also include a 6” toe plate. The horizontal safety rails shall be placed on the inside of the truss and shall be designed to carry a horizontal or vertical 200 lb point load on each rail.

* + 1. **WELDING**

A. Welding and weld qualification tests shall conform to the provisions of AWS D1.1. The flux core arc welding (FCAW) process, utilizing E80 electrodes with similar weathering characteristics as the base material, shall be used. Welding operators shall be properly accredited experienced operators. Each operator have certification of satisfactorily passing AWS standard qualification test(s) for the 3G and/or 4F position(s), evidence of experience and skill in welding structural steel, and have demonstrated the ability to make acceptable welds of the type required.

B. Nondestructive weld testing is required. Testing will be performed by a qualified ASNT Level II Technician or greater and paid for by the Contractor. All welds are to be 100% visually inspected. Ten percent (10%) of all fillet and partial penetration welds shall be magnetic particle tested. For arch type bridges, 100% of end of top chord to bottom chord connections shall be tested. Full penetration shop welds shall be Ultrasonic tested in accordance with AWS D1.1; Section 6. Base material certifications are to be supplied by the material suppliers. Inspection test results shall be available on request.

* + 1. **CONNECTIONS AND ANCHORS**

A. Self-tapping and self-drilling screws are not acceptable for any portion of the structure, except where specified otherwise.

B. Wood members shall be attached with carriage bolts. All wood connections shall be made with locking hardware.

C. Cover plates shall be provided to cover expansion gaps. Cover plates shall fit tight to the top of the abutment backwall without any bridge weight bearing on the backwall. Plate thickness shall accommodate joint size and weight of vehicles.

D. Anchors shall be of the drilled type, installed with a chemical adhesive system, except that when design forces exceed the strength of typical chemical systems, cast-in-place anchors may be used. Anchor systems shall be designed and supplied by the Contractor. Anchor bolts shall conform to ASTM A307, A193, or F1554.

* + 1. **DELIVERY**

A. The Contractor shall coordinate with the Bridge Manufacturer in the delivery and erection schedule.

B. Delivery to the job site will be by trucks by means of good haul roads unless specified otherwise.

C. The Contractor shall provide detailed, written instruction procedures for proper lifting and splicing of bridge components as recommended by the Bridge Manufacturer.

**METHOD OF MEASUREMENT**

**580.04.01 MEASUREMENT**

The quantity of PREFABRICATED STEEL PEDESTRIAN BRIDGE will be measured per lump sum.

**BASIS OF PAYMENT**

**580.05.01 PAYMENT**

The accepted quantity of PREFABRICATED STEEL PEDESTRIAN BRIDGE will be paid for at the contract unit price of lump sum shall include all materials, equipment and labor required including, but not limited to, shop drawings; welding; fabrication; painting; shipping; delivery; tools; all required hardware; bearings; bearing pads; anchor bolts; and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer to ensure the bridge is complete, in place and operational.

Substructures, foundations, approach slabs, and concrete bridge deck will not be measured as part of this work but shall be considered as part of separate bid items.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 580.0005 | PREFABRICATED STEEL PEDESTRIAN BRIDGE | LS |

END OF SECTION 580

SECTION 601 – PIPE CULVERTS-GENERAL

**DESCRIPTION**

**CONSTRUCTION**

**601.03.07 VIDEO INSPECTION**

***ADD THE FOLLOWING PARAGRAPHS TO THIS SUBSECTION***

***Note to Spec Writer – Section 693 is to be used on all projects with new sewer and storm drain pipelines and structures, rehabilitated manholes, and rehabilitated sewer lines.***

B. Refer to Section 693 – INTERNAL INSPECTION OF SEWER AND STORM DRAIN FACILITIES in these Specifications for video inspection requirements.

***ADD THE FOLLOWING SUBSECTION:***

**601.03.70 MARKER BALLS**

1. Marker balls shall be installed per local entity requirements.

**METHOD OF MEASUREMENT**

**601.04.01 MEASUREMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The quantity of [FILL IN ITEM DESCRIPTION] will be measured per [UNIT].

No direct measurement shall be made for [FILL IN ITEM DESCRIPTION].

**METHOD OF PAYMENT**

**601.05.01 PAYMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall conform to the requirements of subsection 601.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include,

Unless otherwise provided in the Special Provisions, no payment will be made for [FILL IN ITEM DESCRIPTION] as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which [FILL IN ITEM DESCRIPTION] is required.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
|  |  |  |

END OF SECTION 601

SECTION 603 – REINFORCED CONCRETE PIPE

**DESCRIPTION**

**603.01.01 GENERAL**

***add The following TO this SUbsection:***

C. This work shall also consist of providing storm drain connections for the storm drain and laterals as directed by the Engineer.

**CONSTRUCTION**

**603.03.07 INSPECTION**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

***Note to Spec Writer – Section 693 is to be used on all projects with new sewer and storm drain pipelines and structures, rehabilitated manholes, and rehabilitated sewer lines.***

E. Internal Video Inspection. Internal video inspection shall be performed by the Contractor per Section 693 – INTERNAL INSPECTION OF SEWER AND STORM DRAIN FACILITIES.

**METHOD OF MEASUREMENT**

**603.04.01 MEASUREMENT**

***Add the following to this subsection:***

The quantity of (XX-INCH) REINFORCED CONCRETE PIPE (CLASS X) will be measured per linear foot, along the centerline of the pipe to the end section or inside face of structure.

The quantity of [FILL IN ITEM DESCRIPTION] will be measured per [UNIT].

No direct measurement shall be made for [FILL IN ITEM DESCRIPTION].

**BASIS OF PAYMENT**

**603.05.01 PAYMENT**

***Add the following to this subsection:***

NOTE TO SPEC WRITER: Make sure video inspection is incidental to new structures

The accepted quantity of (XX-INCH) REINFORCED CONCRETE PIPE (CLASS X) will be paid for at the contract unit price bid per linear foot for reinforced concrete pipe of the class and size specified, which shall be full compensation for removal of existing pavement (only if pavement removal is not included in any other pay items) trench excavation, furnishing and placing bedding and backfill material, Type II aggregate base, compaction, furnishing and placing pipe and jointing mortar, covering open ends of laterals with plywood, cut and join connections, dewatering of trench, shoring, disposal of excess excavated material, protection and restoration, potholing to determine location of existing utilities, temporary pavement, internal video inspection cost, related items of work not otherwise provided for, and for all labor, tools, and equipment necessary to complete the work as shown on the plans, as specified herein, and as directed by the Engineer.

Unless otherwise provided in the Special Provisions, no payment will be made for the Removal of Pavement and the placing of the Permanent Patch in accordance with section 208 “Trench Excavation and Backfill”. The cost thereof shall be considered as included in the price bid for Reinforced Concrete Pipe.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall conform to the requirements of subsection 603.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include,

Unless otherwise provided in the Special Provisions, no payment will be made for Internal Inspection as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which Internal Video Inspection is required.

Unless otherwise provided in the Special Provisions, no payment will be made for [FILL IN ITEM DESCRIPTION] as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which [FILL IN ITEM DESCRIPTION] is required.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 603.XXXX | (XX-INCH) REINFORCED CONCRETE PIPE (CLASS X) | LF |

END OF SECTION 603

SECTION 605 – THERMOPLASTIC PIPE CULVERTS

***Note to Spec Writer – Section 693 is to be used on all projects with new sewer and storm drain pipelines and structures, rehabilitated manholes, and rehabilitated sewer lines.***

***ADD THE FOLLOWING SUBSECTION TO THIS SECTION:***

**605.03.70 VIDEO INSPECTION**

1. Internal Video Inspection: Internal video inspection shall be performed by the Contractor per Section 693 – INTERNAL INSPECTION OF SEWER AND STORM DRAIN FACILITIES.

**METHOD OF MEASUREMENT**

**605.04.01 MEASUREMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The quantity of [XX-INCH] THERMOPLASTIC PIPE [TYPE] will be measured per linear foot.

The quantity of [XX-INCH] THERMOPLASTIC PIPE END SECTION [TYPE] will be measured per each.

The quantity of [FILL IN ITEM DESCRIPTION] will be measured per [UNIT].

No direct measurement shall be made for [FILL IN ITEM DESCRIPTION].

**METHOD OF PAYMENT**

**605.05.01 PAYMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

NOTE TO SPEC WRITER: Make sure video inspection is incidental to new structures

The accepted quantity of [XX-INCH] THERMOPLASTIC PIPE [TYPE] will be paid for at the contract unit price of linear foot and shall conform to the requirements of subsection 605.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include,

The accepted quantity of [XX-INCH] THERMOPLASTIC PIPE END SECTION [TYPE] will be paid for at the contract unit price of each and shall conform to the requirements of subsection 605.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include,

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall conform to the requirements of subsection 605.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include,

Unless otherwise provided in the Special Provisions, no payment will be made for Internal Video Inspection as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which Internal Video Inspection is required.

Unless otherwise provided in the Special Provisions, no payment will be made for [FILL IN ITEM DESCRIPTION] as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which [FILL IN ITEM DESCRIPTION] is required.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 605.XXXX | [XX-INCH] THERMOPLASTIC PIPE [TYPE] | LF |
| 605.XXXX | [XX-INCH] THERMOPLASTIC PIPE END SECTION [TYPE] | EA |

END OF SECTION 605

SECTION 609 – CATCH BASINS, MANHOLES AND INLETS

**DESCRIPTION**

**609.01.01 GENERAL**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

B. The final adjustments and concrete collar for manholes shall be constructed after the final placement of pavement.

**MATERIALS**

**609.02.01 GENERAL**

***add The following to this subsection:***

F. Grout shall conform to ASTM C476 and shall have a minimum strength of 2000 psi. Fine grout shall be proportioned by volume of one part Portland cement and 2-1/4 to 3 parts sand. Coarse grout shall consist of one part Portland cement, 2-1/2 to 3 parts sand, and 1 to 2 parts course aggregate.

G. Laboratory design mixes for grout, approved by a Licensed Professional Engineer in the State of Nevada, are acceptable in lieu of the above proportions and are required if the maximum strength is more than 2000 psi. Grout shall be of a fluid consistency with proper proportions of sand to gravel for pouring and pumping.

1. All exposed steel shall be hot-dipped galvanized per section 715.
2. At lined or T-locked manhole locations, concrete or polyethylene adjustment ring shall be coated after grouting with and approved anticorrosion mastic putty.
3. The Contractor shall notify the Engineer of any non-standard or broken metal frames and covers.

**CONSTRUCTION**

NOTE TO SPEC WRITER: Clark County requires steps in manholes; check your jurisdiction limits.

**609.03.01 GENERAL**

***add The following to this subsection:***

I. Steps in drop inlets shall be installed per local entity requirements.

**609.03.02 ADJUSTING CATCH BASIN, MANHOLE, AND INLET COVERS**

***add The following to this subsection:***

E. Frames, grates, and covers shall be match marked in pairs before removal and/or replacement. Covers shall fit into the frames without rocking. The integrity of the frames, grates, and cover are the responsibility of the contractor.

**609.03.03 CLEAN OUT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

B. The Contractor shall also provide positive means of preventing debris from entering the existing sewer or storm drain lines while work is being performed on the project. The method chosen by the Contractor shall be approved by the Engineer prior to the start of construction.

***ADD THE FOLLOWING SUBSECTION TO THIS SECTION:***

***Note to Spec Writer – Section 693 is to be used on all projects with new sewer and storm drain pipelines and structures, rehabilitated manholes, and rehabilitated sewer lines.***

**609.03.70 VIDEO INSPECTION**

1. Internal video inspection shall be performed by the Contractor per Section 693 – INTERNAL INSPECTION OF SEWER AND STORM DRAIN FACILITIES.

**METHOD OF MEASUREMENT**

**609.04.01 MEASUREMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The quantity of X-FOOT TYPE X DROP INLET will be measured per each.

The quantity of XX-INCH TYPE X STORM DRAIN MANHOLE will be measured per each.

The quantity of ADJUST COVERS will be measured per each.

The quantity of [FILL IN ITEM DESCRIPTION] will be measured per [UNIT].

No direct measurement shall be made for [FILL IN ITEM DESCRIPTION].

**BASIS OF PAYMENT**

**609.05.01 PAYMENT**

***DELETE THIS SUBSECTION IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:***

NOTE TO SPEC WRITER: Make sure video inspection is incidental to new structures

The accepted quantity of X-FOOT TYPE X DROP INLET will be paid for at the contract unit price of each and shall include all materials, equipment and labor required including, but not limited to, excavation; shoring; grading; shaping; dewatering; aggregate base materials; granular backfill; drain rock; compaction; dowels; concrete; reinforcing steel; cones; steps; grout; beams; rings; frames; grates; castings; concrete collars around manholes; protection and restoration of all existing facilities; relocation of existing street light pull-boxes in the excavated area; internal video inspection; support and protection of all utilities and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer

The accepted quantity of XX-INCH TYPE X STORM DRAIN MANHOLE will be paid for at the contract unit price of each and shall include all materials, equipment and labor required including, but not limited to, excavation; shoring; grading; shaping; dewatering; aggregate base materials; granular backfill; drain rock; compaction; dowels; concrete; reinforcing steel; cones; steps; grout; beams; rings; frames; grates; castings; concrete collars around manholes; protection and restoration of all existing facilities; relocation of existing street light pull-boxes in the excavated area; internal video inspection; support and protection of all utilities and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of ADJUST EXISTING MANHOLE COVER TO FINISHED GRADE will be paid for at the contract unit price of each and shall include all materials, equipment and labor required including, but not limited to, sawcutting; pavement removal; excavation; base preparation; concrete; reinforcing steel; forming; grout; grade rings; concrete finishing and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

Unless otherwise provided in the Special Provisions, no payment will be made for Internal Video Inspection as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which Internal Video Inspection is required.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall conform to the requirements of subsection 605.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include,

Unless otherwise provided in the Special Provisions, no payment will be made for [FILL IN ITEM DESCRIPTION] as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which [FILL IN ITEM DESCRIPTION] is required.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 609.XXXX | XX-INCH TYPE X STORM DRAIN MANHOLE | EA |
| 609.XXXX | X-FOOT TYPE X DROP INLET | EA |
| 609.0700 | ADJUST EXISTING MANHOLE COVER TO FINISHED GRADE | EA |

END OF SECTION 609

SECTION 610 – SLOPE AND CHANNEL PROTECTION

**METHOD OF MEASUREMENT**

**610.04.01 MEASUREMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The quantity of [FILL IN ITEM DESCRIPTION] will be measured per [UNIT].

No direct measurement shall be made for [FILL IN ITEM DESCRIPTION].

**METHOD OF PAYMENT**

**610.05.01 PAYMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall conform to the requirements of subsection 610.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include,

Unless otherwise provided in the Special Provisions, no payment will be made for [FILL IN ITEM DESCRIPTION] as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which [FILL IN ITEM DESCRIPTION] is required.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
|  |  |  |

END OF SECTION 610

SECTION 611 – CONCRETE SLOPE PAVING

**MATERIALS**

**611.02.01 GENERAL**

***DELETE PARAGRAPH “C” AND REPLACE WITH THE FOLLOWING:***

C. Reinforcing for the slope paving and cutoff walls shall be reinforcing steel in accordance with the Contract Drawings and Section 505.

***add The following to this subsection:***

F. Concrete for the concrete slope paving and cutoff walls shall be modified Class A or AA using Type V cement (6.0 sack minimum, 0.53 water/cement ratio), having a minimum twenty-eight (28) day compressive strength of 3000 psi having a slump not to exceed 4-inches.

**METHOD OF MEASUREMENT**

**611.04.01 MEASUREMENT**

***add The following to this subsection:***

The quantity of CONCRETE SLOPE PAVEMENT will be measured per square yard.

The quantity of [FILL IN ITEM DESCRIPTION] will be measured per [UNIT].

No direct measurement shall be made for [FILL IN ITEM DESCRIPTION].

**BASIS OF PAYMENT**

**611.05.01 PAYMENT**

***add The following to this subsection:***

The accepted quantity of CONCRETE SLOPE PAVEMENT will be paid for at the contract unit price of square yard and shall conform to the requirements of subsection 611.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include,

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

Unless otherwise provided in the Special Provisions, no payment will be made for [FILL IN ITEM DESCRIPTION] as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which [FILL IN ITEM DESCRIPTION] is required.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 611.0010 | CONCRETE SLOPE PAVEMENT | SY |

END OF SECTION 611

SECTION 613 – CONCRETE CURB, WALK, GUTTERS, DRIVEWAYS AND ALLEY INTERSECTIONS

**MATERIALS**

**613.02.01 GENERAL**

***Add the following to this subsection:***

B. The cement to be used for all concrete shall be Type V Portland Cement.

C. The reinforcing steel shall be Grade 60.

**CONSTRUCTION**

**613.03.06 SLIP FORMS**

***Add the following TO PARAGRAPH “H” OF THIS SUBSECTION:***

1. The adhesive shall be applied, per the manufacturers recommended application rate.

1. Cover 100 percent of the contact area between the underlying surfaces and new concrete.

**613.03.13 WALK**

***delete the following subsection in its entirety and replace with the following:***

A. The forms shall be set to provide finish slopes as specified on the plans. Sidewalk cross slope shall not exceed 2.0% unless specifically indicated on the plans. Newly constructed sidewalk with greater than 2.0% cross slope shall be removed and replaced at the expense of the Contractor.

**613.03.18 DETECTABLE WARNINGS**

***Add the following to this subsection:***

F. Detectable warning strips shall be Armortile, Access Tile, or approved equal. Detectable warning strips shall be embedded for all new construction or reconstruction.

G. For retrofit locations, glue-down detectable warning strips shall be Armortile, Access Tile, or approved equal.

**METHOD OF MEASUREMENT**

**613.04.01 MEASUREMENT**

***Add the following to this subsection:***

The quantity of TYPE L CURB AND GUTTER will be measured per linear foot.

The quantity of TYPE L ISLAND CURB AND GUTTER will be measured per linear foot.

The quantity of CONCRETE SIDEWALK will be measured per square foot.

The quantity of CONCRETE CROSS GUTTER will be measured per square foot.

The quantity of CONCRETE RESIDENTIAL DRIVEWAY will be measured per square foot.

The quantity of CONCRETE DEPRESSED ALLEY DRIVEWAY will be measured per square foot.

The quantity of CONCRETE COMMERCIAL DRIVEWAY (OPTION A) will be measured per square foot.

The quantity of CONCRETE COMMERCIAL DRIVEWAY (OPTION B) will be measured per square foot.

The quantity of TYPE A CURB will be measured per linear foot.

The quantity of Curb and Gutter, Sidewalk, Driveway, Median Island, etc. to be measured for payment will not include the following:

* 1. Curb and Gutter, Sidewalk, Driveway, Median Island, etc. abutting proposed drop inlets 3′ - 6″ away from either side, or to the nearest joint, of the inlet opening. For existing drop inlets without abutting sidewalk, include measurement of new sidewalk abutting on three sides to the property line.
  2. The replacement of existing curb and gutter, sidewalk, driveway, median island, etc. where it is removed for the construction of drop inlets, traffic signal systems, interconnect pullboxes, street lights and the removal and salvage of existing streetlights.
  3. The Curb and Gutter, Sidewalk, Driveway, Median Island, etc. being replaced because of unnecessary damage during construction.

The quantity of [FILL IN ITEM DESCRIPTION] will be measured per [UNIT].

No direct measurement shall be made for [FILL IN ITEM DESCRIPTION].

**BASIS OF PAYMENT**

**613.05.01 PAYMENT**

***DELETE THIS SUBSECTION IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:***

The accepted quantity of TYPE L CURB AND GUTTER will be paid for at the contract unit price of linear foot and shall include all materials, equipment and labor required including, but not limited to excavation; Type II Aggregate Base; plates; compaction; concrete; depressions; reinforcing steel; finishing; joints; curing compound and backfilling and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of TYPE L ISLAND CURB AND GUTTER will be paid for at the contract unit price of linear foot and shall include all materials, equipment and labor required including, but not limited to excavation; Type II Aggregate Base; plates; compaction; concrete; depressions; reinforcing steel; finishing; joints; curing compound and backfilling and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of CONCRETE SIDEWALK will be paid for at the contract unit price of square foot and shall include all materials, equipment and labor required including, but not limited to, excavation; Type II Aggregate Base; plates; compaction; concrete; depressions; reinforcing steel; sleeves; pedestrian curb ramps; detectable tactile warning strips; adjusting all new or existing pullboxes; vault covers; meter boxes; handholes and valve boxes; finishing; joints; curing compound and backfilling and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of CONCRETE CROSS GUTTER will be paid for at the contract unit price of square foot and shall include all materials, equipment and labor required including, but not limited to, excavation; Type II Aggregate Base; plates; compaction; concrete; depressions; reinforcing steel; spandrel and monolithic curb; finishing; joints; curing compound and backfilling and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of CONCRETE RESIDENTIAL DRIVEWAY will be paid for at the contract unit price of square foot and shall include all materials, equipment and labor required including, but not limited to, excavation; Type II Aggregate Base; plates; compaction; concrete; depressions; reinforcing steel; adjusting all new or existing pullboxes; vault covers; meter boxes; handholes and valve boxes; finishing; joints; curing compound and backfilling and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of CONCRETE DEPRESSED ALLEY DRIVEWAY will be paid for at the contract unit price of square foot and shall include all materials, equipment and labor required including, but not limited to, excavation; Type II Aggregate Base; plates; compaction; concrete; depressions; reinforcing steel; adjusting all new or existing pullboxes; vault covers; meter boxes; handholes and valve boxes; finishing; joints; curing compound and backfilling and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of CONCRETE COMMERCIAL DRIVEWAY (OPTION A) and CONCRETE COMMERCIAL DRIVEWAY (OPTION B), will be paid for at the contract unit price of square foot and shall include all materials, equipment and labor required including, but not limited to, excavation; Type II Aggregate Base; plates; compaction; concrete; depressions; reinforcing steel; adjusting all new or existing pullboxes; vault covers; meter boxes; handholes and valve boxes; finishing; joints; curing compound and backfilling and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of TYPE A CURB will be paid for at the contract unit price of linear foot and shall include all materials, equipment and labor required including, but not limited to excavation; Type II Aggregate Base; plates; compaction; concrete; depressions; reinforcing steel; finishing; joints; curing compound and backfilling and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall conform to the requirements of subsection 508.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include,

Unless otherwise provided in the Special Provisions, no payment will be made for [FILL IN ITEM DESCRIPTION] as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which [FILL IN ITEM DESCRIPTION] is required.

All payments shall be made in accordance with Subsection [109.02](http://www.rtcsnv.com/mpo/streets/files/specifications/text/109.doc#RTC_109_02), "Scope of Payment."

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 613.0005 | TYPE L CURB AND GUTTER | LF |
| 613.0120 | “L” TYPE ISLAND CURB AND GUTTER | LF |
| 613.0300 | CONCRETE SIDEWALK (4 INCH) | SF |
| 613.0700 | CONCRETE CROSS GUTTER | SF |
| 613.0800 | CONCRETE RESIDENTIAL DRIVEWAY | SF |
| 613.0860 | CONCRETE DEPRESSED ALLEY DRIVEWAY | SF |
| 613.0890 | CONCRETE COMMERCIAL DRIVEWAY (OPTION A) | SF |
| 613.0910 | CONCRETE COMMERCIAL DRIVEWAY (OPTION B) | SF |
| 613.1100 | TYPE A CURB | LF |

END OF SECTION 613

SECTION 614 – PAINTING

**METHOD OF MEASUREMENT**

**614.04.01 MEASUREMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The quantity of [FILL IN ITEM DESCRIPTION] will be measured per [UNIT].

No direct measurement shall be made for [FILL IN ITEM DESCRIPTION].

**METHOD OF PAYMENT**

**614.05.01 PAYMENT**

NOTE TO SPEC WRITER: On non-federal projects, consider adding language to the special provisions to provide additional (up to 5 gallons) paint for projects that may include high graffiti areas (walls, bridges, etc.). Check with O&M for delivery locations and personnel.

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall conform to the requirements of subsection 614.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include,

Unless otherwise provided in the Special Provisions, no payment will be made for [FILL IN ITEM DESCRIPTION] as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which [FILL IN ITEM DESCRIPTION] is required.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
|  |  |  |

END OF SECTION 614

SECTION 616 – FENCING

**DESCRIPTION**

**616.01.01 GENERAL**

***ADD THE FOLLOWING PARAGRAPHS TO THIS SUBSECTION:***

1. Temporary fencing will be required in association with chain link fence installation to maintain the integrity of fencing around private properties until the new fencing is complete. Temporary fencing shall be considered incidental to the chain link fence item and no additional compensation will be allowed. Temporary fencing is to meet the requirements of this subsection and shall be installed prior to the removal of existing fencing and shall remain in place until the new fence is complete.

**MATERIALS**

**616.02.01 GENERAL**

***ADD THE FOLLOWING PARAGRAPHS TO THIS SUBSECTION:***

B. Include one Masterlock 178D lock and 2’ long section of Blue Hawk heavy duty grade 70 4,700 tow pound chain for each gate installed.

**METHOD OF MEASUREMENT**

**616.04.01 MEASUREMENT**

ADD THE FOLLOWING PARAGRAPHS TO THIS SUBSECTION:

The quantity of XX-FOOT CHAIN LINK FENCE will be measured per linear foot.

The quantity of XX-FOOT SINGLE SWING CHAIN LINK GATE and XX-FOOT DOUBLE SWING CHAIN LINK GATE will be measured per each.

The quantity of [FILL IN ITEM DESCRIPTION] will be measured per [UNIT].

No direct measurement shall be made for [FILL IN ITEM DESCRIPTION].

**BASIS OF PAYMENT**

**616.05.01 PAYMENT**

***ADD THE FOLLOWING PARAGRAPHS TO THIS SUBSECTION:***

The accepted quantity of XX-FOOT CHAIN LINK FENCE will be paid for at the contract unit price of linear foot and shall include all labor, equipment and materials including but not limited to excavation; aggregate base materials; pipe; welding; backfill; compaction; connection to existing fencing; installation of temporary fencing until proposed fencing is installed and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of XX-FOOT SINGLE SWING CHAIN LINK GATE and XX-FOOT DOUBLE SWING CHAIN LINK GATE will be paid for at the contract unit price of each and shall include all labor, equipment and materials including but not limited to excavation; aggregate base materials; pipe; welding; locks; chain; backfill; compaction; connection to existing fencing; installation of temporary gates until proposed gate is installed and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall conform to the requirements of subsection 614.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include,

Unless otherwise provided in the Special Provisions, no payment will be made for [FILL IN ITEM DESCRIPTION] as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which [FILL IN ITEM DESCRIPTION] is required.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 616.XXXX | XX-FOOT CHAIN LINK FENCE | LF |
| 616.XXXX | XX-FOOT SINGLE SWING CHAIN LINK GATE | EA |
| 616.XXXX | XX-FOOT DOUBLE SWING CHAIN LINK GATE | EA |

END OF SECTION 616

SECTION 619 – OBJECT MARKERS AND GUIDE POSTS

**METHOD OF MEASUREMENT**

**619.04.01 MEASUREMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The quantity of FLEXIBLE MARKER POST will be measured per each

The quantity of K71 SELF RE-ERECTING MARKER POST will be measured per each

The quantity of MARKER POST will be measured per each

The quantity of PERMANENT OBJECT MARKER will be measured per each

**BASIS OF PAYMENT**

**619.05.01 PAYMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The accepted quantity of FLEXIBLE MARKER POST will be paid for at the contract unit price of each and shall include all materials, equipment and labor required to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of K71 SELF RE-ERECTING MARKER POST will be paid for at the contract unit price of each and shall include all materials, equipment and labor required to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of MARKER POST will be paid for at the contract unit price of each and shall include all materials, equipment and labor required to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of PERMANENT OBJECT MARKER will be paid for at the contract unit price of each and shall include all materials, equipment and labor required to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 619.0005 | FLEXIBLE MARKER POST | EA |
| 619.0010 | K71 SELF RE-ERECTING MARKER POST | EA |
| 619.0020 | MARKER POST | EA |
| 619.0030 | PERMANENT OBJECT MARKER | EA |

END OF SECTION 619

***ADD THE FOLLOWING SECTION TO DIVISION II – CONSTRUCTION DETAILS***

SECTION 622 – CONSTRUCTION SURVEYING BY THE CONTRACTOR

**DESCRIPTION**

**622.01.01 GENERAL**

A. The Contractor shall, under supervision of a Professional Land Surveyor, registered in the state of Nevada, furnish and set construction stakes establishing locations, lines, and slope stakes for roadway, storm drain, drainage structures, sewer, laterals, and for all other improvements for project necessary to ensure conformance of work to lines, elevations, locations, and grades as shown on the Plans and in these Special Provisions. Any horizontal or vertical discrepancies shall be reported to Engineer prior to commencement of construction. Any revisions or changes approved by Engineer that affect lines, grades, elevations or locations of any improvement shall be indicated on As-Built (Record) Drawings.

B. If necessary, the Contractor shall also perform and provide to the Engineer those items described in subsection 203.04.01 of the USS. Any revisions or changes approved by the Engineer that affect the lines, grades, elevations or locations of any improvement shall be indicated on the As-Built (Record) Drawings.

C. Contractor shall preserve property line and corner survey monuments whenever possible. If their destruction is determined by Engineer to be unavoidable, and their replacement is not called for on the plans, they shall be replaced by the Engineer. Survey monuments that are disturbed or destroyed by Contractor's operations without prior approval by the Engineer shall be replaced by the Engineer at the Contractor’s expense.

D. When a concrete survey monument well is located within the construction area of any roadway, storm drain, drainage structures, sewer line or channel improvement, the Contractor shall adjust the cover if noted on the plans. The cost of adjustment of said monument well covers shall be included in the lump sum bid for Construction Survey.

E. Construction of a Type I or Type II-B Survey Monuments as called out on the plans, will require coordination with the Engineer to provide location and wet set of the cap. The Contractor will be responsible for installing underground features such as concrete monument, monument assembly, and associated rebar.

**MATERIALS**

**622.02.01 BLANK**

**CONSTRUCTION**

**622.03.01 GENERAL**

A. Prior to all work in this section, theContractor shall carefully inspect all installed work and verify that all such work is complete to a point where this installation may properly commence.

B. The Contractor shall verify that all work can be installed in accordance with all pertinent codes and regulations, Contract Drawings and referenced standards.

C. The Contractor shall verify that there are no conflicts with existing utilities prior to the start of work.

D. In event of a discrepancy, the Contractor shall immediately notify theEngineer in writing.

E. Installation of work in areas of discrepancy shall not proceed until all such discrepancies have been fully resolved.

F. After stakes and marks have been set, it shall be the responsibility of the Contractor to protect the stakes and marks. Should any of the stakes or marks be destroyed or disturbed by the Contractor's operations or otherwise, the costs of replacing said stakes or marks shall be paid by the Contractor.

G. The Engineer, at his discretion, may periodically have survey work performed to verify conformance to the construction plans. Any nonconformity found to be the fault of the Contractor, or the Professional Land Surveyor, shall be corrected at no additional cost to the Owner.

H. Upon completion of the project and as a condition for final payment authorization, the Contractor shall furnish to the Engineer a Record of Survey/monument tie map and a certification attested to by the Professional Land Surveyor that the work performed for this contract has been constructed to the lines and grades as described in the As-built (Record) Drawings. When requested, the Contractor shall also provide the Engineer with copies of all field notes, computations, and other related work performed by the Professional Land Surveyor.

**622.03.02 FINAL ACCURACY**

1. No tolerance will be allowed for any Pedestrian Pathway or sidewalk identified on the plans to exceed a 2.00% max cross slope. If final slope in these situations is above 2.00%, then sidewalk shall be removed and replaced at the expense of the contractor in accordance with USS Section 105.12.

B. Surface Drainage Structures (including all concrete or asphalt gutters and drains) shall be installed within 0.05 feet horizontally and 0.05 feet vertically from the location taken from the project plans, and shall not vary more than 10 percent of the gradient shown on the plans.

C. Sanitary and Storm Drainage Sewer Systems shall be installed within 0.05 feet horizontally and 0.05 feet vertically of the exact location taken from the project plans. In addition, the gradient of any 10-foot section of pipe shall not vary by more than 10 percent of the gradient shown the project plans

D. Field verification surveys may be conducted by the city of Las Vegas at any given time during construction progress to ensure compliance with positional accuracy requirements per NAC 625, the contract documents, and this special provision.

**622.03.03 installed/exposed utility surveying**

1. All measurements are to be made by the Engineer who will be certifying the project as constructed.
2. The contractor is responsible for coordinating with the Engineer during construction and shall provide access to all underground sanitary sewer, storm drain, and reuse water facilities prior to being buried; allowing accurate horizontal and vertical measurements to be acquired by the Engineer. In the event of any discrepancies identified by CLV and at no cost to CLV, the Contractor shall verify the location and measurements of any buried utilities.
3. Contractor shall provide a minimum 24-hours’ notice to Engineer for necessary survey work in accordance with this section.

**METHOD OF MEASUREMENT**

**622.04.01 MEASUREMENT**

The quantity of CONSTRUCTION SURVEYING will be measured per lump sum.

The quantity of CONSTRUCT TYPE I SURVEY MONUMENT will be measured per each.

The quantity of CONSTRUCT TYPE II-B SURVEY MONUMENT will be measured per each.

**BASIS OF PAYMENT**

**622.05.01 PAYMENT**

The accepted quantity of CONSTRUCTION SURVEYING will be paid for at the contract unit price per lump sum and shall include all materials, equipment and labor, including, but not limited to, construction staking; protection or adjustment of existing monuments; as-built drawings and all other incidentals necessary to complete this work as described herein.

The accepted quantity of CONSTRUCT TYPE I SURVEY MONUMENT will be paid for at the contract unit price of each and shall include all materials, equipment and labor including, but not limited to, installation of concrete monument, drain backfill, concrete collar, monument assembly, reinforcement and rebar, coordination with Engineer and all other incidentals necessary to complete this work as described herein.

The accepted quantity of CONSTRUCT TYPE II-B SURVEY MONUMENT will be paid for at the contract unit price of each and shall include all materials, equipment and labor including, but not limited to, installation of concrete monument, aggregate base backfill, reinforcement and rebar, coordination with Engineer and all other incidentals necessary to complete this work as described herein.

Unless otherwise provided in these Special Provisions, no payment will be made for monumentation surveys or installed/exposed utility final location surveys. These services are to be provided by the Engineer.

Monthly payments will be made in an amount equal to the percent of total contract complete multiplied times the lump sum price bid for construction surveying minus previous Construction Surveying monthly payments.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 622.0005 | CONSTRUCTION SURVEYING | LS |
| 622.0010 | CONSTRUCT TYPE I SURVEY MONUMENT | EA |
| 622.0020 | CONSTRUCT TYPE II-B SURVEY MONUMENT | EA |

END OF SECTION 622

SECTION 623 - TRAFFIC SIGNALS AND STREET LIGHTING

**DESCRIPTION**

**623 G.01.01 GENERAL**

***Add the following PARAGRAPHS to this subsection:***

1. The Contractor shall provide all labor, materials, equipment, transportation and services required to install the street lighting, traffic control system, and related items on the plans and in the specifications resulting in complete and operational systems, to include fully functional opticom, video detection, pedestrian detection, and loop detection system complete with the manufacturer’s latest versions of firmware.
2. All equipment shall function as designed. All lighting standards shall be operational within fifteen (15) days after installation. The luminaries shall be leveled before they are energized.
3. The Contractor shall maintain the new lighting system and traffic signal system from the date energized until the entire project has been accepted by the City of Las Vegas. The Contractor shall repair or replace any defective component of the systems within 24 hours after notice in writing by the Engineer if of a non-hazardous nature. If public safety is endangered, the Contractor shall take immediate steps to correct the problem after verbal notice by the Engineer.
4. The contractor shall have a lighting representative present at the time the City inspects the street lighting installations.
5. The CLV Roadside Infrastructure shall consist of furnishing and installing CLV Fiber Optic (CFO) conduit with fiber, associated pull boxes and vaults, telecommunications (TELECOM) cabinets, Ethernet switches and all other appurtenant work as shown on plans, as established by the Engineer and in accordance with the specifications.

**623 G.01.05 GLOBAL POSITIONING SYSTEM (GPS) COORDINATES**

***DELETE THIS SUBSECTION IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:***

A. GPS coordinates shall be determined for all new and relocated traffic signal system, CFO, ITS, and street lighting facilities that are connected via the underground conduit system(s) and are visible at ground level, including but not limited to poles, pull boxes, splice vaults, cabinets, and service pedestals.

B. The GPS coordinates shall be submitted to the Engineer in a format specified in the Contract Documents or by the Maintaining Agency, at the end of the project prior to final acceptance. The Engineer will forward the data to the Maintaining Agency.

1. GPS coordinates for Traffic Signal, CFO, Arterial Management System (AMS), and Freeway Management System (FMS) facilities shall be provided using the CLV Coordinate System as follows:

a. NV83.NCRS-LVF

* 1. NV83.NCRS-LVHEF (Higher Elevations)

**MATERIALS**

**623 G.02.01 CONDUIT**

***DELETE PARAGRAPH “I” AND REPLACE WITH THE FOLLOWING:***

I. End caps with "J" hooks in place to secure the bonding conductor shall be installed in all spare conduits and conduits containing fiber optic cables as directed and to the satisfaction of the Engineer.

***DELETE PARAGRAPH “I.2” AND REPLACE WITH THE FOLLOWING:***

I. 2. ITS conduit shall have a Green No. 8 Bond Grounding conductor.

***ADD THE FOLLOWING PARAGRAPHS:***

J. All 90-degree elbows and all other conduit bends of 45 degrees or more installed as part of communications raceways for CFO, AMS, FMS, and traffic signal facilities shall be per CCAUSD drawing number 763.

K. All traffic signal, street lighting, and CFO conduits shall have at least one #10 AWG THW Tracer Wire. This #10 AWG THW Tracer Wire shall be installed within all CFO conduits (empty and with cables).

L. All AMS and FMS conduits shall have a #10 AWG THW Tracer Wire.

**623 G.02.02 PULL BOXES**

***DELETE PARAGRAPH “B.2” AND REPLACE WITH THE FOLLOWING:***

B. 2. Pull box covers shall be inscribed as follows, unless otherwise specified in the Contract Documents or directed by the Engineer:

a. "TRAFFIC SIGNAL" for traffic signal and AMS pull boxes that contain traffic signal cables, or a combination of traffic signal cables and other types of cables from lighting, AMS, FMS, and CFO facilities.

b. "STREET LIGHTING" for pull boxes installed for street lighting circuits and other electrical conduit systems containing only branch power circuit conductors emanating from the electrical service pedestals.

c. "FIBER OPTIC" for AMS and FMS pull boxes.

d. "CITY FIBER OPTIC" for CFO pull boxes

***DELETE PARAGRAPH “K” AND REPLACE WITH THE FOLLOWING:***

K. The Contractor shall not modify approved pull boxes. All proposed modifications to pull box drawings within the CCAUSD and details within the project plans shall be submitted to the Engineer for approval. This includes, but is not limited to, conduit entrance adjustments needed to accommodate the quantity and size of conduits, and the positions for where each conduit enters the pull box. If requested by the Engineer, the Contractor shall provide manufacturer documentation stating that the proposed pull box modifications do not impact the H-20 rating of the pull box.

**623 G.02.04 CONDUCTORS AND CABLE**

***DELETE PARAGRAPH “A.4” AND REPLACE WITH THE FOLLOWING:***

A. 4. Electrical cable for traffic signals shall be IMSA 20‑1 approved signal cable of proper size for the required installation unless otherwise specified in the Contract Documents. All traffic signal cable shall be 25‑conductor, No. 14 AWG solid copper wire traffic signal cable or as specified in the Contract Documents or directed by the Engineer.

***ADD THE FOLLOWING PARAGRAPHS TO “A” OF THIS SUBSECTION:***

10. Ethernet cable shall be either 4 pair 100 Ohm unshielded twisted pairs (UTP), or screened twisted-pair (ScTP), consisting of 22 AWG or 24 AWG solid conductors individually insulated by a thermoplastic material and then formed into 4 twisted pairs with an overall thermoplastic jacket and an RJ-45 connector installed on each end:

a. Cables shall be outdoor rated for installations within underground conduit, outdoor controller cabinets, and outdoor telecom cabinets.

b. Cables shall support Power over Ethernet (PoE) per the IEEE 802.3bt standard for PoE++ delivering at least 71W with the maximum cable of 328 ft.

c. TIA rated CAT6 (category 6) cable shall be used for 1 Gb/s, and less, Ethernet interconnect applications with cable lengths up to 328 ft.

d. TIA rated CAT6a (category 6a) cable shall be used for 10 Gb/s Ethernet (10GBASE-T) interconnect applications with cable lengths up to 328 ft.

e. Ethernet interconnect applications with cable lengths greater than 328 ft shall use fiber optic cable as specified in Section 680.

ADD THE FOLLOWING SUBSECTION:

**623 G.02.08 CLV TELECOMMUNICATIONS (TELECOM) CABINET**

1. Pole Mounted CLV TELECOM cabinets shall be a NEMA 3R rated Hoffman Enclosures U6969APP and provided with the following:
   1. Two Hoffman CPMK24 pole mount kits with 3/4" stainless steel straps
   2. Two 2" threaded chase nipples with plastic bushings to provide cable raceways between the enclosure and the pole it is mounted to. One 2” chase nipple shall be installed towards the top of the enclosure for communications cables, and the other installed at the bottom of the enclosure for the cabinet power cables from the service pedestal. A third 2” threaded chase nipple shall be installed towards the top, if necessary, to support additional communications cable capacity.
   3. A 2-pole, 20 Amp, 120/240 VAC breaker within the same service pedestal that is feeding power to the traffic signal cabinet.
   4. A power distribution assembly (PDA) within the TELECOM cabinet consisting of a main disconnect switch or breaker (2-pole, 20 Amp, 120/240 VAC) receiving the feeder from the electrical service pedestal and two duplex outlets, each within a separate gang box. Each duplex outlet shall be rated 20 Amp, single pole, 120 VAC operation and each outlet shall be feed from a separate pole from the load side of the main disconnect. The PDA shall also provide power to the LED cabinet light and exhaust fan assembly.
   5. EIA 19-inch rack mounting provisions with a rack mounted equipment shelf.
   6. Hinged front access door with keyed lock, two latch rods and guides, door stop guide and bracket.
   7. Heat exhaust fan assembly with filtered intake and rain shield mounted on the lower right side (facing the front) of the cabinet and filtered outtake mounted on the upper left side.
   8. Solar shield mounted on top of the cabinet.
   9. Door open switch and bracket.
   10. LED cabinet light with 900 LM illumination; 120° angle of illumination, manual On/Off, motion-sensor activation, and door open switch control modes.
2. Ground Mounted CLV TELECOM cabinets shall include the foundation and shall be a Communication Cabinet with Type 1 Foundation, per NDOT Standard Plans for Road and Bridge Construction Detail Number ITS-2. Cabinet shall be a 334 type Traffic Signal Controller Cabinet (industry standard 170/2070 style cabinet) without the isolated inputs, switched outputs, PDA-3, Model 206 24 VDC plug-in power supply, load switch positions, service panel, and controller shelf. The cabinet shall meet the following minimum requirements:
   1. Dimensions: 67” H x 24” W x 30” D (rounded to the nearest inch).
   2. Material: 5052-H32 aluminum, 0.125” thick.
   3. Finishes: Natural, anodized, or powder coated.
   4. Doors: Front door (1), back door (1), both full size.
   5. Latching System: 3-point, choice of Corbin or Best locks.
   6. Handles: 3/4” round, stainless steel, with padlock feature.
   7. Door Stops: 90° and 180° (±10°), each door, top and bottom.
   8. Rack Assembly: Removable 19” EIA rack.
   9. Ventilation: Dual thermostatically controlled 100 CFM fans, louvered air intake in door, and pleated filter.
   10. Provided with a 2-pole, 20 Amp, 120/240 VAC breaker within the in same service pedestal that is feeding power to the traffic signal cabinet.
   11. Provided with a power distribution assembly (PDA) within the TELECOM cabinet consisting of a main disconnect switch or breaker (2-pole, 20 Amp, 120/240 VAC) receiving the feeder from the electrical service pedestal and two duplex outlets, each within a separate gang box. Each duplex outlet shall be rated 20 Amp, single pole, 120 VAC operation and each outlet shall be feed from a separate pole from the load side of the main disconnect. The PDA shall also provide power to the LED cabinet light and exhaust fan assembly.
   12. Provided with an EIA 19-inch rack mounted equipment shelf.
   13. Provided with a LED cabinet light controlled by a door open switch.
3. CLV TELECOM cabinets identified as a “Distribution Hub” with the splice details shall be provided with two CDCA 12-strand fiber patch panels and locations identified as an “Access Hub” shall be provided with one CDCA 12-strand fiber patch panel. The unterminated “tail” end of the CDCA fiber cable(s) shall be routed to the nearest CFO Type 200 splice vault. Refer to Section 681 for other CDCA requirements.
4. Unless otherwise specified, CLV TELECOM cabinets located within the “special areas” noted below shall be finished with the color as indicated:
   1. Downtown Centennial Plan Area: RAL 6012 “Black Green”.
   2. Summerlin: RAL 3012, Beige-Red (“Summerlin Hummingbird Brown”)
   3. All other areas coordinate the color with the engineer and include the color on the material submittal.

**CONSTRUCTION**

**623 G.03.01 MAINTENANCE OF EXISTING AND TEMPORARY ELECTRICAL SYSTEMS**

***ADD THE FOLLOWING TO PARAGRAPH “H” OF THIS SUBSECTION:***

Prior to start of work, Contractor shall submit drawings stamped by a Nevada Professional Engineer showing support of facilities covered by Section 623 for approval by City Traffic Engineer for all trenches that will expose greater than eight feet of conduit. The Contractor shall submit the support system to be used for all trenches exposing up to 8 feet of conduit for approval prior to trenching. Conduit support systems, at a minimum shall support all joints in the conduit, prevent the decoupling of joints, and prevent deflection greater than 6 inches.

***Add the following PARAGRAPHS TO THIS subSECTION:***

1. All equipment and materials shall be as manufactured or modified by the manufacturer and installed by the Contractor in the manner for which it was designed and intended. No equipment may be modified by the Contractor unless prior written permission is provided by the Engineer.

NOTE TO SPEC WRITER: Some signalized intersections may require temporary signalization in lieu of support. Check with TEFO prior to bidding, If you know ahead of time that you need a temporary signal and modify paragraph K accordingly. Temporary signals need to include power and there should be a bid item for Temporary signal paid by the month and temporary lighting would be per block and be paid by the month.

1. Existing service shall remain fully operational during construction. Outages required shall be scheduled with the Owner and timing devices reset after resumption of service. The Contractor shall field verify wiring connections and routing prior to disconnecting any conductors. The modification, extension or removal of the existing conductors and equipment shall be inspected by and accepted by the Engineer. Electrical work shall be in accordance with the requirements of the National Electrical Code.
2. The data indicated on the plans and in these specifications is as exact as could be secured, but its absolute accuracy is not guaranteed. Exact locations, distances, levels, and other conditions will be governed by unforeseen obstacles in the field.
3. The Contractor shall use the plans and these specifications for guidance, and secure the Engineer’s approval for all changes of location or scope of work. The Engineer should be consulted regarding the exact locations of pullboxes, vaults, poles and cabinets for the traffic signal system.
4. Once the Contractor commences work on the Project, the Contractor shall provide all maintenance for existing traffic signal facilities that are to be modified or replaced, except that the City will pay for power.  The Contractor shall provide the above maintenance until the City gives written notice that the City accepts signals back for maintenance at the end of the Project. The above maintenance does not include any prior damage such as burned out signal displays, non-operative detection, or other malfunctioning equipment.  The Contractor shall provide written documentation of all non-functioning and malfunctioning traffic signal equipment before commencing work on the project.  This malfunctioning equipment shall be inspected by both the Contractor and the Engineer, or Engineer’s Designee, prior to the commencement of work.  In the event that the Engineer does not receive written notice and the Contractor begins work on the project, this will suffice as evidence that all equipment is functional and operational.  If any traffic signal equipment fails or malfunctions during the course of the Project, the Contractor shall repair or replace traffic signal facilities as necessary to provide a fully functioning system before final acceptance for maintenance by the City.  For traffic signals, repair work by qualified electricians shall commence within one hour of notification via the Contractor’s 24-hour emergency response phone number, at which time the Contractor will have two hours to correct the noted violation. The City will program for the Traffic Signal Controller and the Malfunction Management Unit (MMU).
5. If the repair is not completed within the two-hour time limit, the **Contractor will be assessed $200.00 per hour until the repair is complete.**
6. This condition may cause the Project to “Stop Work”; this will not be grounds for a time extension of the contract.

**623 G.03.02 MAINTAINING EXISTING INTELLIGENT TRANSPORTATION SYSTEM (ITS)**

**FACILITIES**

***ADD THE FOLLOWING TO PARAGRAPH “A” OF THIS SUBSECTION:***

The requirements for ITS communications facilities within this subsection shall also apply to CLV communications facilities, including CFO conduit facilities.

**623 G.03.05 EXCAVATION AND BACKFILLING**

***ADD THE FOLLOWING PARAGRAPHS TO THIS SUBSECTION:***

M. All trenching and backfill shall comply with applicable portions of the USS, USD and plans. All trenching shall be deep enough to ensure a minimum of twenty four inches (24”) of cover over the conduit measured from the top of conduit to finish grade, *with the exception* of interconnect conduit which shall have a minimum of thirty inches (30”) of cover over the conduit. The backfill in street areas shall be Type II gravel compacted to 95% relative density or controlled low strength material (CLSM) Fill. No trench shall be left open after established working hours without approval of the Engineer.

N. Conduit locations on the plans are for reference only. Actual locations are to be determined by the Contractor as to the most economical location --either behind the curb or in front of the lip of the gutter--but in either case, the conduit must remain parallel to the back of curb or the edge of pavement between the lighting standards, and the location shall be approved by the Engineer. "As Built" marked prints showing installed locations shall be given to the Engineer by the Contractor.

O. All conduit that is terminated, stubbed and capped for future use shall be marked by a "+" a minimum of 3 inches high and directly above the conduit, cut into the face of the curb, wall, concrete paving, etc.

**623 G.03.07 FOUNDATIONS**

***DELETE PARAGRAPH “A” AND REPLACE WITH THE FOLLOWING:***

A. Foundations for traffic signal and lighting poles, and ground mounted traffic signal and CLV TELECOM cabinets, and service pedestals shall be concrete conforming to **Section 501, "Portland Cement Concrete."**

***ADD THE FOLLOWING PARAGRAPHS TO THIS SUBSECTION:***

B. 3. Crash caps above foundations shall be sloped away from poles. All traffic signal poles shall be plumb AFTER the signal heads are in place. Any leveling shall be made before the grout cap is poured over the foundations.

C. 6. Foundations shall be excavated without disturbing surrounding material. All loose material shall be removed before concrete is placed into the opening. Foundations shall not be over-excavated.

***DELETE PARAGRAPH “G” AND REPLACE WITH THE FOLLOWING:***

G. Ground mounted traffic signal and CLV TELECOM cabinets shall have a 4-inch thick concrete slab installed in front of the cabinet.

***DELETE PARAGRAPH “G.1.” AND REPLACE WITH THE FOLLOWING:***

1. The concrete slab shall be as wide as the cabinet and a minimum of 4 feet in length from the cabinet base.

**623 G.03.08 WIRING AND CONDUIT**

***ADD THE FOLLOWING PARAGRAPHS TO “E” OF THIS SUBSECTION:***

1. Chair lugs shall be used for termination of solid conductors.
2. Solid conductors shall not be terminated with crimp-on connections.

***ADD THE FOLLOWING PARAGRAPH TO “P” OF THIS SUBSECTION:***

The minimum bend radius for all ITS communications conduit and CFO conduit shall be 3 ft.

***ADD THE FOLLOWING PARAGRAPH TO “R” OF THIS SUBSECTION:***

R. 6. CFO conduit installations shall enter in the side of P30 pull boxes and Type 200 vaults.

***DELETE PARAGRAPH “S.2” AND REPLACE WITH THE FOLLOWING:***

S. 2. ITS communications and CFO installations may be field modified only with the approval of and as directed by the Engineer.

***ADD THE FOLLOWING PARAGRAPH TO THIS SUBSECTION:***

V. When new conduit is to be joined to existing conduit, the Contractor shall verify the integrity of the existing conduit and make necessary repairs. The Engineer shall approve any additional repair work prior to commencing.

**623 G.03.09 ELECTRICAL SERVICE**

***ADD THE FOLLOWING PARAGRAPHS TO “A” OF THIS SUBSECTION:***

Each service provided by the Contractor shall have a 200 amp rating for traffic signal system, streetlight circuits, or combined services.

Services shall be 200 amp pad mount (unless otherwise noted in the plans) and shall be equipped with one 60 amp single pole breaker for the traffic signal and controller cabinet, one 40 amp single pole breaker for the intersection streetlights, and one 20 AMP 2-pole (120/240 VAC) for the CLV TELECOM cabinet. In addition, other breakers as may be shown in the service panel schedule in the plans will be required.

The Contractor shall obtain all addresses for new services from the City of Las Vegas, Department of Planning and Development, 495 South Main Street, (702) 229-5408.

***ADD THE FOLLOWING PARAGRAPH TO “B” OF THIS SUBSECTION:***

It shall be the Contractor’s responsibility to coordinate all work associated with service point connections required by this contract with Nevada Energy.

**623 G.03.10 PULL BOXES**

***DELETE PARAGRAPH “D.2” AND REPLACE WITH THE FOLLOWING:***

D. 2. ITS communications and CFO pull boxes and vaults may be field modified only with the approval of and as directed by the Engineer. Prior to Engineer approval on modified conduit entrances (“knock-outs” and cuts), the Contractor shall provide a shop drawing showing the proposed modifications. Refer to Section 623G.02.02 K for additional provisions.

***ADD THE FOLLOWING PARAGRAPH TO THIS SUBSECTION:***

E. The interior of pull boxes shall be void of any other materials except conduit risers and necessary wiring. All excess materials shall be removed to promote drainage.

***ADD THE FOLLOWING SUBSECTION:***

**623 G.03.13 SALVAGING ELECTRICAL EQUIPMENT**

1. Where shown on the plans or ordered by the Engineer, existing electrical equipment to be removed, including controller units, cabinets, signal heads, luminaires, standards, mast arms, ballasts, transformers, service equipment, pull boxes, and detector contact units shall be salvaged for reuse by the maintaining agency.
2. Care shall be exercised in removing and salvaging electrical equipment so that it will remain in its original form and existing condition whenever possible. Attention is directed to the provisions in subsection 107.11, “Responsibility for Damage Claims”, and 107.12 “Protection and Restoration of Property and Landscape”. The Contractor will be required to replace, at his expense, any of the above-mentioned electrical equipment, which, as determined by the Engineer, has been damaged or destroyed by reason of his operations.
3. Unless otherwise specified, underground conduit, conductors, foundations, and detector frames not reused shall become the property of the Contractor and shall be removed from the City right-of-way, except if not interfering with other construction, said materials, except foundations, may, with the written approval of the Engineer, be abandoned in place. Certain other materials, where shown on the plans, shall also become the property of the Contractor.
4. Unless otherwise specified, foundations to be abandoned shall have the top 18” below the crash cap removed and the resulting excavation backfilled. Attention is directed to the provisions in subsection 623 G.03.05, “Excavating and Backfilling”, regarding foundations to be abandoned.
5. Holes formed by removing pull boxes and foundations shall be filled with material equivalent to the surrounding material.
6. All street lighting and traffic signal equipment removed and / or designated to be salvaged shall be delivered by the Contractor to the appropriate CLV Service Yard with a means to unload. A 48-hour notice of delivery is required. Call (702) 229-6331 to set up delivery time. Repair of any damage to equipment during this process will be the contractor’s responsibility, at no additional cost to the City.

***ADD THE FOLLOWING SUBSECTION:***

**623 G.03.14 REINSTALLING SALVAGED ELECTRICAL EQUIPMENT**

1. When salvaged electrical equipment is to be reinstalled, the Contractor shall furnish and install all necessary materials and equipment, including signal mounting brackets, anchor bolts, nuts, washers, and concrete as required to complete the new installation.
2. All traffic signal, flashing beacon, and lighting fixtures to be reinstalled shall be cleaned and relamped.
3. Existing materials required to be relocated and found to be unsatisfactory by the Engineer shall be replaced by new material and the cost therefore will be paid for as extra work as provided in subsection 104.03, “Extra Work”.

***ADD THE FOLLOWING SUBSECTION:***

**623 G.03.15 STOCKPILING SALVAGED ELECTRICAL EQUIPMENT**

1. Existing equipment removed and not reused shall be salvaged, dismantled and returned to the maintaining agency during normal working hours. Call the maintaining agency to arrange for a time and location to stockpile the salvaged electrical equipment. An inventory of salvaged material shall accompany each delivery.

***ADD THE FOLLOWING SUBSECTION:***

**623 G.03.16 CFO COMMUNICATIONS INFRASTRUCTURE**

A. Communications infrastructure installed for the use of the CLV shall meet the following specifications:

1. The communications conduit shall run straight through the pull box, entering the side of the box near the bottom, to allow for a continuous fiber optic pull of no more than 6,000 feet.

2. The cover depth from the finish grade of all conduits shall be a minimum of 30 inches with allowances for conduit to rise near pull boxes for entry points. If conduit exists adjacent to the proposed conduit installation, the depth and location of the end of the new conduit shall be required to match the existing conduit.

3. The installation of a Type 200 Splice Vault as shown in the Uniform Standard Drawings with the letters "CITY FIBER OPTIC" inscribed on the lid shall be as shown on the Drawings.

4. All buried conduits shall have underground marking tape placed 12 inches above the installed conduit and marked with the letters "FIBER OPTIC." GPS coordinates shall be determined for all new and relocated CLV facilities that are connected via the underground conduit system and are visible at ground level as specified in **Subsection 623 G.01.05, "Global Positioning System (GPS) Coordinates**."

5. For roadway projects where the sidewalk, curb, and gutter are already installed and communications facilities are required, the appropriate size conduit may be installed at the lip of gutter as shown on the drawings or as approved by the Engineer.

6. Installation of fiber optic cable shall conform to **Section 680, "Fiber Optic Cable.**"

7. Conduit caps with J-hooks to support the CFO cable shall be installed for all spare conduit openings to prevent the entrance of debris into the conduit.

8. A #10 AWG THW Tracer Wire, shall be installed in all CFO conduit runs (empty and with cables).

**TRAFFIC SECTION**

**623 T.02.01 TRAFFIC SIGNAL CONTROLLER CABINETS**

***ADD THE FOLLOWING TO PARAGRAPH “A” OF THIS SUBSECTION:***

Cabinets shall be NEMA TS2 Type 2 cabinets with 16 load bay positions and shall be a 64 detector channel R cabinet with rack mounted detection, unless designated otherwise in the plans. The cabinet shall be either model R-44 CAB, TS2-2, LAS VEGAS, 64CH DET, Part # M73650 from McCain, Inc.; model Mobotrex LAS VEGAS TS2-TYPE2 16 POS., 64 CH. DET, Drawing # TF4216TLV01 REV 3 from Sierra Transportation and Technologies; or model TS2-2 HW 16 Position Horizontal City of Las Vegas, Part # 34413G12-2-06 from Econolite Control Products, Inc. All cabinets shall be provided with a complete set of four bus interface units (BIU’s), cabinet power supply and SDLC cables to provide a fully functioning system. Power supplies shall be Reno A&E model CPS-TS2-LED, Peek model PS101, or Econolite PS-200. BIU’s shall be Reno A&E model 1240, Peek model Bus Interface Unit 82-1886-01, or Econolite part number 160-1018-501.

***DELETE PARAGRAPH “D” OF THIS SUBSECTION AND REPLACE WITH THE FOLLOWING:***

D. Unless otherwise specified, all cabinets shall consist of Federal Specification 595 polyurethane, industrial grade pure white powder paint with 1.7 mil thickness both inside and out or approved equal. Unpainted, polished aluminum cabinets are not acceptable.

***ADD THE FOLLOWING TO PARAGRAPH “E” OF THIS SUBSECTION:***

The lifting tabs shall be bolted in place.

***DELETE PARAGRAPH “F.3” AND REPLACE WITH THE FOLLOWING:***

There shall be 3 aluminum shelves provided with all cabinets.

***DELETE PARAGRAPH “J” AND REPLACE WITH THE FOLLOWING:***

Cabinets shall have 2 LED light fixtures mounted in the cabinet interior.

***DELETE PARAGRAPH “J.1” AND REPLACE WITH THE FOLLOWING:***

One LED light shall be mounted over the door, at a location least likely to be damaged, and shall be a minimum of 20 inches in length.

***DELETE PARAGRAPH “J.2” AND REPLACE WITH THE FOLLOWING:***

The second LED light fixture shall be a 15 watt fluorescent equivalent fixture and shall be attached to the bottom of the lowest shelf above the back-panel and field terminals.

***ADD THE FOLLOWING PARAGRAPH TO “L.3” OF THIS SUBSECTION:***

The AutoCAD format used shall be compatible with the current version of AutoCAD used by the city.

***DELETE PARAGRAPH “L.5.i ” AND REPLACE WITH THE FOLLOWING:***

Two dual-circuit, solid state, NEMA flashers having a flash rate of 50 to 60 flashes per minute (see NEMA TS-1, Section 8, “Solid State Flashers”) shall be installed.

***DELETE PARAGRAPH “L.5.i.1” AND REPLACE WITH THE FOLLOWING:***

The red position of the load switch bays shall be operated from the flasher contacts as follows:

Flasher 1, contact A - phases 1, 5, and OLA

Flasher 1, contact B - phases 2, 6, and OLC

Flasher 2, contact A – phases 3, 7 and OLB

Flasher 2, contact B – phases 4, 8 and OLD

***DELETE PARAGRAPH “L.5.j.4” AND SUBPARAGRAPHS.***

***DELETE PARAGRAPH “L.5.l.4.a”.***

***DELETE PARAGRAPH “L.5.l.6.d.3” AND REPLACE WITH THE FOLLOWING:***

The toggle switches shall place a call into the controller for the associated pedestrian or vehicular phase when placed in the down (Test) position. This position shall be a momentary position.

***ADD THE FOLLOWING PARAGRAPHS TO “L.5.l.6” OF THIS SUBSECTION:***

8) An external minimum recall (identified EMR) switch shall be provided on the interior of the cabinet door for troubleshooting purposes. It will be a single pole-single throw switch and will apply logic ground to the EMR input to the controller. An LED circuit will also be wired to indicate the switch is activated.

***ADD THE FOLLOWING PARAGRAPHS TO THIS SUBSECTION:***

M. All field cables and interconnect cable entering the traffic controller cabinet shall be permanently labeled in the cabinet with their location and destination point in the intersection (i.e. “NW Corner – XX-A Pole”). Interconnect cables shall be labeled with their direction of travel (i.e. “Interconnect – From South” or “Interconnect – To North”). Wherever possible, the phase shall be noted on the label (i.e. “NE Corner – XX-A Pole – phase 8”).

The wires shall be identified using 1-inch wide UV resistant marking tape and the tape manufacturers recommended permanent black ink marker. Once marked, a suitable diameter piece of clear heat shrink tubing shall be installed and shrunk to protect the marking tape. The tubing shall extend 1-inch past the extent of the label in each direction along the wire to prevent moisture and dirt penetration.

**623 T.02.02 TRAFFIC SIGNAL CONTROLLER CABINET EQUIPMENT**

***ADD THE FOLLOWING paragraph TO “c” of this subsection:***

1. When Audible Tactile Pedestrian Push Buttons (PPB) are specified, an Audible Tactile interface panel shall be provided and mounted on the middle left side wall above the loop detector terminal panel. Central Control Unit (CCU) and failsafe cables shall be provided, neatly installed and terminated per manufacturer instructions. A CCU shall be provided for all cabinets configured for Audible Tactile PPBs.

***delete paragraph “E” and subparagraphs and replace with the following:***

E. Loop Detection:

1. The cabinet shall be wired with rack-mounted loop detection units. There shall be enough capacity for 32-two (2) channel amplifiers (Total of 64 vehicle detector channels).
2. All detector rack slots must be clearly marked as to the appropriate phase to which it belongs.
3. The panel to be used for field input wiring (loop lead-ins) shall be installed on the lower left sidewall.
4. All cabinets shall be provided with a complete set of two (2) channel rack mount detectors to fully populate the rack detector assemblies. Two channel rack detector amplifiers shall be Eberle Design Inc., Model 622T, Reno A&E model C-1200-SS, or Oriux 222 GP8, with vehicle extend and delay capability. Bicycle detectors shall be Reno A&E Model C-1201-B or Global Traffic Technologies, LLC, Model Canoga 9004, or approved equivalent.

***Delete paragraph TO “F.1” and replace with the following:***

All cabinets shall be equipped with encoded Global Traffic Technologies (GTT) Opticom compatible Emergency Preemption.

***Delete paragraph TO “F.3” and replace with the following:***

Provide one 4 channel rack mounted phase selector card and model 760 rack.

***Delete paragraph “F.4” AND SUBPARAGRAPHS and replace with the following:***

Cabinets shall be wired with an Opticom 768 Auxiliary Interface Panel and green-sense harness terminated on the field terminals.

***Delete paragraph “h.1” and replace with the following:***

Unless otherwise specified in the Contract Documents, all traffic control cabinets shall be supplied with a Malfunction Management Unit (MMU) with 16 channels.

***Delete paragraph “h.2” in its entirety***

***Delete paragraph “h.3” and replace with the following:***

Each MMU shall be furnished with the program card fully programmed for standard NEMA 8‑phase operation.

***Delete paragraph “h.6” in its entirety AND REPLACE WITH THE FOLLOWING:***

The wiring harness for the MMU shall have independent termination points.

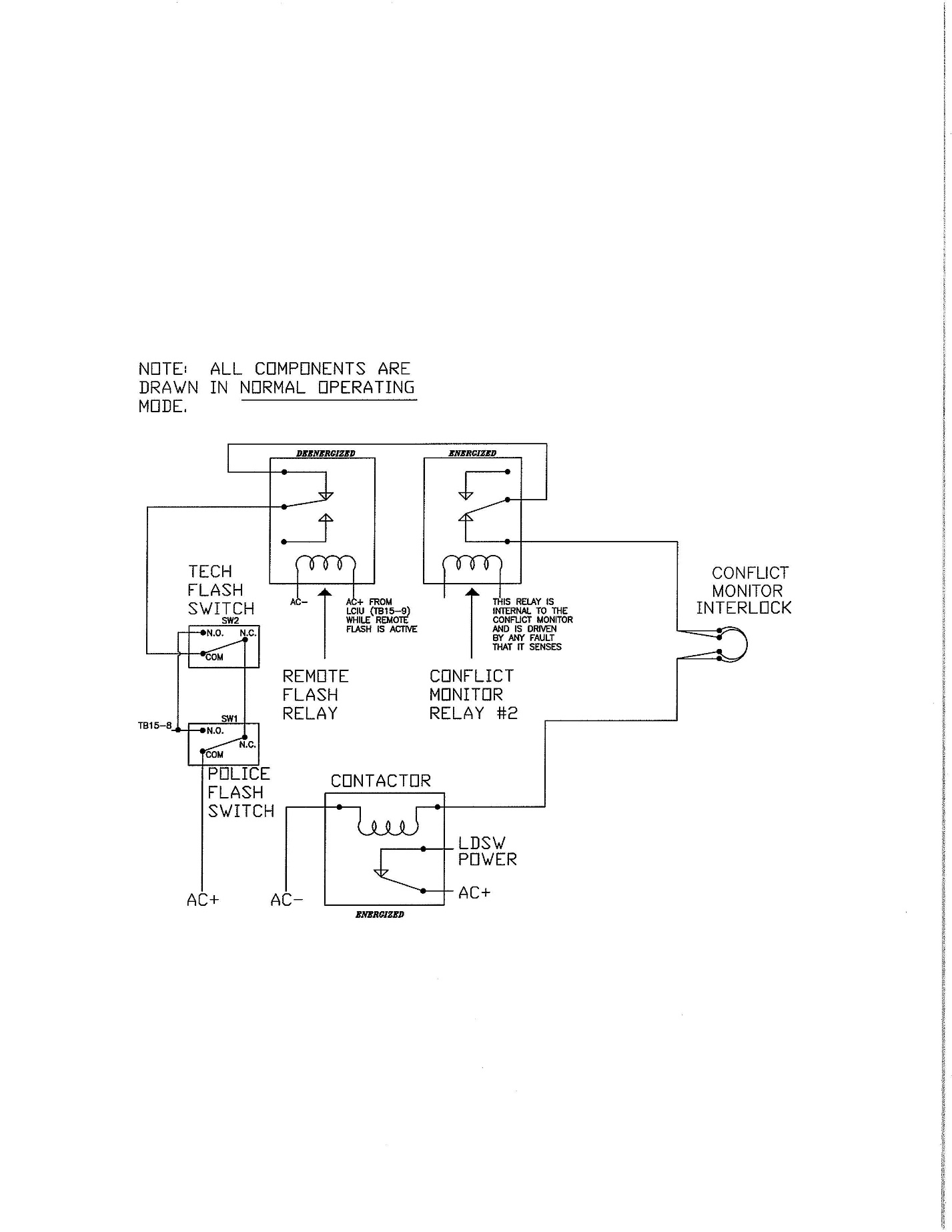
***Delete paragraph “h.9” and replace with the following:***

Unused wires shall be terminated on a separate back panel terminal that is easily accessible from the front of the cabinet without removing other panels.

***Delete paragraph “i” and subparagraphs and replace with the following:***

I. All malfunction management units shall be NEMA standard, meeting all requirements of Section 6 of the latest edition of NEMA TS 2 and shall meet the following requirements:

* + - 1. Malfunction Management Units shall have 16 channels.
      2. Malfunction Management Units shall be capable of monitoring “Flashing Yellow Arrow” operations.
      3. Malfunction Management Units shall be model MMU-1600GE as manufactured by Reno A&E, or approved equal.
      4. Malfunction Management Units shall be wired per the “Interlock Diagram” shown below with the appropriate relays.
      5. Malfunction Management Units shall store all configuration settings, including communication parameters, on the program card such that swapping the card into a new monitor copies all programming, and no laptops or front panel data entry are required.

****

**INTERLOCK DIAGRAM**

**623 T.02.03 TRAFFIC SIGNAL CONTROLLERS**

***delete “B.3” of this subsection in its entirty.***

***delete “B.6.d” of this subsection and replace with the following:***

The contractor shall be responsible for configuring all electronic equipment to provide a fully functioning system which includes opticom, video and/or loop detection as applicable and pedestrian pushbutton configuration. The video detection equipment manufacturer shall provide a technical representative at the intersection during the turn-on and testing period if necessary. The contractor shall also furnish and install all Ethernet cables necessary to connect all IP capable electronic equipment to the IP switch in the cabinet.

***delete “c” and “d” of this subsection and replace with the following:***

C. Traffic signal controllers shall be  **NAZTEC 980 ATC TS2 Type 2 NTCIP Compliant Signal Controller**.

1. *Note to spec writer: for city capital projects, the city will provide the controller, except on Federal projects.*

The Contractor shall supply the controller to the City of Las Vegas Traffic Engineering Field Operations (TEFO), fourteen days prior to signal turn-on, for testing. The Contractor shall deliver the controller to 3001 Ronemus Drive. Contractor shall notify TEFO (702-229-6331) seven days prior to installation.

**623 T.02.04 MAGNETIC INDUCTION LOOP DETECTORS**

***add the following to “A.1”:***

The term “loop leads” and “home runs” refers to two (2) conductors from the loop detector in the roadway to pull box. The term “loop lead in” refers to the conductors from the conductors from the pull box to the traffic signal controller cabinet.

***delete “A.4” and “A.5” of this subsection and Replace with the following:***

A. 4. Loop leads shall be properly marked in the pull box and the cabinet as to the location and which vehicular phase of the traffic signal is associated with that loop as well as a lettered designation corresponding to the designation shown on the contract drawings. For example, a loop lead for the eastbound thru movement might be labeled as either 4B, 4C, 4D, or 4E. The contractor shall contact TEFO to verify the loop numbering and labeling designations to be used before installing the loops.

A. 5. A minimum of 5 feet of loop wire and 5 feet of loop lead-in shall be provided and stored in the pull box for slack.

***delete “A.7” of this subsection in its entirety.***

***Add the following paragraph to “B.7.” of This subsection:***

B. 7. Preformed loops shall by one of the following manufacturers:

* + - * 1. Reno A & E,

Type PLB for mill/overlay or cutting into existing pavement

Type PLH for full depth replacement

b. Approved equal.

***Add the following paragraph to “B” of This subsection:***

*[Note to spec. writer: There are two loop detector installation methods provided below for full depth pavement construction. Check with Traffic Engineering for the appropriate method to use for each project. The one not used should be removed.]*

8. *(This installation should be used when pavement is to be milled/overlay or as an alternative installation method for full-depth pavement replacement)*

[When constructing new asphalt concrete pavement] [For milling and overlay pavement operations], preformed loops shall be installed prior to the final lift of pavement in saw cut loop slots made in the dense grade pavement (i.e. prior to the final lift of dense grade asphalt concrete, open grade, or U.T.A.C.S. pavement). There shall be a minimum cover of two inches measured from the bottom of the final finish grade pavement surface to the top of the preformed loop.

When installing loops in existing asphalt concrete or portland cement concrete pavements not being milled or replaced, saw cut slots in the pavement shall be a minimum of three inches in depth and there shall be a minimum cover of two inches measured from the finish grade pavement surface to the top of the preformed loop.

When constructing new portland cement concrete pavement, preformed loops shall be installed prior to placement of the pavement at the interface between the concrete pavement and base course material.

Sawed slots shall be spaced a minimum of six inches (150 millimeters) apart and shall be blown clean of all loose material and dried prior to the installation of the preformed loop. The preformed loop shall be carefully placed into the saw slot using special tools to avoid inflicting damage to the preformed loop assembly. When more than one loop terminates in a pull box, each loop shall have a separate sawed slot for its leads and leads shall be properly marked as specified below. Loop slots shall be sealed prior to paving. Polymeric sand may be used in lieu of sealant with the approval of the Engineer. The saw cuts shall be blown clean after wire installation and before placement of sealant. The loop lead‑in cable shall be as specified below. Each loop system (i.e. advanced detection, left turn movements, thru movements, and right turn movements) shall have at least one separate lead-in to the controller cabinet.

Loop leads shall be properly marked in the pull box and the cabinet as to the location and which vehicular phase of the traffic signal is associated with that loop as well as a lettered designation corresponding to the designation shown on the contract drawings. For example, a loop lead for the eastbound thru movement might be labeled as 4B, 4C, 4D, or 4E. A minimum of five (5) feet of loop wire and five (5) feet of loop lead-in shall be provided and stored in the pull box for slack. All loop wire home run to pull box shall clearly identify the direction of the cables windings for ease of installation.

Loop wire installation shall be tested using a megohmeter both prior to the placement of loop wire sealant, as well as after installation, in the presence of a City representative. Insulation resistance readings shall not be less than 100 megohms at 1000 volts.

***delete “C” of this subsection and Replace with the following:***

C. Cable-in-Duct System.

1. The loop system shall be wired with a cable-in-duct assembly, defined as No. 14 AWG minimum, meeting IMSA Specification No. 51-5 as indicated in the Standard Drawings, directly installed in sawcut slots.

2. When constructing new asphalt concrete pavement, loop wires shall be installed prior to the final lift of pavement in saw cut loop slots made in the dense grade pavement (i.e. prior to the final lift of A.C.). There shall be a minimum cover of two inches measured from the bottom of the final asphalt concrete surface to the top of the loop.

3. When installing loops in existing asphalt concrete or Portland Cement concrete pavements not being milled or replaced, or in new Portland Cement concrete pavement, saw cut slots in the pavement shall be a minimum of three inches in depth and there shall be a minimum cover of two inches measured from the finish grade pavement surface to the top of the loop.

4. The loop or loops shall be installed in the saw cut slots in the pavement and shall be oriented and color-coded or taped in accordance with the Standard Drawings and plans. Sawed slots shall be blown clean of all loose material and dried. Loop wire shall be carefully placed into slot, avoiding damage to the wire insulation. When more than one loop terminates in a pull box, a maximum of two loop home runs shall be installed per single slot and leads shall be properly marked as specified below. Loop home runs assigned to different signal phases shall not share the same slot with loop home runs for another phase.

5. Sawed slots shall be spaced a minimum of six (6) inches (150 millimeters) apart.

6. Loops slots shall be sealed with detector sealant flush with pavement surface.

7. Each loop system shall have a separate lead-in to the controller cabinet.

8. All loops shall be megohmeter tested.

***ADD THE FOLLOWING PARAGRAPHS TO “F” of this subsection:***

Multiple Conductor Loop Lead-In Cable for connection of Multiple Loop Systems:

When multiple conductor loop lead-in cable is specified on the contract drawings, use cable that conforms to the following specifications to connect multiple loop systems to the terminal blocks in the controller cabinet:

* 1. NEC / (UL) Specification TC or CM, certified for use in underground conduit or as an aerial cable supported by a messenger
  2. 18 AWG stranded tinned copper conductors, polypropylene or polyethylene insulation. Six twisted pairs with insulation colors that match table below
  3. Each twisted pair individually shielded with an aluminum foil shield that provides 100% coverage and a 20 AWG tinned copper drain wire
  4. Outer jacket of polyvinyl chloride (PVC) or polyethylene (PE), cable rated for 300 volts minimum

**6-Pair Loop Lead-in Cable Assignments**

|  |  |  |
| --- | --- | --- |
| **Pair Number** | **Color** | **Phase Letter Designation** |
| 1 | Black & Red | A |
| 2 | Black & White | B |
| 3 | Black & Green | C |
| 4 | Black & Blue | D |
| 5 | Black & Yellow | E |
| 6 | Black & Brown | F |

***Replace EACH OF THE FOLLOWING SENTENCES OF “h” OF THIS SUBSECTION with the following:***

2. All detectors shall be of the rack-mounted type.

* + - 1. There shall be 2 channels per each loop detector.

***Add the following PARAGRAPH to “h” of this subsection:***

* + - 1. Turning off a loop amplifier shall not place a call.

**623 T.02.05 EMERGENCY VEHICLE PRIORITY CONTROL SYSTEM (INTERNAL PREEMPTION)**

***Add the following PARAGRAPH to this subsection:***

**Optical Preemption units shall be Global Traffic Technologies (GTT)** (encoding capable), using a Model 764 phase selector installed in a Model 760 card rack with a Model 768 Auxiliary Interface Panel mounted in the cabinet and fully wired for green sense capabilities. Optical sensors shall be Model 721 and will be interfaced to the traffic signal controller cabinet using an M-138 cable. **No other optical preemption units will be accepted**. This is necessary to facilitate area-wide vehicle encoding.

**623 T.02.06 TRAFFIC SIGNAL VIDEO IMAGE DETECTION SYSTEMS**

*[Note to spec. writer: Agency Specified- many intersections may use loop detection in lieu of video so each set of SP’s must account for the type of detection specified]*

***ADD THE FOLLOWING TO THIS SUBSECTION:***

1. All cabinets shall be wired for a Video Detection System with appropriate cameras (minimum one per vehicular direction) and cables mounted according to the manufactures specifications for each direction of vehicular travel. The following requirements must be met by the supplier of the equipment:
   1. Video detection systems shall be TS2 compatible and shall input detector calls to the controller through an SDLC cable. A TS2 SDLC cable shall be provided with each video system.
   2. All vehicle detection shall be by video image detection**.** System shall be mounted in the cabinet and shall be either Iteris EdgeConnect module with Edge2 TS2-IM module and Edge2 single input video processors, or Peek VideoTrak-IQ with ethernet port and SDLC, or Econolite Autoscope Vision system with Comm Manager and Mini Detection Programming Kit or latest versions of these devices.The Video Detection System shall be an above ground vehicle detection system that utilizes machine vision when interfaced with standard color CCD cameras to provide complete intersection and roadway detection
   3. A single NEMA certified chassis shall be supplied for each Video Image Detection System. All interface equipment including video monitor, interface panels, connectors, and cabling shall be provided and wired in the controller cabinet to accommodate a the number of cameras shown on the Contract Drawings. If a mouse or programming keypad is required to program the system, then a mouse or keypad shall be provided with each system.
   4. Each Video Detection System will include a minimum of 4 standard color cameras, or as shown on the Contract Drawings. All cameras shall be equipped with adjustable lenses, allowing the user to modify the apparent size of the lens angle. These are also referred to as “zoom lenses”. Each direction/camera shall have a minimum of 16 detector outputs to the controller, and include heater, sunshield and mounting brackets. Each camera will have power and video directly from the cabinet. Coaxial cable will be type 8281 (solid center conductor). Camera connections that use a prefabricated cable integrating power and coaxial cable into a single weatherproof connector are acceptable. An in-line filter (CX06-BNCY or equivalent) will be provided for each camera coaxial cable input. The in-line filters will be mounted on a panel (panel to be attached to the inner side wall of the cabinet). “BNC” connectors are the only acceptable termination of coaxial cables. Cameras shall be mounted per the manufacturer’s recommendations and per the CLV Traffic Engineer approval. Cameras shall be mounted using a 72” extension bracket on signal mast arms. Cameras should be centered over the lane line between the left turn lane and the through lane for the approach being detected, unless otherwise directed by Traffic Engineering Field Operations. The contractor should contact the city Traffic Signal Supervisor prior to mounting cameras for approval of the mounting locations.
   5. All delay and extension functions for an approach must be performed within the video unit.
   6. The units must be capable of simultaneously detecting all vehicles 300 feet from the stop bars on every approach.
   7. The Video Image Detection System shall have an internet protocol (IP) port for remote access capability to transmit video and detector information to a computer. The Video Image Detection System shall have the capability to remotely reconfigure detection zones and transmit video via phone line, twisted pair, coaxial cable and fiber optic interconnect, using central software that is capable of managing multiple IP addresses
   8. The Contractor shall provide a fully functioning and programmed system complete with latest version of manufacturer’s software. All software and hardware for installation, operation and maintenance will be supplied to the City along with necessary technical support upon setup, if needed.

* 1. The Video Detection System shall utilize standard 24 volt logic signal outputs to interface with NEMA TS1/TS2, 170/179, 2070, or other future ATC controllers.
  2. The Video Image Detection System must provide logic ground to all detector outputs that shall be active during programming of detection zone layouts.
  3. All of the system’s micro-processing functions must be performed in the video unit, which must be located within the controller cabinet.
  4. All equipment schematics and technical material must accompany any equipment supplied to the City of Las Vegas Traffic Electrical Field Operations, upon turn-on of the signal.

**623 T.02.08 VEHICLE SIGNAL FACES**

***Add the following PARAGRAPH to “a” of this subsection:***

5. Vehicle signal faces shall be ETL compliant. The ETL Listed Mark indicates that the manufacturer’s production site conforms to a range of compliance measures and is subject to periodic follow-up inspections to verify continued conformance, and the product meets the minimum requirements of widely accepted product safety standards as determined through independent testing of a Nationally Recognized Testing Laboratory.

**623 T.02.10 PEDESTRIAN SIGNAL FACES**

***Add the following PARAGRAPH to “a.1” of this subsection:***

All pedestrian signal faces shall provide “Walking Person”, “Hand”, and “Countdown” messages as provided by **Duralight model #JXM-400-VIEIL** or **Dialight model #430-6479-001X** or approved equal (must be ETL compliant for consideration).

**623 T.02.11 PEDESTRIAN PUSH BUTTONS:**

***delete this subsection in its entirEty and replace with the following:***

1. Mounting height of pedestrian push buttons shall be 42” above the sidewalk. The unobstructed reach distance to the pedestrian push button shall meet current PROWAG guidelines. Use of extension brackets or similar hardware will not be allowed to meet PROWAG guidelines.
2. All pedestrian push buttons **shall be Polara iNavigator 2-Wire Pedestrian Pushbutton System with iN2 Push Button Stations and Shelf-Mount BIU control unit with SDLC Cable** Audible-Tactile Pedestrian Push Button type, or approved equivalent, in accordance with the request from the Nevada Bureau of Services to the Blind and Visually Impaired. Equivalent systems shall conform to the audible-tactile pedestrian system specifications below.
3. **AUDIBLE-TACTILE PEDESTRIAN SYSTEM SPECIFICATIONS**
4. **GENERAL DESCRIPTION**
   1. The Audible-Tactile pedestrian system shall consist of all electronic equipment, mounting hardware, power supplies, push buttons, and sign faces, which are designed to provide both a raised vibrating tactile arrow along with a variety of audible sounds for different traffic signal functions. The system shall consist of a Control Unit and Pole Mounting Assembly, as described below. Additionally, documentation shall include shop drawings for all equipment, electronic schematics, required voice setup software/ hardware, and installation/operations manuals.
5. **FUNCTIONAL REQUIREMENTS**
   1. The system shall vibrate the tactile arrow during every time the WALK interval indication is displayed.
   2. The system shall have the field-selectable function known as “Locating Beep.” This means that during the Flashing DONT WALK and the DONT WALK intervals, the system shall provide a steady, non changing, (constant dB level) pole locating tone that emanates directly in the vicinity of the Pedestrian Push Button.
   3. The system shall have the field-selectable function known as “Extended Push Activation.” This means that the audible WALK message will only be activated and sound during the WALK interval if the button is depressed for a minimum of three (3) seconds. This audible WALK message shall be able to be field set to allow for automatically adjusting to ambient noise levels via control circuitry.
   4. The system shall have the function referred to as “Voice Location Message.” This means that the location of the street to cross, and the intersection will be vocalized only when the button is depressed for a minimum of three (3) seconds. This shall be a field-settable option, and the volume shall be automatically adjusted to ambient noise levels
   5. The audible messages must be easily programmable by City staff, with the needed hardware and software to be supplied by the system’s vendor.
   6. Automatic volume adjustments for ambient noise shall be field selectable.
6. **CONTROL UNIT**

GENERAL DESCRIPTION

The equipment needed for the Control Unit must be able to be mounted in the Pedestrian Head Housing on the Traffic Signal Pole. It shall be powered from the 120 VAC, WALK/DONT WALK lamp indications in the housing. The unit shall conform to the following specifications.

1. POWER REQUIREMENTS: 115 VAC, 60Hz, (100 ma, typical)
2. Separate power inputs for “WALK” and “DONT WALK”, two ¼ AMP fuses mounted on the board
3. POWER SUPPLIED TO VIBRATOR: 12 VAC, .3A Typical, to operate during WALK interval only
4. AUDIO AMPLIFIER POWER OUTPUT: 10 W RMS into 8 ohms
5. VOLUME CONTROL: On board trimming potentiometer for overall adjustment
6. VOLUME CONTROL AUTOMATIC ADJUSTMENT RANGE: 28 Db
7. MICRPHONE FOR AMBIENT NOISE: Mounts in Pedestrian head housing. Frequency range: 170 Hz to 2.3 Khz
8. PED PUSH BUTTON INTERFACE: Accepts 12 to 24 Volts AC/DC imposed by connection to push button which will be terminated in an existing traffic signal controller cabinet
9. JUMPER SELECTABLE OPTIONS:
   1. Chirp
   2. Cuckoo
   3. Walk Message
   4. Location Message if Available
   5. Extended Push Button Triggering
   6. Locating Tone
10. MOUNTING: Mounts inside the pedestrian head housing using existing threaded holes in the rear wall on 9 ¼” centers. Designed to clear reflector in standard housing of dual incandescent pedestrian head. Not for use within the older, neon/transformer assemblies. The assembly shall accommodate a standard 9” X 12” pedestrian sign.
11. AUDIBLE LOCATING TONE: 880 Hz plus harmonics, 0.1 second duration, 1 second interval. Operates during flashing DONT WALK and solid DONT WALK indications, only
12. **POLE MOUNTING ASSEMBLY**

GENERAL DESCRIPTION:This equipment is the part that will be visible to the pedestrians. It is commonly referred to as the “Pedestrian Push Button Assembly.” This shall contain the 2” ADA-compliant Pedestrian Push Button, the directional tactile arrow, the weatherproof speaker, and the appropriate informational sign for each location.

* + 1. VIBRATOR POWER: 12 VAC, .3 A Typical
    2. SPEAKER: 8 Ohms, 15 Watt maximum, weather-proof
    3. PUSH BUTTON: Mounting height of the pedestrian push button shall be 42-inches above the sidewalk

1. **MESSAGE MARKING**

The Message Sign shall be an R10-3E sign, 9”x12” (size modified), per MUTCD 2009 edition, and shall be porcelain enameled metal.

**623 T.02.12 FLASHERS**

***ADD THE FOLLOWING PARAGRAPH TO THIS SUBSECTION:***

1. **PEDESTRIAN-ACTIVATED, AC-POWERED, HARD-WIRED RECTANGULAR RAPID FLASHING BEACON (RRFB)**

Each system shall consist of an electronic control module, a wireless communication system to synchronize the flash for multiple system units, Light Emitting Diode (LED) indication light bar signals (uni-directional configuration) and housings, and pedestrian push button assemblies and controls. A single unit shall include one beacon and include side-emitting pedestrian confirmation lights. The number and configuration of Flashing Beacon units for each Pedestrian Crosswalk shall be indicated on the contract drawings.

The system shall be manufactured by RTC Manufacturing, Inc., Elteccorp, or TAPCO Inc. The systems shall be capable of fully functioning with wired connections between the cabinet and the pedestrian pushbuttons, and with wired connections between the cabinet and the RRFB modules, without wireless communications between devices.

Other manufacturer units may be acceptable to the City of Las Vegas that comply with the requirements of the MUTCD, latest edition, FHWA Interim Approval 21 (IA-21), and meet or exceed the following specifications:

1. **LED MODULE**
2. Each RRFB shall consist of two rectangular-shaped yellow indications, each with an LED-array based light source. Each RRFB indication shall be a minimum of approximately 7-inches wide by approximately 3-inches high.
3. LEDs shall be color emitted
4. Lens may be same color or clear
5. LED power peak consumption to be 6 watts
6. **ELECTRONIC MODULE**
7. Electronics to be housed in a weatherproof metal casing with theft resistant locking hardware
8. Flash pattern and rate shall have multiple patterns with one pattern and rate to meet MUTCD, latest edition, Section 4k.01
9. System shall include energy management systems to continuously monitor battery and solar intensity and shall have the ability to increase brightness in sunny conditions and increase longevity in overcast or night time conditions
10. System to continue to operate for a minimum of 30 days, without solar recharging with a set flash rate meeting the MUTCD specified flash pattern
11. **Flasher Unit**
12. Flasher unit to be integrated with no external connected parts
13. Flasher housing to be yellow in color, or as specified in the Contract Drawings
14. Flasher unit shall be powder coated cast aluminum
15. Complete flasher unit weight shall not exceed 60 lbs, including batteries
16. Flasher units shall have detachable metal backplates which shall be flat black in color
17. Flasher units shall have metal tunnel visors which shall be flat black in interior color
18. Flasher units shall be equipped with hardware and be capable of mounting to the top of a Clark County Area Standard 1-A pole with 4.5” O.D. post top collar, or to the side of a Clark County Area Standard streetlight pole, traffic signal pole, or a traffic signal mast arm.
19. Flasher unit shall follow the provisions of FHWA IA-21.
20. **ACTIVITY AND OPERATION**
    1. Each flashing beacon unit or units of a system shall be capable of being activated by a pedestrian push button, and shall operate for a set flash duration upon activation. System shall reset flash duration upon activations that occur mid-cycle. The flash duration shall be user configurable in the field from 5-60 seconds, in increments of 5 seconds or less.
    2. System coordination must be repeatable upon testing for at least 50 activations. Both sides must be activated, flash, and stop flashing at the same time consistently.
    3. System must be able to power and be activated by a compatible pedestrian pushbutton. The button shall be capable of providing an audible tone and/or beep and a visible momentary or latched LED light to notify the user the switch was activated. The pedestrian pushbutton shall be vandal resistant.
    4. Each crossing system(s) shall operate and function as a whole, one system can include as many as, but not limited to, 4 pushbuttons, and 6 flashing beacons. When a two stage crossing is noted, the system shall be capable of programming each side to function independently.
21. **ENVIRONMENTAL SPECIFICATIONS**
22. The system shall be able to withstand and operate at a temperature extremes of 10 deg F to 165 deg F
23. The system shall be designed and constructed to withstand wind loads in conformance with the requirements of the AASHTO publication, “Standard Specifications for Structural Supports of Highway Signs, Luminaries and Traffic Signals”, 4th Edition, with latest interims
24. The electronic circuit board housing, wire harnessing and connectors shall be designed in accordance to IEC International Standard 60529, Ingress Protection IP67 requiring that the enclosure be dust tight and remain completely sealed when immersed in water to a depth of 1 meter for 1 hour
25. The LED Module shall meet the following environmental tests as specified in the ITE Vehicle Traffic Control Signal Heads, Light Emitting Diode (LED) Circular Signal Supplement:
26. Mechanical vibration: MIL-STD-883
27. Temperature cycling: MIL-STD-883
28. Moisture resistance: MIL-STD-810F
29. **WARRANTY**
    1. The manufacturer shall guarantee the system, including LED modules and all components, for a minimum of three years.
    2. Warranty shall include all parts of the unit including batteries.

**623 T.02.13 TRAFFIC SIGNAL POLES:**

***DELETE PARAGRAPH “A” IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:***

1. All traffic signal poles shall consist of continuous, tapered round steel pole shaft of the length specified, pole cap, anchor bolt cover, and hand hole covers(s), with the bolts, nuts, and washers necessary to complete the installation of the pole shaft. Multi-sided steel traffic signal poles are not accepted.

***delete paragraph “b” in its entirety and Replace with the following:***

1. The traffic signal and luminaire mast arms shall consist of continuous, tapered round steel tubes of the length specified, mast-arm end caps and bolts, nuts, and washers necessary to complete the installation of the mast arms. Multi-sided steel traffic signal and luminaire mast arms are not accepted.

***DELETE PARAGRAPH “K” IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:***

1. The pole shafts shall be of round cross section, with a minimum outer diameter at the base as shown in the Uniform Standard Drawings for the type of pole specified, and shall uniformly decrease in diameter at the rate of 0.14 inches per foot of length.
2. Pole shafts shall be straight, with a permissive variation not to exceed ¼ inch for each 10 feet of pole shaft.
   1. A 30-foot pole would have ¾ inch allowable deviation at the midpoint of the pole shaft.
   2. A 20-foot shaft would have a ½ inch allowable deviation.
   3. A 10-foot shaft could deviate a maximum of ¼ inch at the midpoint.

***ADD THE FOLLOWING PARAGRAPHS TO THIS SUBSECTION:***

W. Tenons

1. The mast arm is to be fabricated with end tenon only. The end tenon shall be factory installed and the remaining tenons shall be fabricated in the field at the locations shown on the plans or as directed by the Traffic Engineer and/or his authorized representative.
2. For tenon fabrication details see Clark County Area Uniform Standard Drawing No. 808 and No. 810.

X. Welds

1. All welding shall conform to AWS D 2.0, “Specification for Welded Highway and Railway Bridges”, and to any additional requirements in this subsection.
2. All exposed welds, shall be painted as provided for repairing damaged galvanized surfaces.
3. All welders must be certified by the American Welding Society (AWS) or similar organization in the welding of steel and galvanized steel.
4. All exposed weld joints shall be treated with rust inhibitors (i.e. Chemtrek or equivalent) and shall be painted as provided for repairing damaged galvanized surfaces.

Y. Pole Repairs

1. Holes, larger than one inch in diameter, left in the shafts or mast arms of existing standards, due to removal of equipment, shall be repaired by welding in a suitable disk, grinding smooth, and painting as provided for repairing damaged galvanized surfaces. Welding shall be done only after all combustible materials, cables and conductors have been removed.
2. Holes, one inch in diameter or less, left in the shafts or mast arms of existing standards, due to removal of equipment, may be repaired by threading the standard and inserting a threaded zinc die cast knockout plug of the appropriate size.

**623 T.02.16 INTERNALLY ILLUMINATED STREET NAME SIGNS**

***REPLACE SENTENCES 3 THROUGH 9 OF paragraph “C” WITH THE FOLLOWING:***

1. Sign lettering shall be as shown on the contract plans and shall conform to the 2009 edition of the M.U.T.C.D.
2. The sign face shall have the compass direction of the location marked in the upper left corner of each sign panel with a 5‑inch upper case letter (N, S, E or W).
3. The street name suffix (Street, Way, Blvd., and so forth) shall be displayed in the upper right corner of the sign panel.
4. The street address number of the location shall be shown at the lower right corner in 5‑inch upper case letters and numerals.
5. Engineer approval is required for the sign faces prior to fabrication.

***Add the following PARAGRAPHS TO this subsection:***

1. Internally Illuminated street name signs shall be wired to the luminaries photocell for control with No. 10 AWG THW copper stranded wire. In the event there is no luminaire on the traffic signal pole, a 1000 watt photoelectric control shall be mounted on the pole cap.
2. Internally Illuminated street name signs shall be LED and shall be one of the following products, or approved equal:

**NUART LIGHTING LED EDGE LIT SERIES** with ASTM Type IX retroreflective sheeting, and bandable mounting with L-brackets;

**TEMPLE EDGE·LIT 96" Model R409A** with ASTM Type IX retroreflective sheeting, and under·hang mast arm mount;

**SOUTHERN MANUFACTURING Part No. CP818DTJNNAAD1** with 8' x 18" Double Face Viewable Clean Profile LED; Top Mount, bandable mounting with L‑ brackets, “L” Adapter, No Photocell, Monarch Black, DG-Reflective / EC Film (Green); **Overall size: 8' x 21"**

***ADD THE FOLLOWING SUBSECTION TO THIS SECTION:***

**623 T.02.19 LUMINAIRE ON SIGNAL POLES**

*NOTE TO SPEC WRITER: TEFO is revising the special provisions for luminaires on signal poles for updated LED standards. Please refer to most recent approved fixture per CLV website, under building and safety form, prior to specifying fixture. Specific luminaire callouts shall be shown on the plans and not on the specs.*

1. Each luminaire shall have an individual 1000 Watt photoelectric control. Time delay photoelectric controls are not authorized. The standard luminaire shall be the L.E.D. type, and of style, colortemp, and amperage as shown on the Contract Drawings.
2. Special lighting requirements

*NOTE TO SPEC WRITER: TEFO is revising the special provisions for luminaires on signal poles for updated LED standards. If approved fixture is not on CLV website, contact TED.*

1. Summerlin area
   1. The luminaire mast arms shall be 3” wide by 5” high rectangular steel tubing with an arm span of 15’.

**CONSTRUCTION**

**623 T.03.01 PAINTING**

***ADD THE FOLLOWING SUBSECTION TO THIS SECTION:***

1. Special City of Las Vegas Areas
2. Unless otherwise specified, traffic signal system equipment located within the “special areas” noted below shall be finished with the color as indicated:
   1. Downtown Centennial Plan area: **RAL 6012 “Black Green”.**
   2. Summerlin: **RAL 3012, Beige-Red (“Summerlin Hummingbird Brown”).**
3. The following signal system components located in the special areas noted above shall be painted accordingly:
4. Traffic signal pole
5. Traffic signal mast arm
6. Traffic signal tenons
7. Traffic luminaire arm
8. Traffic signal luminaire head (reference Subsection 623 T.02.19 LUMINAIRE ON SIGNAL POLES of these special provisions)
9. Traffic signal poles, mast arms, luminaire arms and other elements specified to be painted shall be factory finished with a high-build, acrylic polyurethane enamel. Alternatively, a polyester TGIC or urethane polyester powder coat finish may be used. Equipment to be painted/coated shall be prepared and painted per manufacturer’s specifications.
10. The traffic signal mast arm shall be delivered with no tenons mounted to the mast arm, except for the end tenon. After the traffic signal pole foundation is constructed, the tenons shall be fabricated in the field at the locations shown on the plans or as directed by the Traffic Engineer. All welding shall conform to 623 T.02.13 of the CCAUSS and these Special Provisions. After installation of the tenons, the mast arm shall be shop painted and finished to match the traffic signal pole. No brushes or rollers shall be used to apply primers or paint except as approved by the Engineer.

**STREET LIGHTING SECTION**

**623 L.02.03 STREET LIGHTING LUMINAIRES**

*NOTE TO SPEC WRITER: TEFO is revising the special provisions for street lighting for updated LED standards. Please refer to most recent approved fixture per CLV website, under building and safety form, prior to specifying fixture. Specific luminaire callouts shall be shown on the plans and not on the specs.*

***DELETE THIS SECTION IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:***

1. The standard luminaire shall be as specified in the Contract Drawings.

**CONSTRUCTION**

**623 L.03.01 PAINTING AND FINISH REPAIR**

***ADD THE FOLLOWING SUBSECTIONS TO THIS SECTION:***

1. Holes, larger than one inch in diameter, left in the shafts or mast arms of existing standards, due to removal of equipment, shall be repaired by welding in a suitable disk, grinding smooth, and painting as provided for repairing damaged galvanized surfaces. Welding shall be done only after all combustible materials, cables and conductors have been removed.
2. Holes, one inch in diameter or less, left in the shafts or mast arms of existing standards, due to removal of equipment, may be repaired by threading the standard and inserting a threaded zinc die cast knockout plug of the appropriate size.

**623 L.03.03 ELECTRICAL TESTING**

***ADD THE FOLLOWING PARAGRAPH TO THIS SUBSECTION:***

1. The Contractor shall be required to submit record drawings prior to any inspections being performed. He and/or his representative shall be present at the project location during the maintaining agency’s inspection of the streetlight installation.

**METHOD OF MEASUREMENT**

**623.04.01 MEASUREMENT**

*Note to Spec Writer: This section shall be customized for each project to ensure that the basis of measurement for each bid item is properly described.*

The quantity of Pedestrian Pushbutton will be measured per each, in place and operational, as shown on the contract drawings and as directed by the Engineer.

The quantity of XX-INCH PVC CONDUIT will be measured per linear foot, in place and operational, as shown on the contract drawings and as directed by the engineer.

The quantity of TRAFFIC SIGNAL ASSEMBLY (LOCATION) will be measured per lump sum, as shown on the traffic signal plan sheets and details by location, and as directed by the Engineer.

The quantity of (TYPE) PULL BOX WITH NON-CONDUCTIVE LID will be measured per each, in place and operational, as shown on the contract drawings and as directed by the engineer.

The quantity of Solar POWERED Pedestrian ACTIVATED Flashing Beacon SYSTEM (LOCATION) will be measured per each, installed as a single unit or part of a system, in place and operational, as shown on the contract drawings and as directed by the engineer.

*[Note to spec. writer and consultant: verify that items on traffic signal sheets are specific to the traffic signal lump sum. Items not paid for under traffic signal lump sum must be shaded back on TS sheets.*

The quantity of INSTALL X GAUGE STREET LIGHT POLE ASSEMBLY, X FOOT ARM, XX LUMEN LED LUMINAIRE and FOUNDATION will be measured per each, in place and operational, as shown on the contract drawings and as directed by the Engineer.

The quantity of XX-INCH CONDUIT (CFO) will be measured per linear foot as follows, in place and operational, as shown on the contract drawings and as directed by the engineer:

(A) From center to center of pull boxes.

(B) From edge of foundation to center of pull box.

(C) From edge to edge of foundation.

(D) From end of conduit to center of pull box or foundation.

(E) From end to end of conduit when no pull boxes are used.

The quantity of TELECOM CABINET (POLE MOUNTED) will be measured per each, in place and operational, as shown on the contract drawings and as directed by the engineer.

The quantity of TELECOM CABINET (GROUND MOUNTED) will be measured per each, in place and operational, as shown on the contract drawings and as directed by the engineer.

The quantity of TYPE 200 SPLICE VAULT will be measured per each, in place and operational, as shown on the contract drawings and as directed by the engineer.

The quantity of P30 PULL BOX will be measured per each, in place and operational, as shown on the contract drawings and as directed by the engineer.

**BASIS OF PAYMENT**

**623.05.01 PAYMENT**

*This section shall be customized for each project to ensure that the basis of payment for each bid item is properly identified. The following are typical items and payment units:*

NOTE TO SPEC WRITER: if we are providing equipment (poles, mast arms, other long lead items, etc.) the contractor will need to pay the taxes. This will apply if we are not having the contractor replacing the inventory.

The following language is from the Ogden project:

The accepted quantity for TAXES FOR OWNER SUPPLIED ITEMS will be paid for at the contract unit price per lump sum and shall be full compensation for the actual costs of taxes as listed on the Bid Schedule. No Contractor profit or markup are permitted on TAXES FOR OWNER SUPPLIED ITEMS. The Contractor shall include this item on the second pay estimate and shall provide proof of payment of the taxes to the Department of Taxation to the ENGINEER with the pay estimate.

For estimating purposes get the pricing from TEFO and multiply by current sales tax rate (.0875)

Consider specifically listing the items this will apply to (see Ogden project for a great example)

The accepted quantity of Pedestrian Pushbutton will be paid for at the contract unit price per each and shall be shall be full compensation for all labor and materials, including but not limited to shipping and delivering costs, tools and required hardware for mounting, fittings, connections, equipment, making all required tests, and all other incidentals required to make the “Pedestrian Pushbutton” operational, and to function as intended as specified and shown in the contract drawings, the Clark County Area Uniform Standard Specifications, and these Supplemental Project Special Provisions.

The accepted quantity of XX-INCH PVC CONDUIT will be paid for at the contract unit price per linear foot and shall be full compensation for all labor and materials, including but not limited to, shipping, delivery, excavation, trenching, saw cutting, bedding, compacted backfill, concrete encasement, aggregate base, connections to existing conduit, pull boxes and vaults, temporary and permanent pavement patching, sidewalk and curb and gutter replacement, conduit, pull strings, tracer wire, fittings, bends, stub outs, pole risers, making all required tests and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of (TYPE) PULL BOX WITH NON-CONDUCTIVE LID will be paid for at the contract unit price per each and shall be full compensation for all labor and materials, including but not limited to, shipping, delivery, tools, pull boxes, foundations, concrete collars, frames, lids, excavation, bedding, backfill and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of INSTALL X GAUGE STREET LIGHT POLE ASSEMBLY, X FOOT ARM, XX LUMEN LED LUMINAIRE and FOUNDATION will be paid for at the contract unit price per each and shall be full compensation for all labor and materials, including but not limited to transportation, shipping and delivering costs, installation, tools and required hardware for mounting, crash cap, concrete and foundation, excavation (including hand digging foundations in areas of potential utility conflicts), all wiring above ground from the hand hole of the pole to the luminaires and receptacles, fittings, connections, equipment, all required tests, and all other incidentals required to make the streetlight operational, and to function as intended as specified and shown in the contract drawings, the Clark County Area Uniform Standard Specifications, and these Supplemental Special Provisions.

The quantity of TRAFFIC SIGNAL ASSEMBLY (LOCATION) will be paid for at the contract unit price per lump sum. The contract unit price for Traffic Signal Installation shall include full compensation for furnishing and installing all materials including, but not limited to, removal of foundations to a minimum 24” below proposed finished surface, saw cutting, excavation (including hand digging foundations in areas of potential utility conflicts), backfill, foundations new poles, new mast arms, new luminaires, wiring, mountings, pull boxes, new signal heads, new controllers, new cabinets, cabinet foundations traffic signal conduit, conductors, 6 Pair Loop Lead In Cables from the controller through new and existing conduit to new loop pull boxes, conductors between the service panel and the nearest pull box, time clock, loop amplifiers for bike loops and standard loops, breakers new internally illuminated street signs, loop detection system, video image detection, opticom systems, new mast arm mounted signs, and priming and painting of items detailed in Subsection 623 T.02.01 CABINET ENCLOSURES and 623 T.02.09 STANDARDS, STEEL PEDESTALS AND POSTS. the lump sum price paid for Traffic Signal Installation also includes the removal and salvage of existing poles, foundations, cabinets, pull boxes, vaults and other traffic signal equipment required for a complete and operational system as shown on the project Plans and in the Specifications and these Special Provisions.

The accepted quantity of TELECOM CABINET (POLE MOUNTED) will be paid for at the contract unit price per each and shall be full compensation for all labor and materials, including but not limited to, shipping, delivery, tools, mounting, mounting hardware, fans, power receptacles, conduit, racks, connections, and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of TELECOM CABINET (GROUND MOUNTED) will be paid for at the contract unit price per each and shall be full compensation for all labor and materials, including but not limited to, shipping, delivery, tools, foundations, mounting, mounting hardware, fans, power receptacles, conduit, racks, connections, and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of TYPE 200 SPLICE VAULT will be paid for at the contract unit price per each and shall be full compensation for all labor and materials, including but not limited to, shipping, delivery, tools, collars, concrete, forming, reinforcing steel, excavation, bedding, backfill, connections to conduit, replacement of damaged curb and gutter and sidewalk, and all required hardware to ensure item is complete, in place, operational and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

Construction and installation of concrete foundations, median islands, sidewalk ramps, traffic signal poles, streetlight poles, permanent striping and permanent signs shall not be included in the unit price bid for “Solar Pedestrian Crosswalk Flashing Beacon” but shall be paid as specified in their respective sections in the Clark County Area Uniform Standard Specifications or as specified in these Supplemental Project Special Provisions.

***This specification has been written such that each “Solar Pedestrian Crosswalk Flashing*** ***Beacon” unit is bid separately, per each. Depending on the project requirements, these units could be bid as a system, optionally, including the “Pedestrian Pushbutton”. The project engineer should make the determination of what is most appropriate for the project.***

*[Note to spec. writer: Need to add 4” conduit in downtown projects (one on each side of the street with crossings and pullboxes every intersection). Also add Wifi hardward to TS poles downtown. Coordinate with Traffic for locations and Specs for each forthcoming…]*

*Note to spec. writer: Existing Type 200 Splice Vault in project vicinity will have the lid replaced to an adjustable torsion spring assisted steel cover marked “Fiber Optic”. Use standard bid item and quantity:*

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 623.XXXX | ITEM | XX |

**END OF SECTION 623**

SECTION 624 - ACCOMMODATIONS FOR PUBLIC TRAFFIC

**DESCRIPTION**

**624.01.01 GENERAL**

***Delete this subsection in its entirety and REPLACE WITH following:***

A. The work shall consist of providing safe and effective work areas and to warn, control, protect and expedite vehicular and pedestrian traffic through the construction zone. It shall be the sole responsibility of the Contractor to provide for the safety of the traveling public within the limits of the project.

B. The work shall be performed in accordance with the latest edition of the Manual on Uniform Traffic Control Devices (MUTCD) and as specified in these Special Provisions.

***Add the following subsections:***

**624.01.70 SPECIAL TRAFFIC CONTROL, LANE RESTRICTIONS OR ACCESS ISSUES:**

A. Refer to section 107.07 for traffic and access requirements and section 108.04 for limitations of operations.

**624.01.71 TEMPORARY TRAFFIC CONTROL PLAN (TTCP):**

A. The Contractor shall submit a **"Temporary Traffic Control Plan (TTCP)"**.

1. The TTCP shall be drawn to represent existing conditions and scope of work.
2. The Contractor/Traffic Control Company shall comply with the City of Las Vegas **“Temporary Traffic Control Plan Conditions of Approval”.**
3. Acceptance of the plan shall be a condition on the Contractor prior to beginning any Work requiring an approved Traffic Control Plan.
4. For work in the Nevada Department of Transportation (NDOT), Clark County or City of North Las Vegas (CNLV) right-of-way, the TTCP shall also be submitted to the respective agencies for approval prior to the start of the proposed work.

B. A TTCP shall be required for each phase or segment of the construction.

1. The TTCP shall be submitted via CLV citizen portal at the website <https://www.lasvegasnevada.gov/dashboard>, fourteen (14) calendar days prior to the start of the proposed work.
2. The TTCP shall be prepared in accordance with the requirements of the MUTCD, specifically Part VI, latest edition.
3. The TTCP for each phase of construction will be considered separately.
4. Acceptance of the TTCP applies only to a specific phase of construction as identified on the plan.

C. There shall be no deviations from the approved TTCP unless a revised TTCP is submitted to and accepted by the City Traffic Engineer or duly appointed representative. The submittal shall be made at least fifteen (15) working days prior to the need for the proposed revision.

NOTE TO SPEC WRITER: Consider larger penalties/LDs for larger projects or projects with high traffic impacts. Coordinate dollar amount with Traffic Engineering.

D. In the event a routine TTCP deficiency, including maintenance of traffic control items, is not corrected within twenty four (24) hours after notification, **a deduction in the amount of two hundred dollars ($200) per deficiency** shall be made from monies due the Contractor for each calendar day that the deficiency is allowed to remain, not as a penalty, but as liquidated damages.

E. If, in the opinion of the City Traffic Engineer or duly appointed representative, a TTCP deficiency causes an unsafe condition that requires immediate correction, the Engineer will issue the Contractor a “Temporary Traffic Control Violation Notification” at which time the Contractor will have two hours to correct the noted violation.

1. If the violation is not corrected within the two-hour time limit, the **Contractor will be assessed $200.00 per hour as liquidated damages until the violation is corrected.**
2. This condition may cause the Project to “Stop Work”; this will not be grounds for a time extension of the contract.
3. In addition to the fines listed in D. and E. above, the Contractor may also be subject to fines in accordance with City of Las Vegas Municipal Code 11.50.040.

G. As an absolute minimum for each phase of the construction, the Temporary Traffic Control Plan shall show placement and spacing of all the traffic control devices (including signs, markings, channelizing devices, lighting devices, flaggers, etc.) and their spacing within the following traffic control areas:

1. Advance Warning Signs
2. Transition Areas
3. Buffer Spaces
4. Work Areas
5. Termination Areas

H. Type B high-intensity warning lights are required on all warning signs within the advance warning and transitional areas of all temporary traffic control setups. The Contractor shall provide Type C steady burn warning lights on channelizing devices within the transition areas of all night time temporary traffic control setups.

I. Additionally, the temporary traffic control plans must clearly show the following minimum requirements:

1. Method for protecting excavations, work sites and school zone crosswalks
2. Method of barricading at intersections
3. Driveway access plan
4. Provisions for emergency vehicle access
5. All set-up changes to accommodate different phasing of the work
6. Lane widths and transitions
7. 24-hour emergency telephone number
8. Business Access Signs
9. Sidewalk Closed / Cross Here Signs
10. No Parking Signs
11. Project Signs
12. Fresh Oil Signs
13. Duration of Traffic Control and Barricade Plan
14. All Advance Warning Signs
15. Placement of “Double Penalty in Work Zones” warning signs

J. The above-described plan shall conform to the Special Provisions contained herein, the latest edition of the MUTCD for all temporary traffic control methods, devices and appurtenances.

K. The Contractor shall begin placing the temporary traffic control devices in the direction of traffic. The Contractor shall remove the temporary traffic control devices in a direction opposing traffic.

L. During construction the Contractor shall coordinate with the RTC regarding specific dates of bus stop closures. Simultaneous closure of two or more sequential bus stops shall be minimized in duration and will only be allowed when necessary to maintain normal production levels for work items such as asphalt placement. The TTCP shall show required signage and barricading associated with bus stop closures and all applicable requirements of the TTCP shall apply to bus stop closures.

M. For any work requiring a sewer bypass plan:

1. An approved copy of the bypass plan must be submitted in conjunction with the TTCP and account for all bypass operations.
2. Allow 15 working days for review.
3. Contractor shall not mobilize without a TTCP that matches the approved bypass plan.

**CONSTRUCTION**

**624.03.01 SPECIAL DETOURS**

***delete PARAGRAPH “A” and replace with the following:***

A. Special detours shall be constructed as shown on the Temporary Traffic Control Plan prepared by the Contractor. Detour locations indicated on the Traffic Control Plan may be approximate only; the exact location shall be staked by the Contractor’s surveyor.

***add the following paragraphs to this subsection:***

G. It is the City of Las Vegas's policy that under no circumstances will travel on a temporary gravel surface be permitted for longer than fifteen (15) calendar days. Temporary gravel surfaces shall be graded, watered and maintained at all times to provide a smooth dust free traveled surface.

H. All temporary detours and/or bypasses that are expected to be in service for more than fifteen (15) calendar days shall be hard surfaced with a minimum of 1-1/2 inches of AC pavement and maintained in a smooth and usable condition at all times for the duration of the detour and/or bypass.

**624.03.02 FLAGGERS**

***Add the following to this subsection:***

D. Proper advance warning signs shall be in place prior to beginning flagging operations and removed at the end of each shift.

E. Flaggers shall be used to assist trucks for safe ingress and egress whenever truck movements may interfere with safe passage through the work zone. The flaggers’ first priority shall be to maintain the safe and efficient movement of the public traffic. In the event that a flagger is to flag at an intersection controlled by a stop sign they must bag the sign(s) prior to taking control of traffic. If a flagger is to flag at an intersection controlled by a traffic signal the traffic signal must be turned off prior to taking control of traffic. Any changes to regulatory signs or changes to a traffic signal shall be reversed at the end of every workday, unless approved by the City Traffic Engineer or duly appointed representative. Failure to do so could result in an order to stop work.

F. Flaggers operating within 300’ of a signalized intersection shall not direct or suggest a motorist or pedestrian to disobey a traffic control device per Nevada Revised Statute 484B.300 - Obedience to devices for control of traffic; exceptions; placement of devices; additional penalty for violation committed in work zone or pedestrian safety zone.

G. The "Flagger Method” as outlined in Part VI of the MUTCD shall be used for all one lane, two-way traffic control.

***Add the following subsections TO THIS SUBSECTION***

**624.03.70 TEMPORARY STRIPING**

A. The temporary traffic striping tape material shall conform to subsection 635.02.01 of the NDOT Standards. Placement of temporary pavement striping shall be by pilot line method and its use limited to fourteen (14) calendar days. The tape shall be four (4) inches wide and four (4) feet long and spaced every forty- (40) feet. The color of the tape shall match the color of the existing line. The double yellow line shall have two pieces of tape side by side with a four (4) inch space between, and spaced to the above increments.

B. Painted temporary striping shall be 4-inches wide and shall be continuous or intermittent in accordance with the MUTCD. Painted temporary striping shall not be used on the final wearing course of the pavement.

C. Existing pavement markings, either painted or raised pavement markers, which are not applicable and are within the transverse limits of the temporary travel lanes shall be removed to the satisfaction of the Engineer. Painting over existing markings will not be allowed.

**624.03.71 TEMPORARY BRIDGING FOR VEHICULAR ACCESS**

A. Where necessary or required for the convenience of the traveling public or individual residents, businesses or schools, The Contractor shall provide temporary bridges over all unfilled excavations at all street, driveway and alleyway, crossings unless otherwise directed by the Engineer. The bridges shall remain in place until the excavations have been properly backfilled to the satisfaction of the Engineer.

B. Temporary bridges for street crossings shall conform to the requirements of the authority having jurisdiction in each case, and the Contractor shall adopt designs furnished by said authority for such bridges or shall submit designs for approval by said authority as may be required. If plates are used, they must be capable of carrying the heaviest anticipated loads using the roadway, be properly anchored so as to prevent any transverse and/or any longitudinal shifting of the plate and must be certified by a structural engineer registered in the State of Nevada. Refer to USS 208.03.21 for trench plate requirements.

NOTE TO SPEC WRITER: oPEN TRENCH LENGTH SHOULD BE EVALUATED ON A PROJECT BASIS. eNSURE THAT SECTIONS 624.03.72 (b) & 624.03.75 (3) ARE CONSISTENT.

**624.03.72 PIPE LAYING OPERATIONS**

A. Pipe stored in the street rights of way within a barricaded work zone, with the approval of or at the direction of the Engineer, which is to remain one night or more shall be protected by Barrier Rail. Type B high intensity warning lights will be installed on the barrier rail at intervals not exceeding 25 feet.

B. During working hours, the Contractor shall have no more than three hundred (300) feet of open trench and/or structure excavation nor more than one half (1/2) of an intersection closed to vehicular traffic, except with specific written permission by the Engineer. During non-working hours, the Contractor shall have no more than one hundred (100) feet of open trench and/or structure excavation barricaded in accordance with these Special Provisions. Pedestrian access crossings suitably equipped with handrails shall be provided as directed by the Engineer. The cost of such crossings shall be included as a part of the traffic control bid item.

**624.03.73 TRAFFIC CONTROL DEVICES**

A. Trained and knowledgeable traffic control personnel shall be utilized to insure proper set-up and maintenance of temporary traffic control devices and to assist in the safe movement of vehicles through the temporary traffic control zone.

B. The Contractor shall remove from the public right-of-way all traffic control devices that are not in use or will not be used for a period greater than 24 hours. All traffic control devices that are determined by the Engineer to be unnecessary, confusing, or causing an unsafe condition, shall be removed by the Contractor from the public right-of-way immediately upon notification by the Engineer. The Contractor shall not, at any time, use the sidewalk area to store unused temporary traffic control devices unless the sidewalk is closed and an approved temporary traffic control plan is provided for rerouting the pedestrians.

C. The Contractor shall maintain all temporary traffic control devices in clean and effective condition. The Contractor shall replace poorly maintained devices immediately upon notification by the Engineer.

D. The Contractor shall begin placing the temporary traffic control devices in the direction of traffic. The Contractor shall remove the temporary traffic control devices in a direction opposing traffic.

E. **Temporary Stop Signs**: All temporary stop signs shall be installed in a semi-permanent manner in the ground or pavement surface in accordance with Standard Drawing Number 249 of the USD.

**624.03.74 TRAFFIC CONTROL SUPERVISOR**

1. The Contractor shall designate a Traffic Control Supervisor who shall be responsible for initiating, installing and maintaining all temporary traffic control devices as shown on the temporary traffic control plans, as specified in the latest edition of the MUTCD, and revisions thereto, the USS, these supplemental specifications or as directed by the Engineer. When temporary traffic control devices are on the project site the designated Traffic Control Supervisor shall be available to the Engineer twenty-four (24) hours a day for the duration of the contract. The Traffic Control Supervisor shall be an employee of the Contractor andunder the supervision of the Superintendent. The person so designated shall be certified as a worksite traffic control supervisor by the ATSSA. The name and qualifications of this person shall be submitted to the Engineer in accordance with subsection 105.02 "Plans and Working Drawings" of these Special Provisions.

B. The Traffic Control Supervisor shall be capable of being on-site within thirty- (30) minutes of notification.

C. The traffic control supervisor shall make at least four (4) inspections of all temporary traffic control devices each calendar day as follows:

1. Before beginning work
2. At mid shift
3. Half an hour after the end of the shift
4. Once during the period of non working hours

D. The Traffic Control Supervisor shall make a daily record of traffic control activities including a reference to the temporary traffic control in effect that day. The Project superintendent shall sign the daily record each day attesting to its accuracy. The Contractor shall submit these records to the Engineer on a weekly basis.

**624.03.75 REQUIRED PROTECTION FOR OPEN EXCAVATION DURING WORKING AND NON-WORKING HOURS**

A. The following requirements apply to any open excavations where the difference in elevation between the pavement and the excavated area is greater than 6":

1. Any open excavations, in the roadway or within eighteen (18) feet of the roadway, which does not provide a 4:1 (horizontal: vertical) slope between the edge of pavement and the bottom of the excavation, shall be protected with portable precast concrete traffic barrier rails and six (6) feet high non-climb fence. All portable precast concrete traffic barrier rails shall be butted tight and pinned in accordance with the requirements of the Nevada Department of Transportation Standard Drawing RB-47A and RB-47B “Concrete Barrier Rail Portable Precast”,which is hereby incorporated into the plans.

2. Any open excavation further than eighteen (18) feet and less than three hundred (300) feet from any building or roadway, shall be, as a minimum, completely fenced with a six (6) foot high non-climb fence.

3. Any open excavation beyond three hundred (300) feet of any building or roadway shall be protected with a three (3) foot high earth berm completely around the excavation. Type II Barricades with Type B high intensity warning lights shall be spotted around the top of the berm after daylight hours.

4. Barrier rails and fencing may be required, during working hours, when determined by the Engineer, to be in the interest of public safety.

B. The following requirements apply to any open excavations adjacent to a sidewalk where the difference in elevation between the back of the sidewalk and the excavated area is greater than 6 inches:

1. The open excavation shall be protected, as a minimum, with a six (6) foot high non-climb fence.

**METHOD OF MEASUREMENT**

**624.04.01 MEASUREMENT**

The quantity of TRAFFIC CONTROL AND MAINTENANCE will be measured per lump sum.

**BASIS OF PAYMENT**

**624.05.01 PAYMENT**

***Delete this subsection in its entirety and insert the following:***

The accepted quantity of TRAFFIC CONTROL AND MAINTENANCE will be paid for at the contract unit price of lump sum and shall include all labor, material and equipment necessary to provide measures to protect and maintain traffic 24 hours per day during the life of the Contract, including traffic control plan, temporary pavement, detours, the furnishing of such personnel, flaggers, crossing guards properly trained in traffic control for Suggested Routes to School, traffic control supervisor including the furnishing of daily record of traffic control activities, barricades, signs, arrow boards, portable changeable message signs, temporary pavement markings and striping (paint and tape), barrier rails, non-climb fencing, flashers, bridges, plates, etc. as may be required to insure the safety of the traveling public in accordance with Sections 107, 624 and 625 and all other applicable sections of the USS, USD and these Special Provisions.

**The value of the Traffic Control Supervisor’s site inspections in accordance with Subsection 624.03.74, “Traffic Control Supervisor” will be considered to be** **15 percent of the Traffic Control and Maintenance pay item.** Submittal of the daily record of traffic control activities will be evidence that the Traffic Control Supervisor has made the required inspections. **Failure to submit the required daily record of traffic control activities will result in the proportional amount of this bid item not being paid as work not performed.**

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 624.0010 | TRAFFIC CONTROL AND MAINTENANCE | LS |

END OF SECTION 624

SECTION 625 – CONSTRUCTION SIGNS

**MATERIALS**

**625.02.01 GENERAL**

***add The followiNG to this subsection:***

C. Reflective sheeting shall be used on all work zone signs and channelizing devices.

**CONSTRUCTION**

***Add The following SUBSECTIONS TO THIS SECTION:***

**625.03.05 PORTABLE CHANGEABLE MESSAGE SIGNS**

A. Portable Changeable Message Signs (PCMS) conforming to the MUTCD, Part 6, Section 6F.60 shall be used to advise the driver of road closures on streets with an 80-foot or greater right-of-way.

B. The PCMS shall be placed far enough in advance of the closed street to allow traffic ample opportunity to detour around the disrupted area.

C. The location and number of PCMS will be determined by the Engineer.

D. Solar powered panels shall be used in residential areas.

**625.03.06 ARROW DISPLAYS**

A. Arrow Displays conforming to the MUTCD, Part 6, Section 6F.61, Type B, shall be used to advise the driver of lane closures when so directed by the Engineer.

B. The Arrow Displays shall be required at the beginning of the taper and placed behind the barricades in the closed lanes, as required by the approved traffic control plan and as directed by the Engineer.

C. Solar powered panels shall be used in residential areas.

**METHOD OF MEASUREMENT**

**625.04.01 MEASUREMENT**

***Add The followinG TO THIS SUBSECTION:***

No direct measurement shall be made for PORTABLE CHANGEABLE MESSAGE SIGN or ARROW DISPLAY.

**BASIS OF PAYMENT**

**625.05.01 PAYMENT**

***Add The followinG TO THIS SUBSECTION:***

Unless otherwise provided in the Special Provisions, no payment will be made for PORTABLE CHANGEABLE MESSAGE SIGN or ARROW DISPLAY as such. The cost thereof shall be considered as included in the price bid for TRAFFIC CONTROL AND MAINTENANCE.

END OF SECTION 625

SECTION 626 – FINAL CLEANUP

**METHOD OF MEASUREMENT**

**626.04.01 MEASUREMENT**

***DELETE THIS SUBSECTION IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:***

No unit of measurement will be made for FINAL CLEANUP.

**BASIS OF PAYMENT**

**626.05.01 PAYMENT**

***DELETE THIS SUBSECTION IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:***

Unless otherwise provided in the Special Provisions, no payment will be made for FINAL CLEANUP as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which such FINAL CLEANUP is required.

END OF SECTION 626

SECTION 627 – PERMANENT SIGNS

**DESCRIPTION**

**627.01.01 GENERAL**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

E. The work shall include all labor, material, equipment and incidental hardware necessary to remove, relocate and/or install roadway street signs and posts.

F. The unit price shall include delivery of salvaged and unused signs to the City Maintenance Yard located at 3100 East Bonanza Avenue, Building A. The Contractor must call (702) 229-6331, 24-hours in advance of delivery. The Contractor must also have the ability to unload their truck without use of City facilities or equipment.

**MATERIALS**

**627.02.01 GENERAL**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

B. All new permanent signs shall utilize Type XI retroreflective sheeting in accordance with USS sections 627 and 716 and shall have an anti-graffiti protective overlay film that is a matching component to, and of the same manufacturer as the retroreflective sheeting to which it is applied.

**CONSTRUCTION**

**627.03.03 INSTALLATION**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

K. Directional signs that are not functional may require covering during the progress of the work.

1. Covers shall be sufficient size and density to completely block out the message so that it is not visible either during the day or night.
2. The use of burlap or similar fabrics will not be allowed.
3. Covers shall be fastened securely to prevent movement by wind action and withstand the effect of weathering.
4. No adhesive tape shall be applied to the face of the sign

**METHOD OF MEASUREMENT**

**627.04.01 MEASUREMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The quantity of INSTALL NEW SIGN (GROUND MOUNTED) will be measured per each.

The quantity of [FILL IN ITEM DESCRIPTION] will be measured per [UNIT].

No direct measurement shall be made for [FILL IN ITEM DESCRIPTION].

**BASIS OF PAYMENT**

**627.05.01 PAYMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The accepted quantity of INSTALL NEW SIGN (GROUND MOUNTED) will be paid for at the contract unit price of each and shall include all materials, equipment and labor required to fabricate and install the signs including, but not limited to, excavation; backfill; concrete foundation; supports; poles; hardware; making all required tests and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall conform to the requirements of subsection 627.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include,

Unless otherwise provided in the Special Provisions, no payment will be made for [FILL IN ITEM DESCRIPTION] as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which [FILL IN ITEM DESCRIPTION] is required.

All payments will be made in accordance with Subsection 109.02, “Scope of Payment”.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 627.0190 | INSTALL NEW SIGN (GROUND MOUNTED) | EA |

END OF SECTION 627

SECTION 628 – TRAFFIC STRIPING, PAVEMENT MARKINGS, AND CURB MARKINGS

**DESCRIPTION**

**628.01.01 GENERAL**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

D. Prior to using any material, the Contractor shall provide the Engineer with a written “Certification of Compliance” from the manufacturer of the material. The certification shall include the manufacturer’s name, business address and location of the manufacturing plant. It shall identify the specifications and include one copy. It shall show the quantity of materials supplied for each color, batch number and date of manufacture.

E. Manufacturer’s lab test results must be supplied upon request of the Engineer.

**MATERIAL**

**628.02.01 MATERIALS FOR TRAFFIC STRIPING, PAVEMENT MARKING AND CURB MARKING**

***DELETE PARAGRAPH “E.2” AND REPLACE WITH THE FOLLOWING:***

E. 2. If, for any reason, the markings fail to perform as specified, the Contractor, under this warranty, shall completely remove the old markings and apply new markings at no additional cost to the Contracting Agency. Removal shall be by wet sandblasting or other method authorized by the Engineer.

***ADD THE FOLLOWING TO THIS SUBSECTION:***

F. No pavement marking material shall be used which is not on the Qualified Products Lists (QPL) established by the Nevada Department of Transportation (NDOT) unless otherwise specified.

1. Liquid Pavement Marking (LPM) shall be either a polyurea or epoxy paint formulation.

NOTE TO SPEC WRITER: add the following section for work in parking lots

G. The following materials are acceptable for parking lots:

1. Ennis # 985691 Paint, Traffic RD White

2. Ennis # 985697 Paint, Traffic RD Yellow

3. Ennis # 985154 Paint, Traffic RD Red (for Curb)

4. Vista Paint # 6800 On-Line Semi-Gloss Traffic Marking Paint Blue (for Handicap parking)

**CONSTRUCTION**

**628.03.04 PREPARATION OF EXISTING SURFACES**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

D. Areas receiving slurry seal shall be allowed to fully cure for a minimum of twenty-one (21) days before application of the crosswalks, stop bars, arrows, epoxy or painted bike lanes and symbols, and permanent raised pavement markers.

***ADD The following subsection TO THIS SECTION:***

**628.03.70 TEMPORARY MARKINGS**

A. When otherwise not shown on the plans, detour transitional traffic line striping shall have a minimum taper of 20:1 for temporary striping and 30:1 for permanent striping. Temporary traffic lanes shall be at least ten (10) feet (3 meters) wide and no lane shall encroach within five (5) feet (1.5 meters) of an open excavation or within two (2) feet (0.7 meters) of longitudinal curb.

**METHOD OF MEASUREMENT**

**628.04.01 MEASUREMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The quantity of PAINTED MEDIAN ISLAND will be measured per square foot.

The quantity of TYPE 2 FILM FOR ARROWS will be measured per each.

The quantity of TYPE 2 FILM “ONLY” will be measured per each.

The quantity of TYPE 2 FILM FOR CROSSWALKS AND STOP BARS will be measured per square foot.

The quantity of TEMPORARY STRIPING will be measured per linear foot.

The quantity of [FILL IN ITEM DESCRIPTION] will be measured per [UNIT].

No direct measurement shall be made for [FILL IN ITEM DESCRIPTION].

**BASIS OF PAYMENT**

**628.05.01 BASIS OF PAYMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The accepted quantity of PAINTED MEDIAN ISLAND will be paid for at the contract unit price of square foot and shall include all materials, equipment, labor and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of TYPE 2 FILM FOR ARROWS will be paid for at the contract unit price of each and shall include all materials, equipment, labor and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of TYPE 2 FILM “ONLY” will be paid for at the contract unit price of each and shall include all materials, equipment, labor and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of TYPE 2 FILM FOR CROSSWALKS AND STOP BARS will be paid for at the contract unit price of square foot and shall include all materials, equipment, labor and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of TEMPORARY STRIPING will be paid for at the contract unit price of linear foot shall include all materials, equipment and labor required including, but not limited to, 4-inch yellow or white temporary stripig and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall conform to the requirements of subsection 628.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include,

Unless otherwise provided in the Special Provisions, no payment will be made for [FILL IN ITEM DESCRIPTION] as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which [FILL IN ITEM DESCRIPTION] is required.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 628.0270 | PAINTED MEDIAN ISLAND | SF |
| 628.0970 | TYPE 2 FILM “ONLY” | EA |
| 628.0940 | TYPE 2 FILM FOR ARROWS | EA |
| 628.1120 | TYPE 2 FILM FOR CROSSWALKS AND STOP BARS | SF |
| 628.1550 | TEMPORARY STRIPING | LF |

END OF SECTION 628

SECTION 629 – WATER DISTRIBUTION FACILITIES

**DESCRIPTION**

**629.01.01 GENERAL**

***ADD The following to this subsection:***

C. The work for the vertical adjust valve box and water blow-off to finish grade shall be in accordance with the Uniform Design and Construction Standards (UDACS).

D. Any method of relocation or encasement of water facilities other than that indicated on the plans or Standard Drawings must be approved by the Engineer prior to beginning work.

E. It shall also be the Contractor's responsibility to provide reference markers and records of the location of each water valve box and water meter to allow access at any time. The Contractor shall perform all work required for construction of water mains and appurtenances as shown.

F. It shall also be the Contractor's responsibility to verify the location of all existing water valves, meters, blow-off assemblies and other water facilities within the improvement area of this project and make any necessary adjustment of the cover to these facilities to their proper vertical location of the roadway and sidewalk improvement surface.

G. The Contractor shall notify Las Vegas Valley Water District (LVVWD) Construction Division ((702) 258-7171) at least 48 hours prior to start of construction on any water facility in this project.

1. Notice shall be given by 2:00 p.m., the business day prior to a LVVWD inspection.
2. When calling for an inspection, refer to the LVVWD project number found in the notes for scheduling an inspection.

**MATERIALS**

**629.02.01 GENERAL**

***ADD The following to this subsection:***

B. All materials for the water line construction will be in accordance with the current edition of the Water Standards and the Construction Drawings and Specifications, respectively.

**CONSTRUCTION**

**629.03.01 GENERAL**

***ADD The following to this subsection:***

B. The approximate locations of main lines are indicated on the plans.

C. The location of vaults, meters, valves, fire hydrants and service lines are not indicated on the plans. It will be the Contractor's responsibility to locate, and/or adjust these items as necessary for their proper placement according to the plans and standard drawings and the LVVWD.

***ADD The following subsections:***

**629.03.70 WATER SERVICE RELOCATIONS**

A. The locations of water service lines are not shown on the plans.

B. It shall be the Contractor's responsibility to relocate all water service lines interfering with roadway and/or drainage construction according to the UDACS.

C. The Contractor shall not leave said service lines disconnected for a longer period than 2 hours.

**629.03.71 WATER LINE AND SANITARY OR STORM SEWER LINE CROSSING**

A. All waterline and sanitary or storm sewer crossings shall conform to UDACS section 2.22.

**629.03.72 ADJUSTING VALVE BOXES AND VAULT COVERS**

A. Unless otherwise provided on the plans or by the Contract, existing covers shall be adjusted to the finish grade elevation.

B. Work shall include establishing accurate ties for locating valves after paving. Valve boxes that are adjusted to fit each location shall have final rim elevation at 1/8-inch to 1/4-inch below final street grade and shall be of the shape and size indicated in the USD. Water vault cover elevations shall also be of the shape and size indicated in the USD but shall match adjacent finish grade or sidewalk elevation

C. Minor adjustments shall be considered those adjustments made to all existing covers or boxes not requiring concrete collars, including frames or lids, to bring them to final street grade.

Note to Spec Writer – Keep the following section for cases when you have known quantities of ACP removal

**629.03.73 REMOVAL OF EXISTING ASBESTOS CEMENT PIPE (ACP)**

A. The removal of ACP shall be in the areas stated on the Contract Drawings and in these Special Provisions. Asbestos containing particulates are considered a hazardous material. The Contractor shall be fully responsible for taking the necessary measures and precautions when working with ACP. The Contractor shall dispose of all ACP in accordance with all local, state and federal regulations. The Contractor shall obtain and provide proof of the following permits/documentation when required:

1. **CLARK COUNTY DEPARTMENT OF AIR QUALITY, ASBESTOS NATIONAL EMISSIONS STANDARDS FOR HAZARDOUS AIR POLLUTANTS (NESHAP) NOTIFICATION OF ASBESTOS ABATEMENT**

Activity: Disturbance or removal of asbestos containing materials

Activity: Clark County Department of Air Quality (DAQ), (702) 455-5942

The Contractor intending to disturb, remove or engage in an asbestos abatement project is required to submit an Asbestos NESHAP Notification of Asbestos Abatement Application, which must be received by the Department of Air Quality ten days before beginning any on-site work at the asbestos abatement project.  The Contractor will forward a copy of the original application and a copy of the Project Notification Letter from DAQ to the Engineer.

1. **SOUTHERN NEVADA HEALTH DISTRICT AUTHORIZATION TO TRANSPORT ASBESTOS PERMITASBESTOS WASTE MANIFEST**

Activity: Transporting material containing asbestos to a disposal facility.

Activity: Southern Nevada Health District, (702) 759-1000

The Southern Nevada Health District will provide the Contractor with an Authorization to Transport permit.  The Contractor shall forward a copy of the original permit to the Engineer.

1. **ASBESTOS WASTE MANIFEST**

Activity: Disposing of material containing asbestos.

Activity: Disposal facility

The Contractor shall obtain an Asbestos Manifest from the disposal facility and provide the Engineer with the original Manifest.

1. **DECLARATION OF NON-HAZARDOUS WASTE (when required by Disposal Facility)**

The Contractor shall obtain a Non-Hazardous material disposal form from the Disposal Facility and forward copy of completed form to the Engineer.

**METHOD OF MEASUREMENT**

**629.04.01 MEASUREMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

Note to Spec Writer: Only use this if you anticipate it is needed. The quantity of MISCELLANEOUS LVVWD REQUIRED FIELD ADJUSTMENTS will be measured per force account. All force account work shall be performed under the direct supervision of the on-site Owner’s Representative and shall only commence under his/her express direction.

The quantity of XX-INCH C900 PVC PIPE will be measured per linear foot.

The quantity of XX-INCH DUCTILE IRON PIPE will be measured per linear foot.

The quantity of VERTICAL ADJUST WATER VALVE COVER will be measured per each.

The quantity of REMOVE AND RELOCATE WATER METER will be measured per each.

The quantity of ACP WATERLINE REPLACEMENT WITH (MATERIAL) PIPE (XX INCH) will be measured per linear foot.

The quantity of [FILL IN ITEM DESCRIPTION] will be measured per [UNIT].

No direct measurement shall be made for [FILL IN ITEM DESCRIPTION].

**BASIS OF PAYMENT**

**629.05.01 PAYMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The accepted quantity of MISCELLANEOUS LVVWD REQUIRED FIELD ADJUSTMENTS will be paid for at the contract unit price per force account in accordance with Section 109.03 Extra and Force Account Work and shall include all materials, equipment and labor required as necessary by LVVWD and not already included in the contract documents.

The accepted quantity of XX-INCH C900 PVC PIPE will be paid for at the contract unit price of linear foot and shall conform to the requirements of the Uniform Design and Construction Standards (UDACS) and shall include removal of pavement and the placing of the Permanent Patch; excavation; shoring; supporting; dewatering; pipe bedding; pipe installation; backfill; compaction; pipe materials; fittings and other appurtenances; connection to existing facilities; protective coatings; concrete; reinforcing steel; testing and disinfecting and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of XX-INCH DUCTILE IRON PIPE will be paid for at the contract unit price of linear foot and shall conform to the requirements of the Uniform Design and Construction Standards (UDACS) and shall include removal of pavement and the placing of the Permanent Patch; excavation; shoring; supporting; dewatering; pipe bedding; pipe installation; backfill; compaction; pipe materials; fittings and other appurtenances; connection to existing facilities; protective coatings; concrete; reinforcing steel; testing and disinfecting and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of VERTICAL ADJUST WATER VALVE COVER will be paid for at the contract unit price of each and shall conform to the requirements of the Uniform Design and Construction Standards (UDACS) and shall include all labor, equipment and materials, including but not limited to class B concrete collars; reinforcing; temporary adjustments to top of dense grade; and final adjustments to top of finish grade, and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

NOTE TO SPEC WRITER: Anytime 6-feet of ACP is exposed it must be replaced per UDACS. This should be quantified

The accepted quantity of ACP WATERLINE REPLACEMENT WITH (MATERIAL) PIPE (XX INCH) will be paid for at the contract unit price of linear foot and shall conform to the requirements of the Uniform Design and Construction Standards (UDACS) and shall include

trench excavation; placement of temporary patch; shoring; supporting and protection of existing utilities; dewatering of pipelines; pipe bedding; ductile iron pipe material; pipe installation; backfill; compaction; cutting of ACP waterline; handling and disposal of ACP material in accordance with local / state / federal regulations; connection and transition couplings; fittings and other appurtenances; thrust blocks; restraining joint gaskets; connection to existing facilities; service saddles; poly wrapping; protective coatings; CLSM slurry encasement (where required) of crossing utility or waterline; removal of segments of crossing utility and associated re-installation of water quality pipe (where required); concrete protection of under crossing utilities (where required); testing and disinfecting; coordination with LVVWD; and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

Unless otherwise provided in the Special Provisions, no payment will be made for the removal of pavement and the placing of the Permanent Patch in accordance with section 208 “Trench Excavation and Backfill”. The cost thereof shall be considered as included in the price bid for construction and installation of the pipe.

The accepted quantity of REMOVE AND RELOCATE WATER METER, will be paid for at the contract unit price of each and shall conform to the requirements of the Uniform Design and Construction Standards (UDACS) and shall include removal of pavement and the placing of the Permanent Patch; removal and replacement of sidewalk; removal and abandonment of existing water meter; excavation; shoring; supporting; dewatering; concrete pad; water laterals; meters; backflow prevention devices; meter boxes, pipe bedding; pipe installation; thrust blocks; corporation stop; service saddle, gaskets; coupling; backfill; compaction; pipe materials; fittings, tapping valve and other appurtenances; connection to existing facilities; protective coatings; concrete; reinforcing steel; testing and disinfecting and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The following is for items in spec 629: The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT], shall conform to the requirements of the Uniform Design and Construction Standards (UDACS) and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT], shall conform to the requirements of the Uniform Design and Construction Standards (UDACS) and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall conform to the requirements of subsection 605.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include,

Unless otherwise provided in the Special Provisions, no payment will be made for [FILL IN ITEM DESCRIPTION] as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which [FILL IN ITEM DESCRIPTION] is required.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 629.0200 | MISCELLANEOUS LVVWD REQUIRED FIELD ADJUSTMENTS | FA |
| 629.XXXX | XX-INCH C900 PVC PIPE | LF |
| 629.XXXX | XX-INCH DUCTILE IRON PIPE | LF |
| 629.1470 | VERTICAL ADJUST WATER VALVE COVER | EA |
| 629.XXXX | ACP WATERLINE REPLACEMENT WITH (MATERIAL) PIPE (XX INCH) | LF |

END OF SECTION 629

SECTION 630 – SANITARY SEWERS

**DESCRIPTION**

**630.01.01 WORK INVOLVED**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

B. This work shall consist of construction of a wastewater collection pipe and sanitary sewer manholes as shown on the Contract Drawings.

C. Any manhole or pipeline removal, replacement, or adjustment shall be performed in such a manner that the flow of the existing sewer is maintained.

***ADD The following subsection TO THIS SECTION:***

**630.01.70 STANDARDS**

1. All sanitary sewer improvements shall be constructed in accordance with the Southern Nevada Design and Construction Standards for Wastewater Collection Systems, most recent edition.

**MATERIALS**

***ADD The following subsection TO THIS SECTION:***

**630.02.02 MANHOLES**

E. Cast-in-place and precast manhole bases will be allowed for new construction of sewer pipe.

**CONSTRUCTION**

***ADD The following subsections TO THIS SECTION:***

**630.03.70 MANHOLE ADJUSTMENT**

A. When adjusting manholes, all components must be set in a bed of grout: Burke Type V nonmetallic, nonshrink. Burke can be mixed with equal parts of sand and Type V cement for components, but shall be used full strength in pipe inverts.

1. Range of grade ring height allowed for new manhole construction or existing manhole adjustment shall be 0 to 12 inches in accordance with the Design and Construction Standards for Wastewater Collection Systems, Drawing No. SD-5.
2. Class A concrete collars for sanitary sewer manholes shall be constructed in accordance with the Design and Construction Standards for Wastewater Collection Systems, Drawing No. SD-4.

D. When adjusting manholes, Contractor shall install plywood covers in sanitary sewer manhole inverts as well as steel plate covers over manholes (after manhole rings/frames are removed) to prevent debris from entering sewer manholes and corresponding lines.Debris in the manholes shall be removed prior to plywood removal. Plywood and steel covers for manholes shall be installed and removed in the presence of the CITY utilities inspector. All debris dropped into the sewer manholes and corresponding lines shall be retrieved at Contractor’s expense. Contractor shall clean (e.g., jet vac or equivalent) the debris out of the affected manholes and/or sewer lines in the presence of the City’s representative and approved by the Owner.

E. Frames and covers shall be match marked in pairs before removal and/or replacement. Covers shall fit into the frames without rocking. The integrity of the frames and covers are the responsibility of the contractor.

***Note to Spec Writer – Section 693 is to be used on all projects with new sewer and storm drain pipelines and structures, rehabilitated manholes, and rehabilitated sewer lines.***

**630.03.71 VIDEO INSPECTION**

1. Internal video inspection shall be performed by the Contractor per Section 693 – INTERNAL INSPECTION OF SEWER AND STORM DRAIN FACILITIES.

**METHOD OF MEASUREMENT**

**630.04.01 MEASUREMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The quantity of (SIZE) (TYPE) SANITARY SEWER PIPE will be measured per linear foot, measured from the end of pipe or inside face of structures.

The quantity of (SIZE) (TYPE) SANITARY SEWER MANHOLE will be measured per each.

The quantity of REPLACE SANITARY SEWER PIPE WITH PVC PIPE (XX INCH) will be measured per linear foot.

The quantity of [FILL IN ITEM DESCRIPTION] will be measured per [UNIT].

No direct measurement shall be made for [FILL IN ITEM DESCRIPTION].

**BASIS OF PAYMENT**

**630.05.01 PAYMENT**

***CHANGE This subsection to read as follows:***

NOTE TO SPEC WRITER: Make sure video inspection is incidental to new structures and pipe replacements per DCSWCS SD-18

The accepted quantity of (SIZE) (TYPE) SANITARY SEWER PIPE will be paid for at the contract unit price of linear foot and shall include all materials, equipment and labor required including, but not limited to, removal of pavement and the placing of the Permanent Patch; excavation (regardless of depth); shoring; dewatering; bedding; backfill; compaction; connections to existing facilities; abandon manholes; abandon pipe and connection of laterals; protection of existing utilities; internal video inspections; disposal of all excess unsuitable material including disposal fees and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of (SIZE) (TYPE) SANITARY SEWER MANHOLE will be paid for at the contract unit price of each and shall include all materials, equipment and labor required including, but not limited to, excavation; removal of existing manhole; shoring; grading; shaping; dewatering; aggregate base materials; granular backfill; drain rock; compaction; dowels; concrete; reinforcing steel; cones; steps; grout; PVC lining; precast concrete component; beams; grade rings; frames; grates; castings; lids; concrete collars around manholes; protection and restoration of all existing facilities; internal video inspections; support and protection of all utilities and maintain existing sewer flows and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

NOTE TO SPEC WRITER: If you have a utility, crossing under a VCP pipe, it cannot be supported and it should be replaced per DSCWCS SD-18. Any other instances that meet the criteria for DSCWCS should also be quantified.

The accepted quantity of REPLACE SANITARY SEWER PIPE WITH PVC PIPE (XX INCH), regardless of burial depth, will be paid for at the contract unit price of linear foot and shall include all materials, equipment and labor required including, but not limited to: trench excavation; placing of the temporary pavement patch; shoring; cutting and removal of segment of existing sewer pipe; furnishing and installation of new sewer pipe; bedding; trench backfill; compaction; connection to existing sewer pipe; connection and transition couplings / fittings; slurry encasement of sanitary sewer line (where required) for water quality purposes; support and protection of existing utilities; internal video inspection, disposal of all excess unsuitable material including disposal fees and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

Unless otherwise provided in the Special Provisions, no payment will be made for the removal of pavement and the placing of the Permanent Patch in accordance with section 208 “Trench Excavation and Backfill”. The cost thereof shall be considered as included in the price bid for Sanitary Sewer Pipe.

Unless otherwise provided in the Special Provisions, no payment will be made for Internal Video Inspection as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which Internal Video Inspection is required.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

Unless otherwise provided in the Special Provisions, no payment will be made for [FILL IN ITEM DESCRIPTION] as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which [FILL IN ITEM DESCRIPTION] is required.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 630.XXXX | (SIZE) (TYPE) SANITARY SEWER PIPE | LF |
| 630.XXXX | (SIZE) (TYPE) SANITARY SEWER MANHOLE | EA |

END OF SECTION 630

SECTION 633 – PAVEMENT MARKERS

**DESCRIPTION**

**633.01.01 GENERAL**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

D. Warranty:

1. The Contractor shall warranty the applied markings for one year from the date of installation.
2. If, for any reason, the markings fail to perform as specified, the Contractor, under this warranty, shall completely remove the old markings and apply new markings at the Contractor’s expense.
3. Method of removal shall be as directed by the Engineer.

***ADD THE FOLLOWING SUBSECTION:***

**633.02.70 MATERIALS**

A. No pavement markers shall be used which are not on the Qualified Products List established by the Nevada Department of Transportation.

**CONSTRUCTION**

**633.03.01 PREPARATION OF EXISTING SURFACES**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

I. Areas receiving slurry seal shall be allowed to fully cure for a minimum of 21 days before application of the permanent raised pavement markers.

**METHOD OF MEASUREMENT**

**633.04.01 MEASUREMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The quantity of BLUE REFLECTIVE RAISED FIRE HYDRANT ID PAVEMENT MARKERS will be measured per each.

The quantity of NON-REFLECTIVE RAISED PAVEMENT MARKERS will be measured per each.

The quantity of REFLECTIVE RAISED PAVEMENT MARKERS will be measured per each.

The quantity of [FILL IN ITEM DESCRIPTION] will be measured per [UNIT].

No direct measurement shall be made for [FILL IN ITEM DESCRIPTION].

**BASIS OF PAYMENT**

**633.05.01 BASIS OF PAYMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The accepted quantity of BLUE REFLECTIVE RAISED FIRE HYDRANT ID PAVEMENT MARKERS will be paid for at the contract unit price of each and shall include all materials, equipment, labor and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of NON-REFLECTIVE RAISED PAVEMENT MARKERS will be paid for at the contract unit price of each and shall conform to the requirements of subsection 633.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of REFLECTIVE RAISED PAVEMENT MARKERS will be paid for at the contract unit price of each and shall conform to the requirements of subsection 633.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

Unless otherwise provided in the Special Provisions, no payment will be made for [FILL IN ITEM DESCRIPTION] as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which [FILL IN ITEM DESCRIPTION] is required.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 633.0010 | BLUE REFLECTIVE RAISED FIRE HYDRANT ID PAVEMENT MARKERS | EA |
| 633.0030 | NON-REFLECTIVE RAISED PAVEMENT MARKERS | EA |
| 633.0050 | REFLECTIVE RAISED PAVEMENT MARKERS | EA |

END OF SECTION 633

SECTION 634 – TEMPORARY PAVEMENT STRIPING TAPE

**METHOD OF MEASUREMENT**

**634.05.01 MEASUREMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

No unit of measurement will be made for Temporary Pavement Striping Tape.

**BASIS OF PAYMENT**

**634.05.01 PAYMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

Unless otherwise provided in the Special Provisions, no payment will be made for Temporary Pavement Striping Tape as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which such temporary striping is required.

END OF SECTION 634

NOTE TO SPEC WRITER: Include the following sections for RTC Funded Projects only. **RTC is only wanting these for ROW 80’ or greater or if there are no CCTV near.** Recommendation for which devices should be bid and the number of days for each device should come from RTC. Any questions during the bidding process should be directed to RTC.

SECTION 635 – WORK ZONE ITS

**DESCRIPTION**

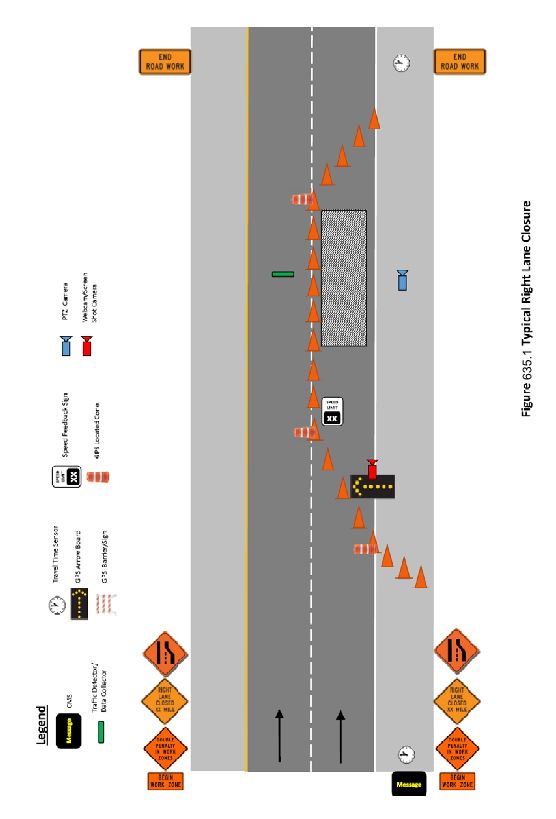
**635.01.01 GENERAL**

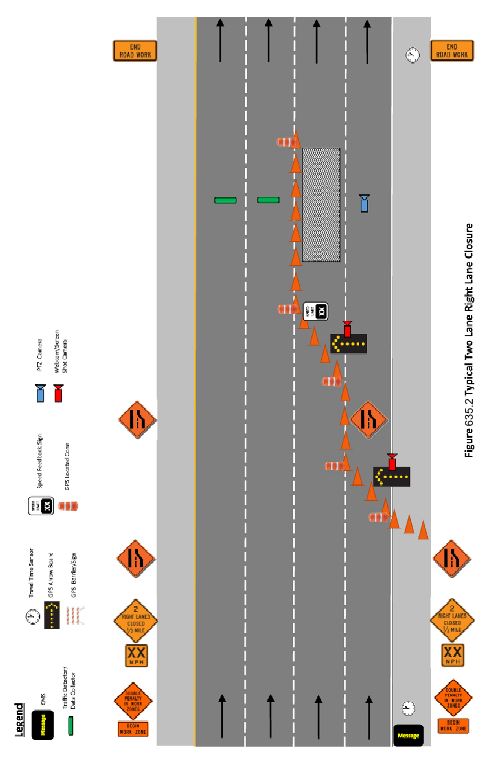
1. This work shall consist of providing, deploying, and maintaining technology within the project work zone that will provide pertinent device information, facilitate coordination with other active work zones, and increase the effectiveness of work zone traffic operations. Work Zone ITS is made up of several devices, supporting systems, and software.
2. The Contractor shall be responsible for the safety of all Work Zone ITS materials and shall take all necessary precautions to avoid loss or damage due to theft, vandalism, environmental conditions, unauthorized use, or other work zone hazards and shall bear the cost of replacing any component that is lost, destroyed or damaged.

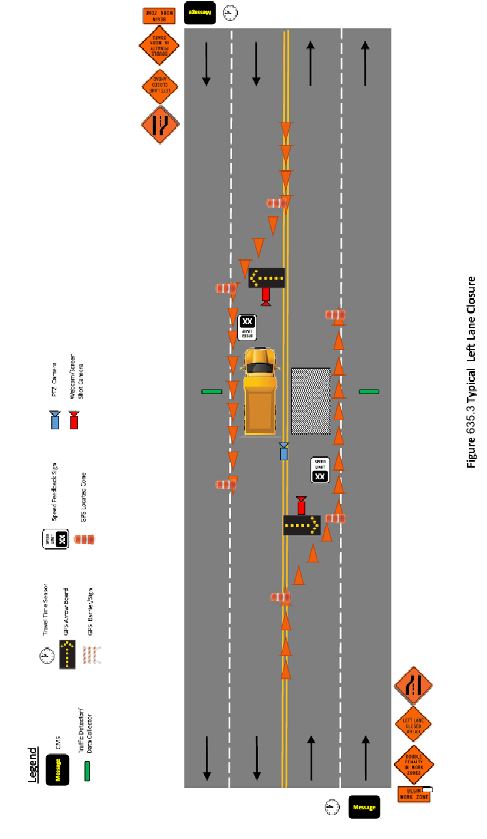
**MATERIALS**

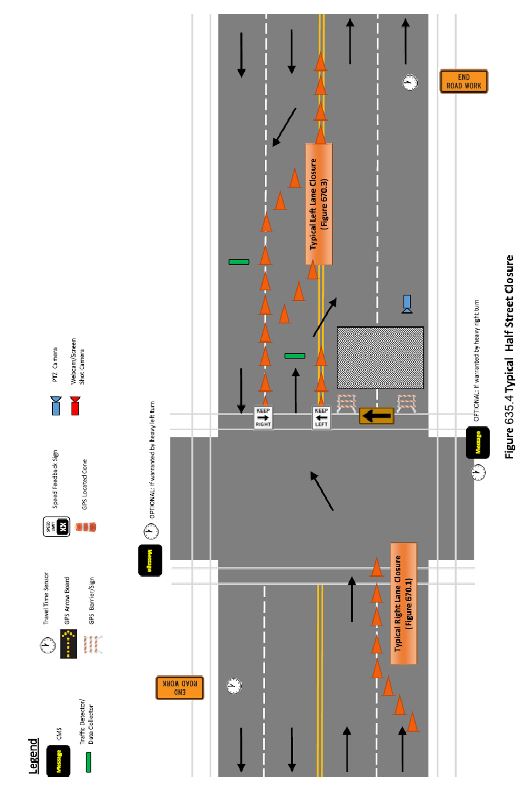
**635.02.01** GENERAL

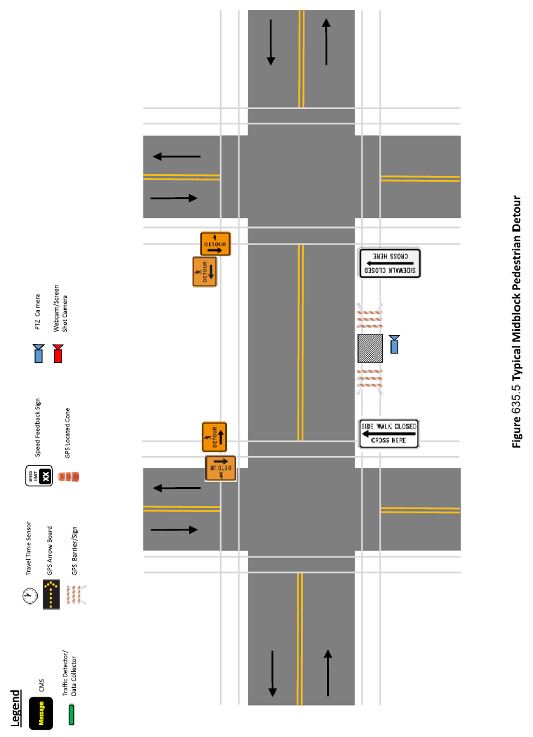
* + 1. All Work Zone ITS equipment components that are intended to be located outdoors shall meet the following environmental requirements:
       1. System device components shall be NEMA-3R (rainproof and sleet resistant) or IP22 (protection against solid objects over 12mm and against direct spray up to 15 degrees from vertical) rated for outdoor use.
       2. System device components shall meet NEMA TS1/TS2 Environmental requirements for temperature.
       3. System device components that don’t meet the above NEMA TS1/TS2 and NEMA-3R or IP22 shall be mounted within a NEMA-3R or IP22 rated enclosure that provides a ventilation system (e.g., temperature sensor, ventilation fan, dust filters, etc.) of sufficient capacity to prevent equipment inside from overheating or be explicitly designed to withstand and operate in seasonal high temperatures for the project area. The design of the provided capacity of this ventilation system shall account for the heat radiating from the enclosure mounted equipment and the historically high temperatures encountered within the summer season in Clark County, NV.
    2. Real-time GPS tracking is required on each device herein to inform remote system users of the location where the device is deployed and shall be shown on a single mapping interface to be determined by the RTC. The format of the data feed shall be Extensible Markup Language (XML), with a known schema coordinated with and approved by the RTC. The XML data shall be made available for RTC via an access through standard internet connectivity and services, with the provision of a data feed address, port (if applicable), and authentication/sign-on parameters. Real-time location shall be updated every 15 minutes at a minimum. The GPS locating device shall provide location data within 3 meters (9.84 feet) or less of the actual location. Each device location shall be uniquely identified on the map with a device type symbol and unique nomenclature for each device location. The map shall include a legend that identifies the device type symbols and the associated device function.
    3. All cameras shall have capabilities for remote viewing photos, at designated time intervals, or video streams by agencies, including RTC, FAST TMC, agency responsible for approving the traffic control plans, and by construction personnel, to monitor the work site, construction activities, and traffic conditions along the project corridor. All camera images and video streams shall be available remotely through a single software platform using a standard internet connection and services, with the provision of a data feed address, port (if applicable), and authentication/sign-on parameters. Each camera shall be uniquely identified on the RTC mapping interface using camera device type symbols (i.e., Fixed and PTZ) and a unique nomenclature for each camera location.
    4. All Work Zone ITS devices shall be provided with the necessary wireless communications equipment, FCC licensing, network services (i.e., cellular, WiFi, satellite, and internet network service plans), and other requirements as necessary to continuously operate and maintain a complete Work Zone ITS system. It shall be the Contractor’s responsibility to perform a site assessment of the project area and pick a cellular network provider that has sufficient data network capacity and coverage needed for this project. The Contractor shall submit to the engineer for approval a Cellular Communications Site Assessment Summary document identifying the project areas evaluated, the cellular network provider selected, and a statement indicating that there is sufficient data network capacity and coverage needed for this project.
    5. All Work Zone ITS devices and system shall be independently powered for operation continuously during all traffic control operations deployed in the project area. This power distribution assembly shall include intelligence for monitoring the remaining power level of the batteries and shall send a "critically low power" type alarm message, to the remote system server. The "critically low power" level selected shall provide enough time for the contractor to replace/recharge the device/batteries before the device has a power failure.
    6. All portable device trailers shall be capable of transporting all the necessary system elements and capable of mounting fully functional Work Zone ITS devices along the roadside. Each device trailer shall provide the following common elements:
       1. A trailer number that is unique (e.g., trailers deployed in the project area shall not have the same number as other deployed trailers) and is visible from the first vehicle travel lane adjacent to the deployed trailer.
       2. All necessary cables, power supplies and communications devices needed for interconnecting the trailer mounted devices shall be provided. Cable mounting provisions shall be provided within the trailer for securing cables during system operation and during transport to a different location.
       3. Mounting provisions for all associated trailer mounted devices. Mounting provisions shall include mounting of devices for deployment within the work zone and mounting provisions for hauling all associated trailer mounted devices from one location to the next without needing a separate vehicle to transport any of the components that are intended to be mounted on the trailer.
       4. The device trailer shall be street legal, have functioning brake lights connected to it when being towed, capable of being towed at high speeds, and provided with a standard size trailer hitch.
       5. The device trailer shall have adjustable leveling legs that can completely support the weight of a fully loaded trailer. The adjustable height of the legs should be able to raise the trailer wheels a minimum of four inches between the bottom of the wheels and a flat/level surface that the trailer is standing on. The device trailer shall have a minimum of two-level gauges (length and width positions) to indicate when the trailer is level.
       6. When in operation with all stabilizing devices in place, the device trailers shall be capable of withstanding wind gusts of up to 80 mph without overturning or changing orientation.
    7. The specific deployment location of each device shall be coordinated with and approved by the Engineer and agency responsible for approving the work zone traffic control plan. Devices locations shall not protrude into the vehicle realm of any work zone. The following figures are graphical scenarios that demonstrate typical intent of device locations. Exact locations will be will be determined at the preconstruction meeting.

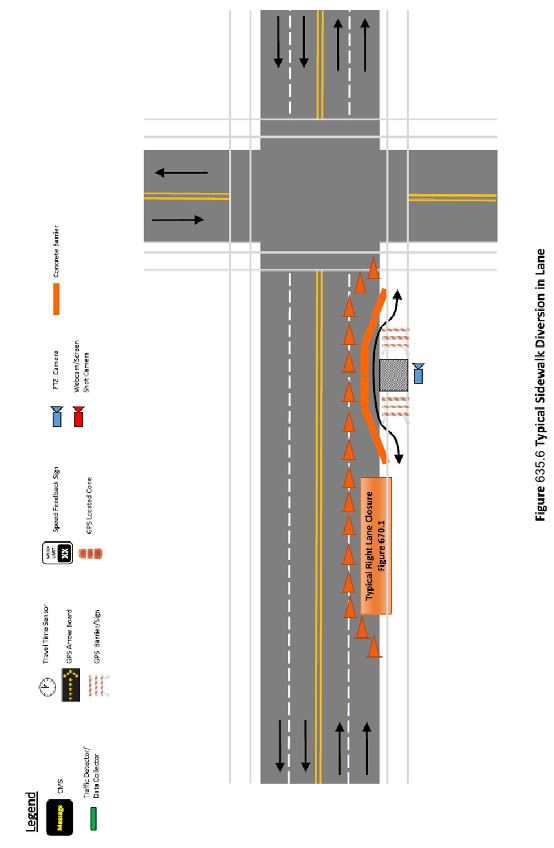


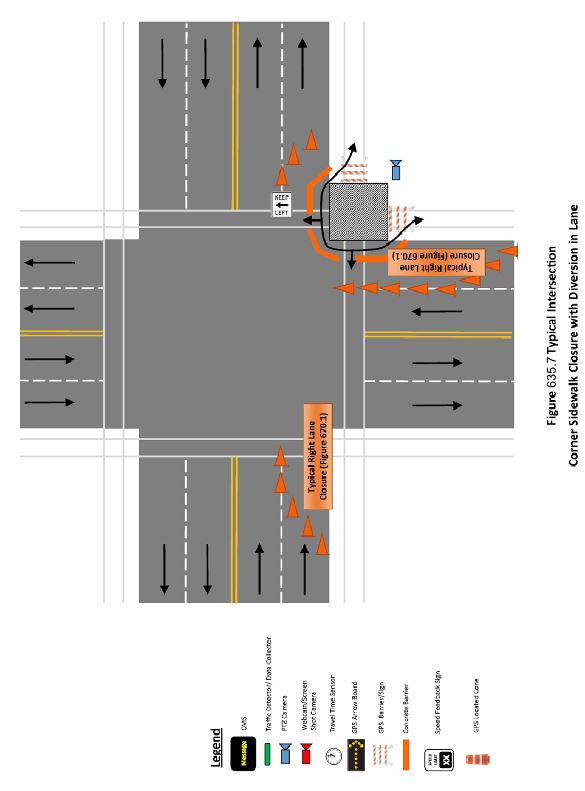












**635.02.02 VEHICULAR TRAFFIC DETECTION ZONE**

* + 1. The functional requirement of this item shall be to collect vehicle count, presence, speed, and flow data of vehicles passing through the work zone. Required deployment and calibration of the sensors by work zone field personnel shall be minimal, i.e. deployment and calibration shall not require specially trained personnel. A bulleted list of calibration instructions shall be given. The intent of the required efficiency for deployment of the system is set up so that it does not cause delays to the project work.
    2. Each detection zone shall be configured to provide vehicle count, presence, speed, and flow data. The selection of which traffic detection sensor system manufacturer(s) and model number(s) provided shall account for the manufacturer’s recommended offset distance from nearest travel lane while still achieving reliable detection data in the travel lane(s) it is deployed for.
    3. The traffic detection technology used shall be provided and integrated with a cloud-based Work Zone ITS system software for remote control/monitoring and shall collect, process, and archive traffic data every three minutes, at a minimum, and provide functionality to send email alert messages when user configurable traffic thresholds occur.

**635.02.03 PTZ CAMERA**

* + 1. A camera shall be provided with Pan-Tilt-Zoom (PTZ) functionality for remote monitoring of work zone conditions, video analytics for real-time status alerts of pre-programed thresholds, and a cellular network router used for remote communications and GPS tracking of the camera deployment location.
    2. Camera shall be mounted to a telescoping pole that provides a minimum height of 20 feet.
    3. Camera shall feature at a minimum the following capabilities:
       1. 20x zoom
       2. 60 frames per second
       3. 2 mega pixel or full high definition
       4. Auto/manual day and night visibility
       5. High speed PTZ

**635.02.04 GPS ARROW BOARD**

* + 1. An arrow board is typically required in traffic control plans to provide advance notice of lane closures and direct traffic to merge right or left. The typically used board is modified to add remote status monitoring, still shot digital camera, and GPS tracking functionality.
    2. Each GPS arrow board shall have a camera mounted on the back of the arrow board oriented in the direction downstream from the arrow board to monitor activity at the work site. The camera shall have the minimum capability of sending pictures at regular intervals, typically every 15 minutes. Sending video streams and providing PTZ capabilities are acceptable but not required to keep power and communication requirements low. The camera shall be mounted near the top of the board for maximum field of view. Camera provided shall feature at a minimum the following capabilities:
       1. 2 mega pixel or full high definition
       2. Auto/manual day and night visibility
    3. The arrow board shall provide a cellular network router used for remote communications and real-time GPS tracking to inform remote system users of the arrow board location, when deployed within the work zone, and shall also indicate which direction to merge or which lane is closed.

**635.02.05 GPS LOCATED TRAFFIC CONTROL DEVICE**

* + 1. The GPS tracking device on a traffic control device informs remote system users of the device location. These devices include but are not limited to:
       1. GPS Located Begin and End Work Zone Indicator
       2. GPS Located Barricade and Signs
       3. GPS Located Flagger
    2. GPS location of begin and end work zone indicator shall provide specific location of first traffic control device (cone) and last traffic control device (cone), each with a unique symbol identified in the legend and unique nomenclature for each device location on the RTC mapping interface.
    3. The GPS tracking device on a barricade and signs informs remote system users of work zone device locations and/or traffic restriction conditions. GPS located barricades and signs shall be placed where barricades and signs are typically placed where identified and required on the traffic control plans for street closures, half street closures, and on both approaches to sidewalk closures. There shall be a unique symbol identified in the legend for closure type (i.e., street, half street, and sidewalk closures) and unique nomenclature for each device location on the RTC mapping interface.
    4. The GPS tracking device on a flagger informs remote system users of work zone device locations and/or traffic restriction conditions that require a flagger. GPS located flagger shall be placed where identified and required on the traffic control plans. There shall be a unique symbol identified in the legend for an active flagger location and unique nomenclature for each device location on the RTC mapping interface.

**635.02.09 TRAVEL TIME TRAFFIC ANALYTICS SYSTEM**

* + 1. Travel time traffic analytics are systems which provide travel time data through the work zone in both travel directions. This system generates data that can be used for pre-Work Zone ITS deployment planning activities, as well as before/during/after evaluations. The system can be provided using cloud-based crowd sourced data or anonymous re-identification device (ARID) sensors. Travel times shall be provided in real-time, via a cloud-based Work Zone ITS software system, operator interface during construction when temporary traffic control devices are deployed, and travel times shall be archived for before/during/after evaluations of the project area.
    2. If ARID sensor(s) are used they shall detect the Bluetooth and WiFi signals in both travel directions from vehicles, hands-free sets, mobile phones, and navigation systems. Placement shall be the contractor’s responsibility. Existing traffic signal cabinets will not be available for housing sensors.
    3. The Travel Time Traffic Analytics technology used shall be provided with and integrated with a cloud-based Work Zone ITS system software for remote control/monitoring and shall collect, process, and archive travel times every three minutes, at a minimum, and provide functionality to send email alerts when travel time thresholds occur.

**635.02.10 SPEED FEEDBACK SIGN**

* + 1. The speed feedback sign detects and displays real time vehicle speeds and functions as a speed data collection point.
    2. Receive detector speed data using three-minute averages, at a minimum, for each location.
    3. Provide a system algorithm that automatically displays the current speed of the vehicle that is currently within the detection zone.
    4. Through the Work Zone ITS Software GUI, project stakeholders shall have the ability to monitor the status of the devices and if applicable for device set any threshold levels which will trigger a change in the speed display state (solid or flashing) and a change in color of the device symbol in the GUI to yellow when the device reading is at or below the threshold and changes the color to red or blue when the device reading is above the speed threshold.
    5. The GPS tracking device on the speed feedback sign informs remote system users of the device location using a unique speed feedback sign symbol identified in the legend and unique nomenclature for each device location on the RTC mapping interface.

**635.02.11 WORK ZONE ITS CHANGEABLE MESSAGE SIGN (CMS)**

* + 1. The Work Zone ITS CMS may be the first Work Zone ITS device that a driver will encounter prior to the beginning of the work zone. There are two (2) Work Zone ITS CMS locations, one for each direction of travel. Work Zone ITS CMS devices are deployed where there is an option for drivers to take an alternate route and thus avoid the work zone entirely. The message displayed on the Work Zone ITS CMS is intended to provide information to drivers regarding the conditions of the work zone, such as congestion or crashes, delay time, and available alternate routes to allow drivers to make informed routing decisions.
    2. The Contractor shall provide Work Zone ITS CMS devices as a fully functional system component that includes the following elements and meeting the applicable performance requirements identified in this section:
       1. One portable device trailer for each Work Zone ITS CMS location capable of transporting and mounting all the necessary system elements.
       2. A CMS mounted to a trailer with mounting bracket to adjust the field of view from the variable message display sign. The variable message display area shall display messages that are compliant with MUTCD Section 6F.60 - Portable Changeable Message Signs and display three lines of eight characters per line with each character a minimum size of five pixels wide by seven pixels high. The size of the characters shall be adjusted to correspond with industry recommended sizes for the actual speed limits posted, in the signs field of view, per the approved traffic control plans and shall accommodate speed limits up to 50 mph. The signs should be visible from 1/2 mile under ideal day and night conditions. Under low light level conditions, the sign shall automatically adjust its light source to meet the legibility requirements and not impair the driver’s vision. The pixels shall be constructed with Light Emitting Diodes (LEDs). The LEDs within the sign shall be visible to drivers that are in front of the sign and within a 30-degree cone of view from the sign.
       3. The Work Zone ITS CMS system shall use historical travel time data (provided under Travel Time Traffic Analytics System) compared against current travel times and shall automatically generate the delay times and other types of messages for display on the CMS, based on pre-set threshold triggers for each type of display message.
       4. The GPS tracking device on the Work Zone ITS CMS informs remote system users of the device location using a unique Work Zone ITS CMS symbol identified in the legend and unique nomenclature for each device location on the RTC mapping interface.

**635.02.12 VEHICLE PRESENCE ALERT SYSTEM**

* + 1. The Contractor shall provide a flashing light transponder for light bar equipped work vehicles to broadcast warnings or presence to other vehicles during construction. This transponder shall send location and status information to the RTC mapping interface and Waze interface. The vehicle presence alert system shall be synchronized with the light bar to allow for passive operation by the contractor. Activation of the light bar by the vehicle operator shall prompt the automatic activation of the device, and the device shall automatically deactivate with deactivation of the light bar. No other steps shall be required for the system to function.
    2. The functionality of the alerts shall be as follows:
       1. Location pin to be displayed on RTC mapping interface and Waze interface when light bar is flashing, and vehicle is stationary for approximately one (1) minute.
       2. When vehicle is in motion, the Waze pin will be deactivated.
       3. Each vehicle set up with “Vehicle Presence Alert System” shall be designated in Waze as “Construction Vehicle.”
       4. Each vehicle detection location shall be uniquely identified on the RTC mapping interface a unique “Construction Vehicle Present” symbol in the legend and unique nomenclature for each vehicle deployed within a work zone. Vehicle location must be static for a predefined period for the location to be displayed on the RTC map.

**635.02.13 WORK ZONE ITS SYSTEM SOFTWARE AND PERFORMANCE REQUIREMENTS**

* + 1. The Contractor provided Work Zone ITS systems shall be comprised of the following standalone systems or integrated together as one complete operational system. The software to operate each shall be full service software system to provide the required deployment controls, data collection, notices, alerts, and access to the RTC and other project stakeholders at a minimum for the following:
       1. Vehicular Traffic Detection Zone System
       2. PTZ Camera System
       3. GPS Arrow Board and associated camera images
       4. GPS Located Traffic Control Devices
       5. Travel Time Traffic Analytic System
       6. Speed Feedback Sign System
       7. Work Zone ITS CMS System
       8. Vehicle Presence Alert System
    2. The Contractor provided Work Zone ITS system software shall include the following minimum functionality:
       1. A secured web interface application software that allows RTC Staff, FAST TMC operators and other project stakeholders to log into the Contractor provided server, from a PC connected to the internet, using unique identifying credentials assigned to each person, for access to the system graphical user interface (GUI).
       2. Online control of device functionality in the following capacities:
          1. PTZ Camera: The ability to configure a minimum of five camera pre-set positions (e.g., five different fields of view).
          2. GPS Arrow Board: The web interface application software shall display the actual message currently being displayed on the arrow board for viewing by the traveling public.
          3. CMS: The web interface application software shall display the actual message currently being displayed on the CMS for viewing by the traveling public.
          4. System Threshold Alerts: Provide the ability to send alert messages to RTC users via email, based on user definable thresholds for speeds, flow, travel time and other traffic conditions.
       3. Archive system data in regular intervals for a minimum duration of seven years and provide the ability for RTC users and authorized stakeholders to access this data by generating RTC user selectable system reports in Microsoft Excel format or some other type of Engineer approved format that allows RTC to populate the data into a Microsoft Excel spreadsheet, using the copy and paste functionality of a personal computer. All system reports shall have a descriptive report name that distinguishes the report from other reports generated and clearly identifies the project name and number, calendar day, time of day (or time interval), device nomenclature, number(s), and location(s) that the data within the report represents. Available system reports shall include:
          1. Receive and archive "critically low power" type alarm message, with device number and time stamp and forward this alarm to the operator(s) via emails and/or text messages to a list of pre-defined stakeholders that want to receive the message.
          2. Monitor and archive "communication loss" type alarms, with device number and time stamp and forward this alarm to the operator(s) via emails and/or text messages to a list of pre-defined stakeholders that want to receive the message.
          3. Traffic Data History: This report shall provide the traffic data (e.g., count, speed, flow, travel time, etc.) requested by the RTC user for the device locations and time intervals selected by the RTC user. Traffic data interval shall typically be three minutes.
          4. Delay Time Data: This report shall identify delay times collected for travel through the work zone site in both directions and identify which direction of travel correlates to the delay times.
          5. Message History: This report shall identify the messages posted to the devices with a time stamp and identify the location of the device as well as the threshold that triggered the message.
          6. Device Location History: This report shall provide the device locations requested by the RTC user for the device numbers and time intervals selected by the RTC user.

**CONSTRUCTION**

**635.03.01** GENERAL

* + 1. At the preconstruction meeting, work zone ITS devices will be discussed so the Contractor can include them with their submitted traffic control plan. The Work Zone ITS items shall be treated as necessary traffic control items required on the site and placement shall not interfere with construction signs, barricades, warning devices or other temporary traffic control items necessary to complete the traffic control plan. Work Zone ITS items shall be paid for as described in Subsection 635.05.01 Work Zone ITS.
    2. The Contractor shall identify two members of the construction crew as the primary and secondary Work Zone ITS System Managers who shall be responsible for maintaining the system operation and dealing with any issues or questions that may arise. The contact information (mobile phone number and email address) of these Work Zone ITS System Managers shall be provided to the Resident Engineer (RE), RTC, FAST, and other project stakeholders. The Work Zone ITS System Managers shall be trained on the deployment and operation of all Work Zone ITS system equipment and web interface applications.
    3. Work Zone ITS material submittal items and other pre-deployment submittals required by this specification shall be submitted at the preconstruction conference when reasonably feasible. When not submitted at the preconstruction conference, the submittal(s) shall be specifically shown in the project schedule. The Work Zone ITS submittals shall be scheduled at least 45 days prior to the intended use and/or material transport to the project site. The Work Zone ITS System must be operational before any devices are deployed in the work zone.
    4. The following items shall be submitted at the preconstruction conference as required by the approved Traffic Control Plan:
       1. Traffic Control Plans with layout of Work Zone ITS Devices and Systems
       2. Equipment for each Work Zone ITS System and Software
       3. Cellular Communications Site Assessment Summary
       4. Work Zone ITS User Manuals including on-site system operational and safety procedures
       5. Work Zone ITS CMS System Algorithms and Messages
       6. Work Zone ITS User Access Privileges
       7. Work Zone ITS Alert Messages
       8. Work Zone ITS Report Formats
       9. Work Zone ITS Mode of Operation Deployment Schedule (“Normal” vs. “Baseline Data”)
       10. Work Zone ITS System Acceptance Testing Procedures
       11. Weekly ITS Reports
       12. Work Zone ITS System Training Curriculum
    5. Cameras shall be located adjacent to the work being completed currently on the work site. More than one camera may be required due to the length of project. Camera location(s) will be proposed and approved on the traffic control plan(s) submittal. Each camera shall be uniquely identified on the RTC mapping interface via legend and nomenclature.
    6. There shall be two GPS located traffic control devices at a minimum within each work zone to identify limits of the work zone. One GPS traffic control device shall be placed at the beginning of the work zone and one shall be placed at the end of the work zone. These shall be placed where the drums or cones are placed and not at the advance signing locations.

**635.03.02 WORK ZONE ITS MOBILIZATION AND DEMOBILIZATION**

* + 1. The Contractor shall provide a staging area and deliver the Work Zone ITS system field equipment to the staging area a minimum of two (2) weeks prior to deployment of the equipment within the work zone. The Contractor is responsible for the equipment while it is stored in the staging area and any insurance deemed necessary.
    2. The Contractor shall be responsible for pick-up of the Work Zone ITS field devices from the staging area and mobilization of the Work Zone ITS field devices at the work zone locations identified within the approved traffic control plan.
    3. The Contractor shall set up, configure, calibrate, and perform acceptance testing activities to verify proper operation. The Contractor shall provide these activities each time one or more Work Zone ITS field devices are moved within the project area. The Contractor shall relocate system field devices in accordance with changes to the traffic control plans and for system performance evaluation reasons.
    4. Upon completion of the Work Zone ITS system deployment period, the Contractor shall demobilize the Work Zone ITS field devices and remove them from the project site.

**635.03.03 WORK ZONE ITS SYSTEM CONFIGURATION**

* + 1. The Contractor shall provide support from a local and/or remote location for the setup and configuration of the Work Zone ITS system. All on-site system configuration procedures shall be clearly documented within the approved Work Zone ITS System User Manuals submittal.
    2. The Contractor shall coordinate with the Engineer and submit Contractor proposed CMS messages and associated traffic data thresholds for approval. No message shall be displayed on a CMS sign without prior approval from the Engineer. The Contractor’s Work Zone ITS CMS System Algorithms and Messages submittal shall include the proposed system algorithm with a minimum of four different real-time traffic condition thresholds (calculated based on Work Zone ITS system detector data) with an associated hierarchy of message types for each threshold that the system will display. The submittal shall include multiple message options message (e.g., stopped traffic ahead, alternate route, delay time, etc.) for each CMS location and for each real-time traffic condition threshold. The Contractor shall coordinate with the Engineer to pre-define alternate routes that may be used and include each of the associated alternate route messages in the submittal.
    3. The Contractor shall coordinate with the Engineer and provide a Work Zone ITS User Access Privileges submittal that clearly identifies each user by first and last name and the associated level of access that each of these users will have when logging into the system
    4. The Contractor shall coordinate with the Engineer and provide a Work Zone ITS Alert Messages submittal that clearly identifies all stakeholders by first and last name, the associated types of system generated alerts that each of these stakeholders want to receive, and the method (email and/or text) that the stakeholder wants to receive the alert.
    5. The Contractor shall provide a Work Zone ITS Report Formats submittal that includes a sample format for each type of required system report.
    6. Each Work Zone ITS system deployment configuration shall include two basic modes of operation. This first mode of operation shall be referred to as “Normal Operation” and the second shall be referred to as “Baseline Data Operation.” Within the baseline data mode of operation, all the system devices that collect and archive traffic data shall be fully operational and there shall be no messages displayed on the CMS and speed feedback signs (e.g., all message displays are blanked). During this baseline data mode of operation, the system shall be collecting, archiving, calculating, and reporting all the required data the same way that is used during normal operation. The baseline data collecting periods of time shall be clearly documented within the system reports, to distinguish them from the data that was collected during normal operations. This baseline data mode of operation and the associated data is a key component for evaluating the system performance. The Contractor shall coordinate with the Engineer and submit a Work Zone ITS Mode of Operation Deployment Schedule that identifies when the system is scheduled to be in each mode of operation (e.g., “Normal Operation” vs. “Baseline Data Operation”).
    7. The Contractor shall log into the Work Zone ITS system and confirm that the system setup and configuration has been completed and all Work Zone ITS field devices are operating as intended for the project area. Once this is confirmed, the Contractor shall send an email to the Engineer to inform stakeholders that the system is set up, operating properly, and ready to start acceptance testing.

**635.03.04 WORK ZONE ITS SYSTEM ACCEPTANCE TESTING**

* + 1. The Contractor shall perform and successfully pass system acceptance testing in accordance with the approved Work Zone ITS system acceptance testing procedures. The testing procedures submitted by the Contractor and approved by the Engineer shall demonstrate proper operation of all system and device configurations in accordance with the performance requirements. The testing procedures shall include the following:
       1. Initial system and device testing intended to demonstrate that the system provided successfully achieves all the required functionality, performance requirements, and reporting requirements. This initial system testing shall be at a test bed location provided by the Contractor where the field devices are deployed.
       2. Individual Work Zone ITS location type testing to verify the system and devices at each individual Work Zone ITS location is configured, reporting, and operating properly when moved in the project area after initial system setup.

**635.03.05 WORK ZONE ITS TRAINING**

* + 1. The Contractor shall provide system training in accordance with the approved Work Zone ITS system training curriculum. The training curriculum submitted by the Contractor shall demonstrate proper system setup, testing, and operational procedures at a minimum. The training shall reflect the actual needs of the field personnel and other project stakeholders accessing the system. Training shall ensure that field personnel are up-to-date on the safest and most efficient methods for moving and setting up field devices in the project area.
    2. The Contractor shall coordinate with the Engineer to identify mutually agreed upon training dates/times for each training class. The Contractor provided training shall include the following, at a minimum:
       1. One four-hour (4 hour) training class, hosted at the RTC FAST facility, for RTC, FAST TMC and other project stakeholders who will be accessing the system for system evaluation purposes. The training shall be hands-on type training using a personal computer that is connected to the Work Zone ITS system server(s) via the internet.
       2. One four-hour (4 hour) training class, at the test bed location provided by the Contractor where the field devices are deployed, for Contractor field personnel who will be deploying and operating the system and for RTC representatives who will be observing the system operation and acceptance testing.
    3. All on-site system configuration procedures shall be clearly covered in the System Training provided.

**635.03.06 WORK ZONE ITS OPERATIONS AND MAINTENANCE**

* + 1. The Contractor shall operate the Work Zone ITS system and provide technical support to RTC Staff throughout the duration of the Work Zone ITS system deployment period. The Contractor shall be responsible for identifying and performing preventive maintenance of the Work Zone ITS system and for software/firmware updates addressing glitches, substandard performance, and requested system configuration changes, reporting changes, and CMS system algorithm and message changes that may be desired as part of the system evaluation process. The Contractor shall resolve demonstrated software and equipment failures.
    2. The Work Zone ITS equipment vendor shall provide support from a local or remote location for operation while the equipment is deployed within a work zone. The Contractor shall provide on-site system operational functions using the Portable Operator Control Devices provided with each system. All on-site system operational and safety procedures shall be clearly documented within the submitted Work Zone ITS system user manuals.
    3. While the Work Zone ITS system is set-up and operating in the project area, the Work Zone ITS equipment vendor, the Agency RE or PM, the RTC FAST TMC representative, and the Contractor superintendent shall coordinate via email if there are any problems or issues that arise after the initial set-up. The stakeholder who discovers the issue shall initiate the email and copy all other stakeholders and resolution will be confirmed via email.
    4. The Contractor shall provide the Engineer in writing with responses to all questions and concerns, throughout the contract period and within five (5) working days of notification if the Work Zone ITS equipment is not active in the project area, and within 24 hours or less when the Work Zone ITS equipment is deployed within the project area.
    5. The Contractor shall be responsible for troubleshooting and fixing any problems with the equipment as it relates directly to how the equipment is mounted to the portable device trailers and how the power for these devices is connected to the trailer’s power distribution assembly.
    6. The Contractor shall be responsible for modifying file format, troubleshooting and fixing any problems with the application programming interface, and format/protocol of the GPS location data being sent to the RTC mapping interface system.

**635.03.07 WORK ZONE ITS REPORTING**

* + 1. The Contractor shall submit weekly system reports, as identified herein, to the Engineer and RTC. The Contractor shall submit each of these weekly reports by the close of business the following business day. The following weekly reports shall be included in these submittals as they apply:
       1. Vehicular Traffic Detector Zone
          1. System Alarm History Report
          2. System Traffic Threshold Alerts Report
          3. History of Archived Traffic Data Report
       2. PTZ Camera
          1. System Alarm History Report
       3. Traffic Control Device Location Data
          1. System Alarm History Report
          2. History of Archived Location Data Report
       4. Travel Time Traffic Analytics System
          1. System Alarm History Report
          2. System Traffic Threshold Alerts Report
          3. History of Archived Traffic Data Report
       5. Speed Feedback System
          1. System Alarm History Report
          2. Detector Speed Data Report
       6. Work Zone ITS CMS System
          1. CMS Message History Report
          2. System Alarm History Report
          3. Delay Time Data Report
       7. Vehicle Presence Alert System

**METHOD OF MEASUREMENT**

**635.04.01 MEASUREMENT**

ADD THE FOLLOWING TO THIS SUBSECTION:

The quantity of VEHICULAR TRAFFIC DETECTION ZONE, PTZ CAMERA, GPS ARROW BOARD, GPS LOCATED TRAFFIC CONTROL DEVICE, TRAVEL TIME TRAFFIC ANALYTICS SYSTEM, SPEED FEEDBACK SIGN, WORK ZONE ITS CHANGEABLE MESSAGE SIGN, AND VEHICLE PRESENCE ALERT SYSTEM will be measured per day.

Measurement for Work Zone ITS Mobilization and Demobilization shall be incidental to other item requirements. These incidentals shall include all materials, equipment and labor necessary to facilitate Work Zone ITS mobilization and demobilization per the contract documents. Work Zone ITS includes, but is not limited to, the mobilization and removal of Work Zone ITS devices, submittals, installing and removing equipment, and software including related modifications, configurations, acceptance testing, and training.

No direct measurement of individual traffic control elements or devices shall be made. All traffic control devices, unless otherwise noted, shall be considered as included in other items.

**BASIS OF PAYMENT**

**635.05.01 PAYMENT**

ADD THE FOLLOWING TO THIS SUBSECTION:

The accepted quantity of VEHICULAR TRAFFIC DETECTION ZONE, PTZ CAMERA, GPS ARROW BOARD, GPS LOCATED TRAFFIC CONTROL DEVICE, TRAVEL TIME TRAFFIC ANALYTICS SYSTEM, SPEED FEEDBACK SIGN, WORK ZONE ITS CHANGEABLE MESSAGE SIGN, AND VEHICLE PRESENCE ALERT SYSTEM will be paid for at the contract unit price of per day and shall be full compensation to furnish, deploy, operate, and maintain devices, systems software, and necessary appurtenances to provide a fully operational and complete system for each technology item or system as shown on the plans, as specified herein and as directed by the Engineer.

Unless otherwise provided in the Special Provisions, no payment shall be made for Work Zone ITS Mobilization and Demobilization as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items for which it is required.

Full compensation for all additional materials and labor, not shown on the Drawings or specified herein, which are necessary to complete the installations of the various systems, shall be considered as included in the prices paid for the systems, or units thereof, and no additional compensation will be allowed therefor.

All payments will be made in accordance with ***Subsection***[***109.02***](http://rtcws.rtcsnv.com/mpo/streets/files/specifications/text/109.doc#RTC_109_02)***, "Scope of Payment."***

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 635.0010 | VEHICULAR TRAFFIC DETECTION ZONE | DAY |
| 635.0020 | PTZ CAMERA | DAY |
| 635.0030 | GPS ARROW BOARD | DAY |
| 635.0040 | GPS LOCATED TRAFFIC CONTROL DEVICE | DAY |
| 635.0050 | TRAVEL TIME TRAFFIC ANALYTICS SYSTEM | DAY |
| 635.0060 | SPEED FEEDBACK SIGN | DAY |
| 635.0070 | WORK ZONE ITS CHANGEABLE MESSAGE SIGN | DAY |
| 635.0080 | VEHICLE PRESENCE ALERT SYSTEM | DAY |

**END OF SECTION 635**

SECTION 636 – POLYMER CEMENT SURFACING FOR ASPHALT AND CONCRETE SURFACES

**DESCRIPTION**

**636.01 Description**

This work consists of installing a polymer cement surface system (PCSS) (colored or base color) on a prepared substrate in accordance with these specifications and with the plans established by the engineer. The resulting surface may be patterned or monolithic as required by the design plans. The work shall be performed utilizing the products, processes, equipment, and certifications of Endurablend™ Systems, or an approved equal. Materials shall have proven in-place history over asphalt and/or concrete and should meet all the material properties and be installed in accordance with this specification.

**MATERIAL**

**636.02 Materials**

The PCSS material used shall meet the requirements of Sections 636.02.01.

**636.02.01 PCSS Material Properties**

The polymer cement surface, or approved equal shall provide a skid and abrasion resistant surface and meet or exceed the requirements in Table 636.2.1, which are included in the specifications or specified by the engineer.

|  |  |  |
| --- | --- | --- |
| **Table 636.2.1. Polymer Cement Material Properties** | | |
| **Description** | **Test Method** | **Value** |
| Compressive Strength, (at 28 days) 2” Cube **1** | ASTM C-109 | > 3,100 PSI |
| Tensile Strength **1** | ASTM C-190 | > 700 PSI |
| Bond Strength with Asphalt **1, 2** | ASTM C-1583 | > 250 PSI |
| Bond Strength with Concrete**1** | ASTM C-1583-13 | > 250 PSI |
| Skid Resistance (at 60km/hr) | ASTM E-1911 ASTM E-274 | > 40 > 40 |
| Length Change **1** | ASTM C-157 | < 0.024% |
| Solar Reflectivity Index **3, 4** | ASTM C-1549  ASTM E-1980 | > 29 |
| Flexibility **5** | ½” Thick Beam under Static Load – Max. Deflection | ≥ ½” |

**1**) The data shown is representative of laboratory test 28 day cured samples at 50% humidity.

**2**) Test sample must be prepared by overlaying ¼” (6mm) of product on 12.5mm HMA sample.

**3**) A SRI of greater than 29 can be obtained by using pigments or changing the color index of the aggregate. It is not applicable where color pigments are requested.

**4**) Only applicable for projects where a LEED certification credit is a requirement of the surfacing or where a reflective surfacing is specified.

**5**) Use the same loading rate as for the ASTM C-109 test above.

♣) Quality assurance tests for site

**636.02.02** **Admixtures and Pigments**

Any chemical admixtures and/or color pigments used, the dosage rates and the conditions for use in the PCSS shall be approved by the manufacturer.

Red brick application must be 5% by weight crushed red granite.

**636.02.03** **Sealer**

PCSS must be sealed after curing using Euclid Chemical EverClear or approved pure acrylic sealer compatible with the PCSS.

Sealer must be placed and cured in accordance with manufacturer’s recommendation prior to opening the corridor to traffic.

**636.02.04 WARRANTY**

Warranty all polymer cement surfacing material against manufacturing and installation defects for a period of two years after the date of substantial completion.

**CONSTRUCTION**

**636.03.01 Delivery, Storage, and Handling**

The material shall be delivered to site in weatherproof containers and stored in a covered and ventilated location.

**636.03.02 Equipment**

The equipment to be used shall be approved by the manufacturer or an approved installer. The installer shall demonstrate that the equipment shall be capable of handling materials, performing the work, maintaining proper material temperature, maintaining the minimum level of required productivity, and producing a product of the specified quality and be maintained in good mechanical condition. The contractor shall also provide sufficient equipment to enable the prosecution of the work in accordance with the project schedule and completion of the work in the specified time.

**636.03.03 Material Handling Equipment**

The equipment shall be capable of handling and transferring the dry materials and liquids to the approved mixer without causing spillage, segregation, or contamination.

**636.03.04 Weather Limitations**

A. Required Conditions

PCSS shall only be placed when all of the following conditions are met:

* The pavement surface is dry.
* Ambient and substrate temperatures are 50° F (10° C) and rising and expected to remain above 50° F (10° C) for 6 hours
* There is no forecast of temperatures below 35° F (2° C) within 24 hours from the time of placement.
* The weather is not foggy or rainy. When rain appears imminent, all placement operations shall cease and the work shall not be resumed until the threat of rain has passed.

B. Cold Weather Requirements

When the ambient temperature is below 50° F (10° C), but will remain above 40° F (5° C) during paving and the substrate temperatures are 50° F (10° C) and rising, the PCSS can be placed only when manufacturer approved accelerators are added to the mix and approval of the Engineer is obtained.

C. Hot Weather Requirements

Care should be taken when placing the PCSS when the substrate temperature exceeds 130° F (50° C). Application temperatures of the substrate above 130° F (50° C) should be closely monitored for performance during the course of application. Any observable defects occurring as a result of extreme temperature should be cause for immediate halting of placement operations.

Where the ambient paving air temperature is going to exceed 90° F (32° C) then the use of cold water and ice should be considered for the blending operation. Where the provision of cold water or replacing the part of the water requirement with ice is not possible, then the use of a retarder should be used with the mix.

**636.03.05 Surface Preparation**

The substrate that is to receive the PCSS system shall be cleaned of sand, dirt, dust, rock, or any other debris that could prevent proper adhesion. Cleaning shall be accomplished by power broom, scraping, blowing, washing, or other approved methods necessary to assure bonding between the PCSS surface course and the substrate. PCSS operations shall not be started until the surface is in a condition as recommended by the manufacturer.

**636.03.06 Damaged Substrate**

All substrate receiving PCSS shall be free of potholes, spalling, or other areas of structural deterioration. If identified in the plans, or directed by the Engineer, all such areas shall be excavated to a depth where the substrate is structurally sound and repaired with an approved pothole repair method. Structurally deficient areas not identified for repair in the plans shall be reported to the Engineer.

**636.03.07 Mixing**

The measuring and mixing operation shall be capable of producing a consistent homogeneous mix sufficient to maintain the production levels required for the work. The water and dry blend shall be charged into the mixer and blended to the desired consistency while maintaining effective temperatures to prevent flashing of the mix. **Hand mixing in pails is not permissible.**

**636.03.08 Placing**

1. PCSS shall not be applied within 14 days after laying and rolling bituminous asphalt pavement or concrete pavement.
2. Joints between both similar and different substrates, must be perpetuated. Surface shall be prepared to allow for joint perpetuation prior to installation of the PCSS system.
3. PCSS shall be uniformly deposited on the substrate by roto-stator spray equipment. The spray apparatus shall be a device approved by the manufacturer and have the capability of mixing the materials at a rate to insure continuous spray operations. With the stenciled design the base coat may be placed with a squeegee.
4. Stenciled Pavement

This design requires a base coat of the material to be applied by squeegee or spray on top of asphalt or concrete pavement. Concrete pavement may require shot blasting to roughen the surface to ensure proper bonding. The base coat provides a grout line color plus seals the surface. Once the base coat has cured, apply the specified stencil pattern and spray the top coat. Remove stencil when the top coat has reached the proper consistency and allow coating to cure. Cure to traffic time is approximately 2 hours at 70 degrees. The total cured thickness should be between 1/8” and 3/16”.

The stencils should be a plastic or paper pattern consistent with the design of the crosswalks.

1. Non-Patterned Application

This design uses a colored or base color coating without a decorative pattern. Apply the material to the asphalt or concrete pavement using roto-stator spray apparatus. Concrete pavement may require shot blasting to roughen the surface to ensure proper bonding. A smooth or textured surface can be created. A textured surface is achieved by adding aggregate to the mix or distributing a fine aggregate to the surface after application as specified in the plans. Cure to traffic time is approximately 2 hours at 70 degrees. The total cured thickness should be between 1/8” and 3/16”.

**636.03.09 Curing and Opening to Traffic**

Care shall be taken by the contractor to protect the PCSS surface course from traffic until the area is sufficiently cured. Curing time will vary depending on ambient and surface temperatures. The PCSS shall not be opened to traffic until it has reached sufficient compressive strength that the surface will not be damaged by vehicular traffic and the area has been approved for opening by a representative of the manufacturer, the installer, or the Engineer.

**METHOD OF MEASUREMENT**

**636.04.01 Measurement**

The quantity of DECORATIVE CROSS WALK MARKINGS will be measured per square foot.

**BASIS OF PAYMENT**

**636.05.01 BASIS OF PAYMENT**

The accepted quantity of DECORATIVE CROSS WALK MARKINGS will be paid for at the contract price per square foot and shall include all materials, equipment, labor and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 636.0010 | DECORATIVE CROSS WALK MARKINGS | SF |

**END OF SECTION 636**

SECTION 637 - POLLUTION CONTROL

**DESCRIPTION**

**637.01.01 GENERAL**

***Add the following to this subsection***

D. Dust control work includes creating a Dust Control Mitigation Plan (DCMP), obtaining all necessary approvals for the DCMP, obtaining a Dust Control Permit for Construction Activities, payment of all fees associated with the project dust control, all work necessary to comply with the DCMP, Dust Control Permit, and the requirements of Section 94 of the Clark County Department of Air Quality Regulations, most recently adopted.

E. Any fines or penalties levied by the Clark County Department of Air Quality and Environmental Management due to violations of the project Dust Control Permit requirements are the sole responsibility of the Contractor and shall be paid by the Contactor.

F. The Contractor shall use all necessary Stormwater Runoff Best Management Practices (BMPs) performing the Work so as to not discharge stormwater runoff containing pollutants or sediment into the waters of the United States, including municipal separate storm sewer systems (MS4s) in violation of federal and state laws, rules, and regulations and the City’s water pollution requirements.

G. The Contractor shall:

1. Comply with the provisions of Nevada Revised Statutes, Chapter 445A: Water Pollution Control and City of Las Vegas Municipal Code 14.18; and
2. Adhere to all Federal regulations under 40 CFR 122.26(b)(14).
3. Submit SWPPP Submittal Checklist found in Appendix C of these Special Provisions to the Owner’s Representative. This checklist must be on file prior to the issuance of the Notice to Proceed for construction.

H. All information and forms pertaining to Nevada’s Stormwater NPDES Permitting Program can be found on the following website:

<http://ndep.nv.gov/water/water-pollution-control/permitting/permit-forms-fees>

1. The City, state and federal regulations identified above are hereby incorporated by reference as preconditions of this Contract. The Contractor shall familiarize itself with these regulations and practices, and is advised that prior to engaging in any construction activities, the Contractor shall submit a Notice Of Intent (NOI) to the Nevada Division of Environmental Protection. A Storm Water Pollution Prevention Plan (SWPPP) must be completed prior to submission of the NOI and must remain on the project site and be updated as necessary for the duration of the project. As applicant, the Contractor is responsible for insuring that all persons on the project site, including contractor and subcontractor personnel, abide by the conditions of the permit. As the applicant, the Contractor is responsible for supplying complete copies of the NOI and SWPPP to all project subcontractors.

J. Upon completion of the project, the Contractor will need to permanently stabilize the construction area and file a Notice Of Termination (NOT) with NDEP to terminate the permit. The Contractor shall provide a copy of the approval letter of termination from NDEP to the Owner. Receipt of this letter will be required prior to acceptance of Contractor’s final payment request.

K. Contractor shall apply for, pay for, and gain approval of the required permit from NDEP in a timely manner so as not to affect the project schedule. Contractor shall comply with the requirements of the permit and shall bear all associated costs. If the Owner suffers damages including but not limited to delays and fines as a result of the Contractor’s failure to obtain a required permit or for non-compliance with the requirements of the permit, the Contractor shall reimburse the Owner for such damages and the Owner may withhold amounts equal to the damages from the Contractor’s payments. Failure of the Contractor to obtain required permits in a timely manner shall not be justification for delay of the issuance of the Notice to Proceed by the Owner.

L. Any fines or penalties levied by the City of Las Vegas, Nevada Division of Environmental Protection, U.S. EPA, or any local, state, or federal agency to violations of the project Stormwater Runoff Management requirements are the sole responsibility of the Contractor and shall be paid by the Contactor.

**CONSTRUCTION**

***ADD THE FOLLOWING SUBSECTION TO THIS SECTION:***

**637.03.70 STORM WATER POLLUTION PREVENTION PLAN (SWPPP) PERMIT FOR CONTRACTOR’S STAGING AREAS**

1. The following applies to the Contractor’s staging areas:

NDEP, Bureau of Water Pollution Control, has issued general permit NVR100000 that covers construction activities within the state of Nevada. The Contractor shall comply with the requirements of the general permit at no extra cost to the Owner. In order to be covered by the permit, the Contractor shall submit, at no extra cost to Owner, a Notice of Intent (NOI).

1. Upon the completion of the construction, Contractor is responsible for permanently stabilizing the staging area and any disturbed areas, filing Notice of Termination (NOT), and obtaining approval of NOT with NDEP to terminate the permit. Site stabilization requirements can be reviewed in Section 3.6 of Construction Stormwater General Permit (NVR100000) at:

<https://ndep.nv.gov/water/water-pollution-control/permitting/stormwater-discharge-permits/construction-sites-greater-than-1-acre>

[NOTE TO SPEC WRITER: The following section ROCK MULCH applies to large excavation areas such as detention basins or in areas of undeveloped land.

**637.03.71 ROCK MULCH**

1. Rock mulch, granite based non-organic ground cover, shall be placed 2 inches thick on all disturbed areas as required by NDEP final stabilization requirements for the purpose of dust control.  Unless otherwise specified, rock mulch shall be one inch (3/4”) minus nominal from a local quarry.  The Contractor shall provide three samples of the proposed rock mulch prior to ordering for placement, with any relative manufacturer's comprehensive product description, including specifications and installation instructions for selection by the Engineer.
2. Final approval of product samples shall be made by the Engineer. No work shall proceed until Contractor has coordinated and received approval of the material from NDEP and provided a copy of the written approval to the Owner.  Contractor shall then receive written approval from the Owner prior to proceeding with work.
3. All areas to receive rock mulch shall be treated with pre-emergent herbicide in accordance with the manufacturer’s recommendations and approved by the Engineer.

**METHOD OF MEASUREMENT**

**637.04.01 MEASUREMENT**

***Add the following to this subsection:***

The quantity of Dust Control will be measured per lump sum.

The quantity of NPDES Discharge Permit will be measured per lump sum.

The quantity of POST CONSTRUCTION ROCK MULCH will be measured per acre placed 2-inches thick.

The quantity of [FILL IN ITEM DESCRIPTION] will be measured per [UNIT].

No direct measurement shall be made for [FILL IN ITEM DESCRIPTION].

**BASIS OF PAYMENT**

**637.05.01 PAYMENT**

***Add the following to this subsection:***

The accepted quantity of Dust Control will be paid for at the contract unit price per lump sum and shall include all permits, labor, materials and equipment necessary to provide dust control for the entire duration of the project as described in the approved DCMP or as directed by the Engineer. Payments shall be divided evenly using the initial contract duration, plus any additional contract time added by change order or as directed by the Engineer. When additional contract time is added the remaining unpaid portion of the lump sum bid amount shall be divided evenly over the remaining contract time by recalculating the prorated payment.

The accepted quantity of NPDES Discharge Permit will be paid for at the contract unit price per lump sum and shall include all permits, labor, materials and equipment necessary to carry out the Storm Water Pollution Prevention Plan (SWPPP) and any related requirements of the NDOT encroachment permit for the entire duration of the project as described in the permit and as directed by the Engineer and shall also include permanent stabilization of the construction area and staging area. Payments shall be divided evenly using the initial contract duration, plus any additional contract time added by change order or as directed by the Engineer. When additional contract time is added the remaining unpaid portion of the lump sum bid amount shall be divided evenly over the remaining contract time by recalculating the prorated payment.

[NOTE TO SPEC WRITER: The accepted quantity of POST CONSTRUCTION ROCK MULCH will be paid for at the contract unit price per acre placed 2-inches thick and shall include all permits, labor, materials and equipment necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer. Payment shall not include permanent stabilization required for staging areas.]

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

Unless otherwise provided in the Special Provisions, no payment will be made for [FILL IN ITEM DESCRIPTION] as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which [FILL IN ITEM DESCRIPTION] is required.

Payment will be made under:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **ITEM NO.** | | **ITEM DESCRIPTION** | | **UOM** | | |
| 637.0005 | | Dust Control | | LS | | |
| 637.0010 | | NPDES Discharge Permit | | LS | | |
| 637.0030 | | POST CONSTRUCTION ROCK MULCH | | AC |

END OF SECTION 637

SECTION 646 – WATERPROOFING AND DAMP PROOFING

**METHOD OF MEASUREMENT**

**646.04.01 MEASUREMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The quantity of [FILL IN ITEM DESCRIPTION] will be measured per [UNIT].

No direct measurement shall be made for [FILL IN ITEM DESCRIPTION].

**METHOD OF PAYMENT**

**646.05.01 PAYMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall conform to the requirements of subsection 646.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include,

Unless otherwise provided in the Special Provisions, no payment will be made for [FILL IN ITEM DESCRIPTION] as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which [FILL IN ITEM DESCRIPTION] is required.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
|  |  |  |

**END OF SECTION 646**

***ADD THE FOLLOWING SECTION TO DIVISION II – CONSTRUCTION DETAILS***

SECTION 650 – ONSITE IMPROVEMENTS

**650.01.01 GENERAL**

* + - * 1. This work shall consist of furnishing all equipment, labor, and materials necessary to remove, restore, relocate, and construct improvements on adjacent properties as shown on the Plans, as specified herein, and as directed by the Engineer.
        2. All work on the adjacent properties shall be to current electrical, plumbing, and building code standards.
        3. All work shall be performed in a manner that the improvements (e.g., asphalt pavement, landscaping, etc.) are returned to original or better condition.
        4. All work to be performed shall comply with the contract documents whose governing order is set for in the General Conditions.

**MATERIALS**

**650.02.01 BLANK**

**CONSTRUCTION**

1. **650.03.01 BLANK**

**METHOD OF MEASUREMENT**

**650.04.01 MEASUREMENT**

Payment shall include all work necessary to remove structures and obstructions, relocate items, restore existing conditions, and construct improvements per each Assessor’s Parcel Number (APN) as indicated on the plans.

The quantity of IMPROVEMENTS TO APN XXX-XX-XXX-XXX will be measured per each.

**BASIS OF PAYMENT**

**650.05.01 PAYMENT**

The accepted quantity of IMPROVEMENTS TO APN XXX-XX-XXX-XXX will be paid for at the contract unit price of each and shall include all materials, equipment and labor required including, but not limited to, sawcutting; removal, hauling, and disposal of asphaltic concrete, existing aggregate base, all other sub-surface material to depth specified for proposed pavement section, all types of curb and gutters, sidewalks, block walls with footings; landscape materials (mineral and plant materials); removal, salvage, and relocation of existing sign (including, but not limited to: storage; removal of the signs foundation to a minimum of 24-inches below proposed finished surface; backfilling and compacting cavities with approved backfill material to the proposed sub-grade elevation; design of foundation; excavation [including hand digging foundations in area of potential utility conflicts]; trenching; fittings; bends; concrete foundation; rebar; anchor bolts; hardware; conduit; wiring; connections to existing conduits and circuits; primer and paint; any work required to bring up to code; and all other incidentals required); removal and disposal of existing sign (including, but not limited to: hauling, disposal, and removal of the signs foundation to a minimum of 24-inches below proposed finished surface or as directed by the Engineer; backfilling and compacting cavities with approved backfill material to the proposed sub-grade elevation); landscaping (including, but not limited to: site preparation; planting soil; pre-emergent herbicide; decomposed granite; trees; shrubs; and removal, salvage, and relocation of existing decorative boulders); irrigation modifications (including, but not limited to: excavation; backfill; connection to existing irrigation; controllers; satellite pedestal; all conduit and wiring between the service pedestal, satellite pedestal, and controllers; pipe; flex pipe; emitters; polyethylene inline drip tubing; control valves; flush valves; connections; fittings; and other related mechanisms to properly installed and operate a drip irrigation system with 100 percent coverage for plant materials); installation of: asphaltic cement pavement (including, but not limited to: excavation; scarification; Type II aggregate base; asphalt cement; mixing; loading; hauling; placing; compacting; tack coat; prime coat); all types of curb and gutter, sidewalk, sidewalk drains, concrete stairs; concrete cross gutters, and concrete commercial driveways (including, but not limited to: excavation; Type II Aggregate Base; plates; compaction; concrete; depressions; reinforcing steel; finishing; joints; curing compound and backfilling); pavement markings; street signs; and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

NOTE TO SPEC WRITER; consider using Force Account for onsite landscape restorations and make sure it requires explicit requirements for approval before work on force account items

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 650.0030 | IMPROVEMENTS TO APN XXX-XX-XXX-XXX | EA |

END OF SECTION 650

***ADD THE FOLLOWING SECTION TO DIVISION II – CONSTRUCTION DETAILS***

SECTION 670 – UTILITY CONDUITS

**DESCRIPTION**

**670.01.01 GENERAL**

A. The Contractor shall provide all labor, materials, equipment, transportation and services required to install the utility conduits and related items as shown on the plans and in the specifications.

B. All materials furnished and used shall conform to the provisions in Section 106.

1. The materials shall be manufactured, handled and used in a manner to insure completed work in accordance with the plans, specifications, Special Provisions, Cox Communications Specifications and NV Energy Specifications.
2. In the event of a conflict, the Cox Communications Specifications and NV Energy Specifications shall govern as applicable.

**670.01.02 REGULATIONS AND CODES**

A. Nothing described in these specifications or indicated on the plans shall be construed to permit work not conforming to the most stringent of applicable codes and regulations. When plans or specifications call for materials or construction of better quality or larger size than required by codes, laws, rules or regulations, the plans and specifications shall take precedence.

B. All electrical equipment shall conform to the standards of the National Electrical Manufacturers Association (NEMA), and listed by Underwriters' Laboratories, Inc. (UL), or the Electronic Industries Association (EIA), wherever applicable. In addition to the requirements of the plans, the specifications, and the Special Provisions, all materials and workmanship shall conform to the requirements of the National Electrical Code; the National Electrical Safety Code (NESC); Standards of the American Society for Testing and Materials (ASTM); American National Standards Institute (ANSI) manuals; International Municipal Signal Association (IMSA) cable specifications; Institute of Electronic and Electrical Engineers (IEEE); Rural Electrification Association (REA); Nevada Occupational Safety and Hazard Act (NOSHA); National Board of Fire Underwriters (NBFU); Federal Specifications (FS), the Uniform Standard Drawings; and any local ordinance which may apply.

**670.01.03 EQUIPMENT LIST AND DRAWINGS**

A. Unless otherwise permitted in writing by the Engineer, the Contractor shall within fifteen (15) days following approval of the contract, submit to the Engineer for approval, a list of equipment and materials which he proposes to install.

1. The list shall be complete as to name of manufacturer, size, and identifying number of each item.
2. The list shall be supplemented by such other data as may be required, including scale drawings of cabinets showing location and spacing of shelves, terminal blocks and equipment, including dimensioning.

**MATERIALS**

**670.02.01 CONDUIT**

A. Underground conductors will be installed in conduit by the respective utility companies unless otherwise specified in the Special Provisions or on the drawings.

1. Conduit shall be listed by the Underwriters' Laboratories Inc., and shall bear the U.L. label on each length.
2. PVC SCH. 40 U.L. approved conduit shall be used unless otherwise noted.

B. The conduit sizes and types to be used will be indicated on the plans, or specified in the Special Provisions.

1. The Contractor may, at his own expense, use larger size conduit.
2. Where used, it shall be for the entire length of the run from outlet to outlet with no reducing couplings permitted.

C. Where conduit is to be placed in an open trench, excluding roadway sections, the trench shall be excavated to four (4) inches below the invert grade of the conduit and properly backfilled with sand.

1. A cradle shall be shaped in the bedding to cushion and support the conduit.
2. Backfill material of sand shall be used for the first six (6) inches over the top of the conduit.

D. Where there is existing sidewalk, the conduit shall be run in the street next to the concrete gutter.

1. Trenching for the installation of conduit shall only be 4-1/2 inches wide.
2. The curb and gutter shall neither be cut nor damaged.

**670.02.02 EXPANSION FITTINGS**

A. Expansion fittings, as detailed on the plans, shall be installed where the conduit crosses an expansion joint in the structure.

1. Each expansion fitting shall be provided with a bonding.
2. Expansion fittings shall be used where they exit a structure.

**670.02.03 PULL BOXES**

A. Pull boxes shall be precast reinforced concrete or composite boxes of the sizes and details shown on the plans and standard drawings.

1. Reinforcement shall be 3/4 inch (19 millimeters) mesh, No. 20 U.S. gage, hardware cloth or bar reinforcement.
2. Either steel composite or cast iron lids shall be used.

B. Pull boxes for structure installation shall conform to the dimensions and locations shown on the plans. Boxes or vaults formed in concrete shall have metal frames and covers with wording inscribed on the covers as shown on the plans.

C. All metal parts shall be hot‑dip galvanized and shall conform to the applicable portions of ASTM Designation A 153, after fabrication.

1. Gasket surfaces shall form a true plane.
2. Gaskets shall be one piece neoprene 1/8 inch (3 millimeters) thick, and shall cover the contact surface between the frame and cover.

D. No. 3-1/2, No. 5, and No. 7 pull boxes shall comply with applicable portions of the USS, USD, and plans.

1. The interior of pull boxes shall be void of any other materials except conduit risers and necessary pull strings.
2. All excess materials shall be removed to promote drainage.
3. The cost of supplying and installing new pull boxes or adjusting existing pull boxes to finished grade shall be considered as incidental to the work and no additional compensation shall be allowed.

E. All pull boxes shall have steel covers and shall be grounded in accordance with standard drawing 709.

1. All pull box lids shall be stamped to identify the type of utility in accordance with the applicable utility company standards to identify their use.
2. Any voltage over 600 shall be inscribed "HIGH VOLTAGE."

**CONSTRUCTION**

**670.03.01 MAINTAINING EXISTING AND TEMPORARY UTILITY SYSTEMS**

A. The owner or owning utility will continue operation and maintenance of existing electrical facilities.

B. Where damage is caused by the Contractor's operations, the Contractor shall, at his expense, repair or replace damaged facilities promptly in accordance with these specifications. Should the Contractor fail to perform the required repairs or replacements, the cost of performing such repairs or replacements will be deducted from any monies due or to become due the Contractor.

C. The exact location of existing conduits and pull boxes shall be ascertained by the Contractor before using equipment that may damage such facilities or interfere with any system.

D. These provisions will not relieve the Contractor in any manner of his responsibilities as provided in Subsection 107.11, “Responsibility for Damage”, and Subsection 107.16, "Contractor's Responsibility for the Work and Materials".

E. The data indicated on the plans and in these specifications is as exact as could be secured, but its absolute accuracy is not guaranteed. Exact locations, distances, levels, and other conditions will be governed by unforeseen obstacles in the field.

F. The Contractor shall use the plans and these specifications for guidance, and secure the Engineer's approval for all changes of location or scope of work. The Engineer should be consulted regarding the exact locations of pullboxes, poles and cabinets.

G. It shall be the Contractor's responsibility to coordinate all work required by this contract with all affected utility companies.

**670.02.03 EXCAVATING AND BACKFILLING**

A. Excavations required for the installation of conduit, manholes, pullboxes and other facilities, shall be performed in such a manner as to cause the least possible damage to the streets, sidewalks, and other improvements.

1. Excavations shall not be larger than necessary for the proper installation of conduit, electrical facilities and foundations.
2. Excavating shall not be performed until immediately before installation of conduit, facilities, and foundations.

B. The material from the excavation shall be placed in a position where the least disruption and obstruction to vehicular and pedestrian traffic will be realized and the least interference with surface drainage will occur.

C. Surplus excavated material shall be removed and disposed of by the Contractor outside of the right‑of‑way.

D. At the end of each day's work, and at other times when construction operations are suspended, equipment and other obstructions shall be removed from the right‑of‑way.

E. Structural excavation and backfill shall conform to the requirements of Section 206, Structure Excavation and 207, Structure Backfill.

F. Trench excavations shall be backfilled in conformance with the requirements of Section 208, Trench Excavation and Backfill, and with the applicable utility company specifications and requirements.

G. Backfilled excavations shall be kept well filled and maintained in a smooth and well‑drained condition, until permanent resurfacing is completed as specified in Subsection 208.03.05, Cutting and Restoring Street Surfacing.

H. Unless otherwise specified in the Special Provisions, excavation in the street right-of-way shall be performed in such a manner that not more than one lane of traffic is restricted in either direction at any time, unless otherwise approved by the Engineer.

I. All streets upon or within which any work is being done shall be kept open to all traffic by the Contractor, as specified in Subsection 104.04, Maintenance of Traffic, unless otherwise provided in the Special Provisions, or as approved by the Engineer.

J. Barricading shall conform to the latest edition of the Nevada Traffic Control Manual or as directed by the Engineer.

K. All trenches, conduit and backfill shall comply with applicable portions of the USS, USD, the contract drawings, applicable utility company specifications, and Section 208.

1. All trenching shall be deep enough to insure 24 inches of cover over the conduit, unless otherwise noted.
2. The backfill in street areas shall be Type II gravel compacted to 95% relative density unless otherwise noted. No trench shall be left open after hours without approval of the Engineer.

L. The Contractor shall not sawcut or disturb any concrete structures to remain in place.

1. Conduit locations on the plans are for reference only.
2. Actual locations are to be determined by the Engineer as to the most economical, and the location shall be approved by the Engineer.
3. As-built (Record) marked prints showing installed locations shall be given to the Engineer by the Contractor.

M. All conduit that is terminated, stubbed and capped for future use shall be marked by a "+" a minimum of 3 inches high and directly above the conduit, cut into the face of the curb, wall, concrete paving, etc., or otherwise marked for location.

N. Where conduit is to be placed in an open trench, excluding roadway sections, the trench shall be excavated to 4 inches below the invert grade of the conduit and properly backfilled with sand.

1. A cradle shall be shaped in the sand cushion to support the conduit.
2. Backfill material of sand shall be used for the first six (6) inches over the top of the conduit.

**670.03.03 REMOVING AND REPLACING IMPROVEMENTS:**

A. Improvements, such as sidewalks, curbs, gutters, Portland cement concrete and asphalt concrete pavement, bituminous surfacing, base material and other improvements removed, broken or damaged by the Contractor, shall be replaced or reconstructed in compliance with the applicable sections of these specifications.

B. Whenever a portion of a panel or slab of existing concrete sidewalk or driveway is broken or damaged, it shall be repaired in accordance with Subsection 202.03.02, Removal.

C. The outline of all areas to be removed in Portland cement concrete sidewalks and in pavements shall be cut to a minimum depth of 1‑1/2 inches with an abrasive type saw prior to removing the sidewalk and pavement material.

1. Cut for the remainder of the required depth may be made by any method satisfactory to the Engineer.
2. Cuts shall be neat and true with no shatter outside the removal area.

**670.03.04 CONDUIT INSTALLATION**

A. Taped or PVC coated steel conduit shall be used for all bends, unless otherwise approved by the affected utility company.

B. Conduit shall enter concrete pull boxes from the bottom and shall terminate two (2) inches inside the box wall and not less than two (2) inches nor more than four (4) inches above the bottom, and shall be sloped to facilitate pulling of conductors.

1. Conduit entering the bottom of a pull box shall be located near the end walls to leave the major portion of the box clear.
2. At all outlets, conduit shall enter from the direction of the run.

C. Existing underground conduit to be incorporated into a new system shall be cleaned by blowing out with compressed air, or by other methods required by the Engineer or the owning utility.

D. Conduit runs shown on the plans are for bidding purposes only and may be changed with the approval of the Engineer to avoid underground obstructions.

E. Trenching, conduit installation and backfill shall comply with these Special Provisions, the Uniform Standard Specifications and Standard Details, and the applicable utility specifications and standards. In the event of a conflict, the utility specifications and standards shall govern.

**METHOD OF MEASUREMENT**

**670.04.01 MEASUREMENT**

The quantity of PULL BOX will be measured per each.

The quantity of MANHOLE will be measured per each.

The quantity of 48-INCH X 54-INCH CONCRETE TRANSFORMER PAD WITH BOLLARDS will be measured per each.

The quantity of [FILL IN ITEM DESCRIPTION] will be measured per [UNIT].

No direct measurement shall be made for [FILL IN ITEM DESCRIPTION].

**BASIS OF PAYMENT**

**670.05.01 PAYMENT**

The accepted quantity of PULL BOX will be paid for at the contract unit price of each shall include all materials, equipment and labor required including, but not limited to, excavation; bedding; compacted backfill; pull box and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer

The accepted quantity of MANHOLE will be paid for at the contract unit price of each and shall include all materials, equipment and labor required including, but not limited to, excavation; bedding; compacted backfill; manhole and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of 48-INCH X 54-INCH CONCRETE TRANSFORMER PAD WITH BOLLARDS will be paid for at the contract unit price of each and shall include all materials, equipment and labor required including, but not limited to, excavation; bedding; compacted backfill; five fixed 4-inch concrete bollards; concrete; reinforcing steel and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of [CONDUIT] will be paid for at the contract unit price of linear foot and shall and shall include all materials, equipment and labor required including, but not limited to, removal of pavement and the placing of the Permanent Patch; excavation; trenching; saw cutting; bedding; conduit; pullstrings; fittings; bends; stubouts; pole risers; compacted backfill; concrete encasement; connections to existing conduit; making all required tests and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

Unless otherwise provided in the Special Provisions, no payment will be made for [FILL IN ITEM DESCRIPTION] as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which [FILL IN ITEM DESCRIPTION] is required.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 670.XXXX | PULL BOX | EA |
| 670.XXXX | MANHOLE | EA |
| 670.XXXX | 48-INCH X 54-INCH CONCRETE TRANSFORMER PAD WITH BOLLARDS | EA |
| 670.XXXX | SERIES 200 CATV PULL BOX 30" X 48" X 36" (COX COMMUNICATIONS) | EA |
| 670.XXXX | B-36 CATV PULL BOX 18"x 36"x 24" (COX COMMUNICATIONS) | EA |
| 670.XXXX | 17"x 30"x18" PULLBOX (NV ENERGY) | EA |
| 670.XXXX | 3'-0"x 7'-0"x 4'-0" PULL BOX (NV ENERGY) | EA |
| 670.XXXX | 5'-0"x 10'-6"x 7'-0" MANHOLE (NV ENERGY) | EA |
| 670.XXXX | 48"x 54" CONCRETE TRANSFORMER PAD WITH BOLLARDS | EA |
| 670.XXXX | 4-INCH UTILITY CONDUIT WITH TRENCH AND BACKFILL | LF |
| 670.XXXX | 1-2" CONDUIT WITH PULLSTRING | LF |
| 670.XXXX | 1-3" CONDUIT WITH PULLSTRING | LF |
| 670.XXXX | 1-4" CONDUIT WITH PULLSTRING | LF |
| 670.XXXX | 2-3" CONDUITS WITH PULLSTRINGS | LF |
| 670.XXXX | 3-6" CONDUITS WITH POLY. PULL TAPE | LF |
| 670.XXXX | 1-6" CONDUITS WITH POLY. PULL TAPE | LF |
| 670.XXXX | 2-6" CONDUITS WITH POLY. PULL TAPE | LF |
| 670.XXXX | 1-6" CONDUITS WITH POLY. PULL TAPE, 2-3" CONDUITS WITH PULLSTRING | LF |
| 670.XXXX | 3-6" CONDUITS WITH POLY. PULL TAPE, 2-3" CONDUITS WITH PULLSTRING | LF |
| 670.XXXX | 5-6" CONDUITS WITH POLY. PULL TAPE, 2-3" CONDUITS WITH PULLSTRING | LF |
| 670.XXXX | 9-6" CONDUITS WITH POLY. PULL TAPE, 2-3" CONDUITS WITH PULLSTRING | LF |

END OF SECTION 670

***ADD THE FOLLOWING SECTION TO DIVISION II – CONSTRUCTION DETAILS***

SECTION 671 – UTILITY SUBSTRUCTURES

**DESCRIPTION**

**671.01.01 GENERAL**

A. The work to be done consists of furnishing all labor, materials, equipment, transportation and services required to install NV Energy and CenturyLink substructure and other miscellaneous conduits as shown on the plans and in accordance with these special provisions.

**MATERIALS**

**671.02.01 GENERAL**

A. All materials furnished and used for the installation of NV Energy and CenturyLink substructure shall conform to NV Energy and CenturyLink service requirements, latest edition.

B. All conduit used for miscellaneous installations shall be Schedule 40 PVC.

C. Casing material shall be ¼ inch steel and shall conform to steel casing requirements in accordance with the Las Vegas Valley Water District Standards.

**CONSTRUCTION**

**671.03.01 GENERAL**

A. All utility substructures shall be installed in accordance with NV Energy and CenturyLink service requirements, latest edition.

**671.03.02 REMOVAL AND REPLACEMENT OF EXISTING IMPROVEMENTS**

A. Existing improvements, such as sidewalks, curbs, gutters, Portland cement concrete and asphalt concrete pavement, and other improvements removed, broken or damaged by the CONTRACTOR, shall be replaced or reconstructed in compliance with the applicable sections of these specifications.

B. The outline of all areas to be removed in Portland cement concrete sidewalks and in pavements shall be cut to a minimum depth of 1‑1/2 inches (38 millimeters) with an abrasive type saw prior to removing the sidewalk and pavement material.

1. Cut for the remainder of the required depth may be made by any method satisfactory to the ENGINEER.
2. Cuts shall be neat and true with no shatter outside the removal area.

**METHOD OF MEASUREMENT**

**671.04.01 MEASUREMENT**

The quantity of PULL BOXES, MANHOLES and TRANSFORMER PADS will be measured per each.

The quantity of [FILL IN ITEM DESCRIPTION] will be measured per [UNIT].

No direct measurement shall be made for [FILL IN ITEM DESCRIPTION].

**BASIS OF PAYMENT**

**671.05.01 PAYMENT**

The accepted quantity of PULL BOXES, MANHOLES and TRANSFORMER PADS will be paid for at the contract unit price of each and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of 2-INCH CONDUIT, 4-INCH CONDUIT, 6-INCH CONDUIT for NV Energy, CenturyLink and City of Las Vegas will be paid for at the contract unit price of linear foot and shall include all materials, equipment and labor required including, but not limited to, excavation; bedding; backfill; concrete encasement; colored concrete ; spacers; fittings; stubs; bends; caps; sweeps; risers; installation in 30” steel casing; warning tape; pull stings; conductors; connections to pads, vaults, manholes and pull boxes, existing or new; temporary asphalt concrete patching and all other items necessary to complete the work in accordance with the latest NV Energy and CenturyLink service requirements, as shown on the Plans, as specified herein and as directed by the Engineer

The contractor shall supply a crane or other suitable equipment and operator to support existing utility poles number 63025 and 31616 as noted on the plans in a static condition during the installation of new conduit adjacent to these poles. The cost of supplying equipment and operator for the duration of the conduit installation shall not be paid for separately but shall be considered as incidental to all other pay items and no additional compensation shall be allowed.

The accepted quantity of NV Energy and CenturyLink PULL BOXES, MANHOLES and HAND HOLES will be paid for at the contract unit price of each and shall include all materials, equipment and labor required including, but not limited to, new precast pull boxes, manholes and hand holes; excavation; bedding; backfill; frames; lids; cones; concrete collars; grade rings; risers; steps; grout; sealants and temporary and final adjustments to grade and all other items necessary to complete the work in accordance with the latest NV Energy and CenturyLink service requirements,as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of 30-INCH DIAMETER CASING AT [GIVE LOCATION] will be paid for at the contract unit price of [linear foot] and shall include all materials, equipment and labor required including, but not limited to, steel casing by tunneling methods; boring; excavation; pipe jacking; annular grouting of casing; excavating and backfilling; jacking and receiving pits; steel casing material; casing spacers; dewatering; disposal of waste material from site including disposal fees and all other items necessary to complete the work in accordance with the latest NV Energy and Century Link service requirements as shown on the Plans, as specified herein and as directed by the Engineer .

The cost for the removal and replacement of permanent asphalt concrete and Portland cement concrete surfaces associated with the installation of conduit, pull boxes or manholes shall be paid for under separate pay items.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

Unless otherwise provided in the Special Provisions, no payment will be made for [FILL IN ITEM DESCRIPTION] as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which [FILL IN ITEM DESCRIPTION] is required.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 671.0030 | 3’x7’x4’ NV ENERGY PULL BOX (RS-82) | EA |
| 671.XXXX | 5’x10.5’x7’ NV ENERGY MANHOLE FOR SWITCH (RS-98) | EA |
| 671.XXXX | 17”x30” NV ENERGY HAND HOLE (RS-1) | EA |
| 671.XXXX | NV ENERGY INTERCEPT PULL BOX (RS-85) | EA |
| 671.XXXX | 2’6”x4’x3’ CENTURYLINK PULL BOX | EA |
| 671.XXXX | 2” CLV POWER CONDUIT | LF |
| 671.XXXX | 4” NV ENERGY CONDUIT | LF |
| 671.XXXX | 4” CENTURYLINK CONDUIT | LF |
| 671.XXXX | (2) 6” NV ENERGY CONDUITS | LF |
| 671.XXXX | (3) 6” NV ENERGY CONDUITS (CONCRETE ENCASED) | LF |
| 671.XXXX | (6) 6” NV ENERGY CONDUITS (CONCRETE ENCASED) | LF |
| 671.XXXX | (8) 6” NV ENERGY CONDUITS (CONCRETE ENCASED) | LF |

END OF SECTION 671

***ADD THE FOLLOWING SECTION TO DIVISION II – CONSTRUCTION DETAILS***

SECTION 672 – TRAIL LIGHTING

**DESCRIPTION**

**672.01.01 GENERAL**

A. Trail lighting work shall consist of furnishing and installing, modifying or removing trail lighting systems, electrical equipment in structures, partial installations for future systems, or combinations thereof, all as shown on the Drawings, and as specified in these Special Provisions.

B. Unless otherwise indicated on the Drawings or specified in the Special Provisions, all materials shall be new.

C. All materials furnished and used shall conform to the provisions in Section 106. The materials shall be manufactured, handled, and used in a manner to insure completed work in accordance with the Drawings, specifications, and Special Provisions.

D. All systems shall be complete and in satisfactory operating condition at the time of acceptance of the contract. Where an existing system is to be modified, the existing material shall be reused in the revised system, removed, salvaged, and stockpiled or abandoned as shown on the Drawings, as specified in the Special Provisions or as directed by the Engineer.

E. The Contractor shall provide all labor, materials, equipment, transportation and services required to install the trail lighting and related items on the Drawings and in the specifications resulting in a complete and operational system.

F. All equipment shall function as designed. The trail lighting standards shall be leveled before they are energized.

G. The Contractor shall maintain the new lighting system from the date energized until the entire project has been accepted by the City of Las Vegas.

1. This includes maintaining proper operation of the new system and any necessary replacement parts to make the system operational including but not limited to lamps, igniters, ballasts, breakers, and photo-electric and time clock controls.
2. The Contractor is also responsible for any damage to the system as a result of vandalism or negligence during this period.

H. The lights must be operating properly.  The Contractor is responsible for replacement parts to make lights operational, (i.e. lamps, igniter, ballasts, breakers,  photo eyes, time clocks, and so forth).  The Contractor is also responsible for damage and vandalism during this period.

I. The Contractor shall have a qualified representative present at the time the City inspects the trail lighting installations.

**672.01.02 REGULATIONS AND CODE**

A. All electrical equipment shall conform to the standards of the National Electrical Manufacturers Association (NEMA), and listed by Underwriters' Laboratories, Inc. (UL), or the Electronic Industries Association (EIA), wherever applicable.

B. In addition to the requirements of the Drawings, the specifications, and these Special Provisions, all materials and workmanship shall conform to the requirements of the National Electrical Code (NEC); National Electrical Safety Code (NESC); ASTM International (ASTM); American National Standards Institute (ANSI) manuals; Institute of Electronic and Electrical Engineers (IEEE); Illumination Engineering Society (IES); Rural Electrification Association (REA); Nevada Occupational Safety and Hazard Act (NOSHA); National Board of Fire Underwriters (NBFU); Uniform Standard Drawings, Clark County Area; and any local ordinance which may apply.

C. Wire sizes shall be indicated in American Wire Gage (AWG).

**672.01.03 EQUIPMENT LIST AND DRAWINGS**

A. Unless otherwise permitted in writing by the Engineer, the Contractor shall within 15 days following approval of the contract, submit to the Engineer for approval, a list of equipment and materials which he proposes to install.

1. The list shall be complete as to name of manufacturer, size, and identifying number of each item.
2. The list shall be supplemented by such other data as may be required, including scale drawings of cabinets showing location and spacing of shelves, terminal blocks and equipment, including dimensioning.

B. All of the above data shall be submitted, in triplicate, for review. Where electrical equipment is constructed as detailed on the Drawings, the submission of detailed drawings and diagrams will not be required.

**672.01.04 WARRANTIES, GUARANTEES, AND INSTRUCTION SHEETS**

A. Manufacturers' warranties, guarantees, and certifications for materials used in the work and instruction sheets and parts list shall be supplied with materials and shall be delivered to the Engineer prior to acceptance of the project.

B. As a minimum, the equipment shall include the following warranty:

1. Full system warranty including parts and labor for 2 years' parts and labor from the project Substantial Completion and a warranty of 5 years for the light fixtures and poles.

2. The supplier shall repair or replace any defective part within 1 week of notification at no expense to the Owner during the warranty period.

**672.01.05 REMOUNT ELECTRICAL SERVICE**

A. Existing service shall remain fully operational during construction.

1. Outages required shall be scheduled with the Owner and timing devices reset after resumption of service.
2. The Contractor shall field verify wiring connections and routing prior to disconnecting any conductors.

B. The modification, extension or removal of the existing conductors and equipment shall be inspected by and accepted by the Engineer.

C. Electrical work shall be in accordance with the requirements of the National Electrical Code.

**MATERIALS**

**672.02.01 TRAIL LIGHTING STANDARDS AND POLES**

A. Trail lighting standards shall be as specified in these Special Provisions or as shown on the Drawings and shall conform to the requirements below.

B. The trail lighting standard shall consist of a continuous square steel pole assembly, base cover, mast arm, L.E.D. luminaire, pole top, anchor rods and necessary bolts, nuts and washers. Workmanship and finish shall be equal to the best general practice of modern metal fabrication.

C. Pole Assembly.

1. Trail lighting poles shall be manufactured steel poles with steel handhole covers; aluminum poles or handhole covers will not be allowed.
2. Unless otherwise specified, the pole shaft shall be 6-inch, 11-gauge, straight square steel, and shall have the height as indicated on the Drawings.
3. Poles shall be fabricated from hot rolled commercial quality, one-piece carbon steel with minimum yield strength of 55,000 psi.
4. A removable pole cap shall be provided for poles receiving drilling patterns for side-mount luminaire arm assemblies.
5. Pole Anchor base shall be fabricated from hot-rolled carbon steel plate conforming to ASTM A36. Base plate and shaft shall be circumferentially welded top and bottom. A matching metal base cover shall be provided.
6. All structural fasteners shall be galvanized high strength carbon steel.  All non-structural fasteners shall be galvanized, zinc-plated carbon steel, or stainless steel.
7. Pole and mast assembly to be finished with a high-build, acrylic polyurethane enamel with a clear acrylic polyurethane top coat. Alternatively, a polyester TGIC or urethane polyester powder coat may be used.

D. A minimum 4-inch by 6-inch steel access handhole with reinforced frame and slip‑resistant type steel cover located approximately 18 inches from the base plate shall be provided.

1. The steel cover shall include a bar with one weather and vandal resistant 1/4‑inch stainless steel hex socket head screw.
2. The handhole may have radius corners such that the handhole is oval in shape.
3. The handhole reinforcement shall provide a bending strength equal to that of the pole without an opening.
4. Field cutting, welding, or other adjustments of the access handhole will not be allowed.
5. After final inspection, contractor shall weld handholes closed and shall paint to match the pole as directed by the Owner.
6. Handholes on trail or ramp poles shall be located on luminaire side of pole. Handholes on bridge poles shall be located on the pole on the opposite side of the luminaire.
7. Each handhole shall be provided with grounding provision.

F. Posts, poles, standards, and cabinets shall not be erected until the foundation has set at least 72 hours, and shall be plumbed or raked, as ordered by the Engineer.

G. Existing trail lights displaced by new ramps shall be removed, salvaged, and returned to the Owner.

**672.02.02 TRAIL LIGHTING LUMINAIRES**

A. The standard luminaire for trail lighting shall be XXXXX, XXXX, or approved equal.

Note to Spec Writer – contact TED for catalog data for a minimum of two luminaires and consider applicability of house side shields/spill control. Specify color (Black for Trail Lighting, Bronze for Parks/Facilities).

**672.02.03 FUSE HOLDERS AND FUSES**

A. Fuses shall be installed in manufacturer installed fuse blocks located in the luminaire.

**672.02.04 LOW VOLTAGE UNDERGROUND TRAIL LIGHTING SYSTEM**

A. Unless otherwise specified on the Drawings, the low voltage lighting system shall be single phase, two wire, 240 volt multiple.

1. The 2-wire system shall consist of 2 insulated 600 volt THW conductors of the specified gage and a green THW equipment grounding conductor of the specified gage as shown on the Drawings and shall bear the U.L. label.
2. The service panel shall be 200 ampere, unless otherwise specified, and shall be wired for 120‑240 volt with a full size neutral.

B. Pole and Arm Cable (Load side):

1. Unless otherwise specified on the Drawings and if the feeding circuit breaker is 30 amps or less, the cable from the base of the lighting standard to the luminaire shall be 2-conductor No. 10 AWG plus ground, solid copper with insulation rated at 600 volts.
2. The individual conductors shall be insulated with TW grade, and the outer jacket shall be PVC jacket type UF grade.

**672.02.05 FOUNDATIONS**

A. Foundations for trail lighting shall be constructed as shown on the Drawings.

B. Foundations for posts, standards, and pedestals shall be concrete conforming to the applicable requirements of Section 501, "Portland Cement Concrete." The concrete shall be of a CLV approved mix design and shall have a minimum compressive strength of 4,500 pounds per square inch.

C. Forms shall be true to line and grade. Foundations shall extend 12 inches above finish grade in trail areas and shall extend 30 inches above finish grade with rebar cage in parking areas unless otherwise specified by the Engineer.

D. Forms shall be rigid and securely braced in place.

1. Conduit ends and anchor bolts shall be held in place by means of a template until the concrete sets.
2. Both forms and ground which will be in contact with the concrete shall be thoroughly moistened before placing concrete.

E. For pedestals, a 6-inch minimum concrete foundation cap shall be poured after the pedestal is in proper position.

F. For trail lighting standards, the foundation shall be poured to 1-1/2 inches below base plate in a single pour and shall slope away from the base plate.

1. Non-shrink grout shall be poured under the base plate after the light pole has been set and plumbed.
2. The forms shall be stripped off while concrete is still “green” and the foundation shall be stone rubbed to provide a smooth, seamless surface appearance.
3. A light broom finish shall then be applied.
4. The foundation shall be wet cured for a minimum of 72 hours.
5. Attempts to fill and shape poured foundation will not be allowed after the initial pour; improperly poured foundations shall be demolished and rebuilt at the contractor’s expense.

5. No. 4 AWG multi-strand bare copper grounding conductor wire shall be used to ground pole and all anchor bolts as shown on the Drawings or in the Standard Drawings.

6. A matching metal base cover shall be provided which makes contact with the top of the foundation and does not rest on the top of the anchor bolts.

**672.02.06 ANCHOR BOLTS**

A. Anchor bolts for standard lighting poles shall conform to the following:

1. Anchor bolts shall conform to ASTM F1554, Grade 55, or ATSM A307 and shall have minimum yield strength of 36,000 psi. Bolts shall have “L” bends on one end.
2. Anchor bolts shall be provided with 2 hex nuts and 2 washers.
3. The anchor bolts and all nuts and washers shall be galvanized by the hot-dip process conforming to ASTM A123 and ASTM A153.
4. Anchor bolts shall be galvanized for the entire length of the bolt.
5. After galvanizing, the bolt threads shall accept the standard galvanized nuts for the full length of the thread without requiring tools, causing removal of protective coating, or requiring rethreading of the bolt or nut.
6. The upper 8 inches of the anchor bolts shall be threaded.
7. Anchor bolt sizes shall be as specified on the Drawings.
8. Plumbing of standards shall be accomplished by adjusting the nuts before the foundation is finished to 1 inch minimum above final grade. Shims or other similar devices for plumbing or raking will not be permitted.

**672.02.07 CONDUIT**

1. All conduit shall be PVC schedule 40 unless otherwise indicated on the Drawings Underground conductors shall be installed in conduit unless otherwise specified in these Special Provisions or the drawings. Conduit shall be listed by the Underwriters' Laboratories Inc., and shall bear the U.L. label on each length.
2. Low voltage conductors shall not be installed in high voltage light standards.
3. The conduit sizes to be used will be indicated on the Drawings. Conduit shall be 1-1/4 inches minimum diameter, unless otherwise indicated on the Drawings.
4. The Contractor may, at his own expense and with Engineer approval, use larger size conduit, and where used, it shall be for the entire length of the run from outlet to outlet with no reducing couplings permitted.
5. PVC coated rigid steel conduit shall consist of galvanized rigid steel conduit conforming to applicable federal specifications and Underwriters' Laboratories.
6. The exterior surface of the conduit shall be acid-treated to provide an acceptable surface for plastic coating with a heat polymerizing lacquer with a thickness not to exceed 0.0005 inch thick.
7. A polyvinyl chloride compound shall then be bonded to the prepared conduit with a thickness not less than 0.035 inch for the full length of the conduit except the threads.
8. The bond between the metal and the plastic shall be equal or greater than the tensile strength of the plastic coating.
9. In addition, the PVC compound shall have the following physical characteristics:
   1. Hardness: 85+ Shore A Durometer
   2. Dielectric Strength: 400 (Volts/mil @ 60 cycles)
   3. Tensile Strength: 3,500 psi

F. PVC coated rigid steel conduit shall be used for all exposed conduit such as when attached to the exterior of pedestrian bridge and underpass structures. Electrical Metallic Tubing, or EMT conduit, will not be allowed.

G. When new conduit is to connect to existing conduit, the Contractor shall verify the integrity of the existing conduit and make necessary repairs. The Engineer shall approve any additional repair work prior to commencing.

H. Conduits shall extend continuous through and above pole bases to within 3 inches below bottom of handhole of lighting standard.

1. Conduits shall be bent, without crimping or flattening.
2. No single run shall include more than two 45-degree bends and two 90-degree bends without prior approval of the Engineer and shall not exceed 300 feet between pull boxes.

I. Conduits shall be proven free and clear of dirt and debris by use of an appropriately sized mandrel no less than 1/4 inch smaller than the inside diameter of the conduit.

J. All installed spare or empty conduit shall include a green No. 8 AWG conductor installed from end to end and shall conform to subsection 672.03.06, Wiring, of these Special Provisions.

**672.02.08 PULL BOXES**

A. New pull boxes shall comply with applicable portions of the Standard Specifications, the Standard Drawings, and the Drawings.

1. The interior of pull boxes shall be void of any other materials except conduit risers and necessary wiring.
2. All excess materials shall be removed to promote drainage.

B. Pull boxes installed in grass, dirt, or asphalt shall have an 8‑inch minimum concrete collar with No. 4 rebar.

C. Pull box lids shall be an approved non-metallic polymer type material and shall be secured with brass tie downs. Pull boxes 2 feet by 3 feet and larger shall have torsion assisted lids.

D. Pull box lids shall be factory imprinted with the word "LIGHTING" or "ELECTRIC."

E. A pull box shall be required in conduit runs greater than 300 feet and at every 300 feet thereafter.

F. Conduits shall be 3 inches above the bottom of the pull box.

G. Wires shall extend 24 inches outside of pull box.

**672.02.09 CONDUCTORS AND CABLE**

A. Insulation for multiple circuit lighting conductors shall be rated at 600 volts, 75 degrees C. minimum.

B. Conductors, unless otherwise specified, shall be single conductor, solid or stranded copper of the gage shown on the Drawings, or indicated herein, insulated with THW grade plasticized polyvinyl chloride.

C. Copper wire shall conform to the applicable portions of ASTM D2220, B3 and B8.

**672.02.10 CONNECTIONS**

A. Unless noted otherwise, all connections shall be made using bronze split bolt type connectors and coated with approved weatherproofing compound or other liquid-tight connection method as approved by Engineer and in accordance with these Special Provisions and the Standard Drawings. Wire nuts are not allowed.

**672.02.11 LIGHTING CONTROLS**

A. Photo-electric controls:

1. Photo‑electric controls shall be as shown below, or as shown on the Drawings.
2. The photo‑electric control shall be capable of switching multiple lighting systems directly or by a separate contactor as indicated on the Drawings.
3. The photo‑electric control shall consist of a photo‑electric unit installed in the pad mounted service and control cabinet, and control the lighting contactor in the pad mounted service and control cabinet.
4. A by‑pass switch shall be included to permit manual operation of the lighting system contactor.
5. **The photo-electric control shall be Tork 2007A, or approved equal.**
6. **Equipment Details:**
   1. The photo‑electric unit shall consist of a light sensitive element connected to a control relay.
   2. The light sensitive element shall have a spectral response such that it is especially sensitive to north sky illumination and shall have an "ON" level adjustable between minimum limits of 1 and 3 foot-candles.
   3. The unit shall be so designed such that a failure of any electrical or electronic component will energize the lighting circuit.
   4. The photo‑electric unit shall be mounted at the top of the standard designated on the Drawings and shall be oriented as directed by the Engineer.
7. **Contactor:**
   1. The contactor shall be constructed in accordance with NEMA standards for lighting contactors and shall have contacts rated to switch the specified lighting load.
   2. Contactor shall be the mechanical armature type.
   3. The mechanical type shall consist of an operating coil, a laminated core, a laminated armature, contacts, and terminals.
   4. Contacts shall be silver alloy.
8. **Housing:**
   1. The contactor may be either integral with the photo‑electric unit or may be located externally from it.
   2. When located externally, the contactor shall be housed in the same pad mounted service and control cabinet where the photo-electric unit is installed.

9. **Wiring:** Conductors between the photo‑electric unit and an external contactor shall be a minimum No. 10 AWG, and shall be installed inside the lighting standard.

B. Flood Level Control:

1. Flood level controls shall be as shown below, or as shown on the Drawings.
2. The flood level control shall be capable of switching multiple lighting systems by a separate contactor as indicated on the Drawings.
3. The flood level control shall consist of a level probe unit installed on the ramp wall which controls a relay in the pad mounted service and control cabinet. The relay shall open shunt trip-enabled circuit breakers to disconnect electrical power to circuits as indicated on the drawings.
4. **The flood level control shall consist of Warrick Series 16M relay, Warrick 3E2C electrode fitting, and Warrick 3RXC5 probes or approved equals.**
5. **Equipment Details:**
   1. The probes shall be constructed of Teflon coated, 316 stainless steel. One end of the probes shall be factory threaded for attachment to the electrode fitting.
   2. The electrode fitting shall be NEMA 4 rated and capable of directly receiving the level probes. Enclosed terminal lugs for wiring capable of accepting No. 12 AWG conductors shall be provided.
   3. The relay unit shall consist of a transformer providing secondary voltage less than or equal to 24 volts for the probes. The relay unit shall be enclosed in a plug-in module with a matching base for installation in the pad mounted service and control cabinet. Minimum sensitivity shall be 100K ohms. The relay unit shall also have an integral Form C contactor rated 10 Amp/240 Volts resistive. Entire relay shall be powered by a single 120 Volt AC source.
6. **Wiring:** Conductors between the electrode fitting and the relay shall be a minimum No. 12 AWG.
7. **Operation:** Probes shall be located so bottom of probes are at elevation indicated on Drawings. Upon contact with water, the probes shall provide a circuit of adequate resistance to change the state of the relay. The relay shall close the NO portion of the Form C contact and provide 120 Volt AC current to the shunt trip breakers as indicated on the Drawings.

C. Time Clock control:

1. Facility lighting set for dusk to facility closing will be controlled by a photocell on and a time clock off installed inside the service pedestal cabinet. **The time clock controller shall be Intermatic ET90115C, or approved equal**.

:

**CONSTRUCTION**

**672.03.01 MAINTENANCE OF EXISTING AND TEMPORARY ELECTRICAL SYSTEMS**

A. Existing electrical systems (traffic signal, ramp metering, highway and street lighting, flashing beacon and sign illumination), or approved temporary replacements thereof, shall be kept in effective operation for the benefit of the traveling public during the progress of the work, except when shutdown is permitted to allow for alterations or final removal of the systems.

1. Traffic signal shutdown shall be as specified in the Special Provisions or as requested by the Engineer.
2. Lighting system shutdowns shall not interfere with the regular lighting schedule, unless otherwise permitted by the Engineer.
3. The Contractor shall notify the Operating Engineer’s Agency in writing 3 normal working days prior to performing any work on existing systems.

B. The CLV shall be notified in writing 3 normal working days in advance by the Contractor prior to any operational shutdown of a traffic signal system.

C. The CLV will continue operation and maintenance of existing electrical facilities.

D. Where damage is caused by the Contractor's operations, the Contractor shall at his expense, repair or replace, at the direction of the Engineer, damaged facilities promptly in accordance with these specifications. Should the Contractor fail to perform the required repairs or replacements, the cost of performing such repairs or replacements will be deducted from any monies due or to become due the Contractor.

E. The data indicated on the Drawings and in these Special Provisions is as exact as could be secured, but its absolute accuracy is not guaranteed. Exact locations, distances, levels, and other conditions will be governed by unforeseen obstacles in the field.

F. The exact location of existing conduits and pull boxes shall be ascertained by the Contractor before using equipment that may damage such facilities or interfere with any system. The Contractor shall use the Drawings and these specifications for guidance, and secure the Engineer’s approval for all changes of location or scope of work.

G. Where roadways are to remain open to traffic and existing lighting systems are to be modified, the lighting systems shall remain in operation and the final connection to the modified circuit shall be made so that the modified circuit will be in operation by nightfall of the same day.

H. Temporary electrical installations shall be kept in effective operation until the temporary installations are no longer required for the traveling public.

I. These provisions will not relieve the Contractor in any manner of his responsibilities as provided in Subsection 107.11, "Responsibility for Damage," and Subsection 107.16, "Contractor's Responsibility for the Work and Materials."

J. A temporary overhead cable system may be used for the existing signal system circuitry in lieu of maintaining the underground installations during construction if approved by the Operating Engineer’s Agency.

K. Where an existing system is being modified, work not shown on the Drawings or specified in these Special Provisions and which is considered by the Engineer as necessary to keep all or any part of the existing system in effective operation shall be considered as included in the prices paid for the systems, or units, therefore no additional compensation will be allowed.

**672.03.02 SCHEDULING OF WORK**

A. Storage:

1. Luminaires and wiring shall be stored off-site until they are ready for installation, assembly, and erection. Under no circumstances shall any of these items be stored on‑site when the contractor is not present.

2. Poles may be stored on-site for a short time period if they do not impact the day-to-day operation of the facility. The contractor is responsible for any damage or theft to any materials left on-site. Poles shall be placed on suitable supports off the ground.

B. Conductors shall not be pulled into conduit until pull boxes are set to grade, crushed rock sumps installed, and metallic conduit bonded, where applicable.

B. Lighting for pedestrian structures shall be placed in operation prior to opening the structure to pedestrian traffic.

C. If the Engineer orders lighting for pedestrian structures placed in operation before permanent power service is available, the cost of installing and removing temporary power service will be paid for as extra work as provided in Subsection 104.03, "Extra Work."

D. **Trail lighting shall not be inspected for acceptance or turned on until a completed set of red lined plans is received by the local agency. This does not preclude the preparation and submittal of as-built plans or Record Drawings.**

**672.03.03 SAFETY PRECAUTIONS**

A. Before starting work on existing lighting circuits, the Contractor shall obtain daily a safety circuit clearance from the responsible local agency.

B. By‑pass shall be switched to the "off" position, fuses shall be removed, and signs posted at the switch box before any work is done.

**672.03.04 EXCAVATING AND BACKFILLING**

A. All trenching and backfill shall comply with applicable portions of the USS, USD and Drawings.

1. All trenching shall be deep enough to ensure a minimum of 24 inches of cover over the conduit measured from the top of conduit to finish grade.
2. Vinyl power warning tape shall be placed above conduits at 12 inches below the finish grade.
3. The backfill in street areas shall be Type II gravel compacted to 95 percent relative density or an agency approved controlled low strength material (CLSM).
4. No trench shall be left open after established working hours without approval of the Engineer.

B. Conduit locations on the Drawings are for reference only.

1. Actual locations shall be determined by the Contractor as to the most economical location, either behind the curb or in front of the lip of the gutter, but in either case, the conduit shall remain parallel to the back of curb or the edge of pavement between the lighting standards, and the location shall be approved by the Engineer.
2. As-built marked prints or Record Drawings showing installed locations shall be given to the Engineer by the Contractor prior to final acceptance by the agency.

C. All conduit that is terminated, stubbed, and capped for future use shall be marked by a "+" a minimum of 3 inches high and directly above the conduit, cut into the face of the curb, wall, concrete paving, etc.

D. Excavations required for the installation of conduit, foundations and other facilities, shall be performed in such a manner as to cause the least possible damage to the streets, sidewalks, and other improvements.

1. Excavations shall not be larger than necessary for the proper installation of conduit, electrical facilities and foundations.
2. Excavating shall not be performed until immediately before installation of conduit, facilities, and foundations.

E. The material from the excavation shall be placed in a position where the least disruption and obstruction to vehicular and pedestrian traffic will be realized and the least interference with surface drainage will occur.

F. Surplus excavated material shall be removed and disposed of by the Contractor outside of the right-of-way.

G. At the end of each day's work, and at other times when construction operations are suspended, equipment and other obstructions shall be removed from the right-of-way.

H. Structural excavation and backfill shall conform to the requirements of Section 206, "Structure Excavation" and 207, "Structure Backfill."

I. Trench excavations shall be backfilled in conformance with the requirements of Section 208, "Trench Excavation and Backfill." Backfill shall be free of stones, caliche, or lumps of material exceeding 3 inches and free from sod, frozen earth and organic materials.

J. Backfilled excavations shall be kept well filled and maintained in a smooth and well drained condition, until permanent resurfacing is completed as specified in Subsection 208.03.05, "Cutting and Restoring Street Surfacing."

K. Unless otherwise specified in the Special Provisions, excavation in the street and highway shall be performed in such a manner that not more than one lane of traffic is restricted in either direction at any time, unless otherwise approved by the Engineer.

L. All streets upon or within which any work is being done shall be kept open to all traffic by the Contractor, as specified in Subsection 104.04, "Maintenance of Traffic," unless otherwise provided in these Special Provisions, or as approved by the Engineer.

M. Barricading shall conform to the latest editions of the Traffic Control Plans for Highway Work Zones for the Clark County Area and the *Manual On Uniform Traffic Control Devices*.

**672.03.05 REMOVING AND REPLACING IMPROVEMENTS**

A. Improvements, such as sidewalks, curbs, gutters, Portland cement concrete and asphalt concrete pavement, bituminous surfacing, base material and other improvements removed, broken or damaged by the Contractor, shall be replaced or reconstructed in compliance with the applicable sections of these specifications.

B. Whenever a part of a square or slab of existing concrete sidewalk or driveway is broken or damaged, it shall be repaired in accordance with Subsection 202.03.02, "Removal of Structures and Obstructions."

C. The outline of all areas to be removed in Portland cement concrete sidewalks and in pavements shall be cut to a minimum depth of 1‑1/2 inches with an abrasive-type saw prior to removing the sidewalk and pavement material.

1. Cut for the remainder of the required depth may be made by any method satisfactory to the Engineer.
2. Cuts shall be neat and true with no shatter outside the removal area.

**672.03.06 WIRING**

A. Wiring shall conform to appropriate articles of the National Electrical Code.

1. Wiring within cabinets, junction boxes, etc., shall be neatly arranged and laced.
2. Powdered soapstone, talc, or other approved lubricant shall be used when installing conductors in conduit.

B. Each conductor shall have 18 inches of slack coiled within each lighting standard and at least 2 feet of slack coiled in each pull box.

C. Conductors shall be installed without splices from luminaire to luminaire and from service to luminaire unless otherwise specified. Multiple lighting conductors may be spliced in the base of lighting standards or in pull boxes adjacent thereto.

D. Splices for trail light conductors shall be connected using bronze split bolt type connectors in accordance with these Special Provisions and the Standard Drawings. All splices, taps, or other connections in pull boxes, junction boxes or lighting standard bases shall be made liquid-tight and suitable for submersion in water using a suitable method approved by the Engineer.

E. Conductor insulation shall be well penciled, trimmed to conical shape, roughened and meet manufacturer’s recommendations before applying splice.

1. When conductors and cables are pulled into the conduit, all ends of the conductors and cables shall be taped to exclude moisture.
2. Ends of spare conductors shall be taped.

F. The ends of all conduits shall be well reamed to remove burrs and rough edges.

1. Field conduit cuts shall be made square and true so that the ends will butt or come together for the full circumference in the couplings or adapters.
2. Slip joints or running threads shall not be permitted for coupling metal conduit.

G. When a standard coupling cannot be used, an approved union coupling shall be used.

H. Couplings for steel conduit shall be tightened until the ends of the conduits are brought together, so that a good electrical connection will be made throughout the entire length of the conduit run.

I. Conduit ends shall be threaded and capped with standard pipe caps until wiring is started. When caps are removed, the threaded ends shall be provided with approved conduit bushings.

J. Manual or power-operated equipment normally used for cutting rigid steel conduit is acceptable for use in cutting PVC coated rigid steel conduit.

1. PVC shall not be peeled back before cutting and all cuts shall be reamed.
2. Threading shall be the same as for non-coated rigid conduit.
3. All scarred and grip marked areas shall be touched up with approved heavy consistency coating compound.

K. For PVC coated rigid steel, all couplings and threaded fittings shall be hand tightened before using a wrench.

1. Use strap wrench for the final two turns only.
2. All wrench marks and scores shall be recoated and joints must be sealed with heavy consistency PVC compound.
3. Ensure that the final installation does not have any exposed metal areas.

L. PVC coated rigid steel conduit, 2 inches in diameter or larger, shall be used for all bends, except for 90‑degree bends at trail light pole foundations.

1. Standard field bending techniques shall be used which typically uses a shoe one size larger to accommodate the larger pipe diameter.
2. The minimum radius of the bend shall be 36 inches for PVC coated rigid steel conduit.

M. Conduit terminating in pedestals shall be a minimum of 2 inches and a maximum of 4 inches above the foundation and should be sloped toward the handhole opening.

N. Conduit shall enter concrete pull boxes from the bottom and shall terminate 2 inches inside the box wall and not less than 3 inches nor more than 4 inches above the bottom, and shall be sloped to facilitate pulling of conductors.

1. Conduit entering the bottom of a pull box shall be located near the end walls to leave the major portion of the box clear.
2. At all outlets, conduit shall enter from the direction of the run.

O. Existing underground conduit to be incorporated into a new system shall be cleaned by blowing out with compressed air, or by other methods required by the Engineer.

P. Conduit runs shown on the Drawings are for bidding purposes only and may be changed with the approval of the Engineer to avoid underground obstructions.

**672.03.07 SERVICE**

A. Service points when required for trail lighting shall be as indicated on the Drawings.

1. Each service provided by the Contractor shall have a 200 amp rating and shall conform to the Clark County Area Uniform Standard Drawings as applicable.
2. Breakers as shown in the service panel schedule in the drawings will be required.

B. The Contractor shall obtain all addresses for new services from the City of Las Vegas, Department of Planning and Development, 731 South 4th Street, (702) 229-5408.

C. It shall be the Contractor’s responsibility to coordinate all work associated with service point connections required by this contract with the NV Energy.

D. The Contractor shall furnish and install conduit and conductors to the service point as shown on the Drawings or as required to complete the installation.

E. No service point will be considered acceptable unless approved in writing by the NV Energy and the Engineer or his designee.

**672.03.08 BONDING AND GROUNDING**

A. Metallic cable sheaths, steel conduit, metal poles, pedestals, pull boxes, and other metal enclosures shall be metallically joined together and made mechanically and electrically secure to form a continuous electrical conducting path and shall be effectively grounded as required by the National Electrical Code.

B. All non‑metallic conduits shall contain a green grounding conductor as specified herein, except if none is specified, this conductor shall be sized according to Article 250 of the National Electrical Code.

C. Bonding and grounding jumpers shall be copper wire or copper strap of the same cross‑sectional area as No. 4 AWG for series and multiple lighting circuits.

1. Bonding of standards and foundations shall be accomplished by means of a bare No. 4 copper wire attached to each anchor bolt and to a 1/2-inch, or larger, brass, cadmium-plated or bronze bolt installed on the lower lip of the lighting standard handhole as shown on the Standard Drawings or on the Drawings.
2. The No. 8 green grounding conductor from the conduit and the No. 10 luminaire ground shall be connected to the No. 4 grounding conductor.
3. Grounding of conduit and neutral at the service point shall comply with the applicable sections of Article 250 of the National Electrical Code.

**672.03.09 TESTING**

A. The Contractor shall be required to submit Record Drawings prior to any inspections being performed. Contractor and/or his representative shall be present at the project location during the Maintaining Agency’s inspection of the street light installation.

B. Prior to completion of the work, the Contractor shall cause the following tests to be made on all lighting circuits, in the presence of the Engineer:

1. Test for continuity of each circuit.
2. Test for grounds in each circuit with a 500 volt megohmmeter with a minimum acceptable reading of 200 megohms.
3. A functional test in which it is demonstrated that each and every part of the system functions as specified or intended herein.
4. A high‑pot test when specified.
5. Before acceptance of the work, the Contractor shall provide the Engineer with foot-candle readings showing average to minimum ratios in accordance with I.E.S. standard recommendations.

C. Any fault in any material or in a part of the installation revealed by these tests shall be replaced or repaired by the Contractor in a manner approved by the Engineer, and the same test shall be repeated until corrected.

**METHOD OF MEASUREMENT**

**672.04.01 MEASUREMENT**

The quantity of Modify Existing Service Pedestal will be measured for payment by each modified as required to meet additional lighting requirements, in place, complete and operational.

The quantities of POLE AND LIGHT ASSEMBLY (14.5 FOOT), POLE AND BRIDGE LIGHT ASSEMBLY (14.5 FOOT), and POLE AND LIGHT ASSEMBLY (11 FOOT) will be measured for payment by each installed, in place, complete and operational.

The quantity of NO. 3-1/2 PULL BOX will be measured for payment by each installed, in place, complete and operational.

The quantity of REMOVE, SALVAGE, AND RETURN LIGHT ASSEMBLY TO OWNER will be measured for payment by each removed, salvaged, and returned to Owner.

The quantity of 200 AMP SERVICE PEDESTAL will be measured for payment by each installed, in place, complete and operational.

The quantity of FLOOD LEVEL CONTROL UNIT will be measured for payment by each installed, in place, complete and operational.

The quantities of (Size, Type) Conduit with (#/AWG) Conductor will be measured for payment by linear foot installed, in place and complete.

All measurements will be made in accordance with Subsection 109.01, "Measurement of Quantities."

**BASIS OF PAYMENT**

**672.04.02 PAYMENT**

The accepted quantity of MODIFY EXISTING SERVICE PEDESTAL shall be paid for at the Contract unit price bid per each, which shall be full compensation for furnishing and installing all required upgrades to existing service pedestal to allow operation as indicated on the Drawings, including, but not limited to, circuit breakers, contactors, internal conductors, fittings, connections, tools, labor, and incidentals required to make the service pedestal complete and operational as shown on the Drawings, as specified, and as required by the Engineer.

The accepted quantities of POLE AND LIGHT ASSEMBLY (14.5 FOOT), POLE AND BRIDGE LIGHT ASSEMBLY (14.5 FOOT), and POLE AND LIGHT ASSEMBLY (11 FOOT) will be paid for at the Contract unit prices bid per each, which shall be full compensation for furnishing and installing all materials including trenching, conduit and/or conductors not shown as separate bid items, shipping, delivery, tools, fittings, bends, excavation, compacted backfill, concrete foundations, concrete or steel pedestals, connections to existing conduits and circuits, all wiring above ground from the hand hole of the pole to the luminaires and receptacles, poles, field modification of poles, mast arms, luminaires, hardware, making all required tests, and for providing all labor, tools, equipment, and incidentals required to make lights operational, as shown on the Drawings, as specified, and as directed by the Engineer.

The accepted quantity of NO. 3-1/2 PULL BOX will be paid for at the Contract unit prices bid per each, which shall be full compensation for furnishing and installing all materials including shipping, delivery, tools, foundations, required hardware to ensure item is complete, in place and operational, excavation, installation, conduit connections, and backfill, and for providing all labor, tools, equipment, and incidentals required to complete the work as shown on the Drawings, as specified, and as directed by the Engineer.

The accepted quantity of REMOVE, SALVAGE, AND RETURN LIGHT ASSEMBLY TO OWNER will be paid for at the Contract unit price bid per each, which shall be full compensation for removal of existing trail light and foundation, salvage and storage of existing trail light, and delivery of salvaged trail light to Owner in accordance with Owner's directions including trenching, rerouting existing conduit and conductors not shown as separate bid items, tools, fittings, bends, excavation, compacted backfill, connections to existing conduits and circuits, making all required tests, and for providing all labor, tools, equipment, and incidentals required to salvage existing trail light, as shown on the Drawings, as specified, and as directed by the Engineer.

The accepted quantity of 200 AMP SERVICE PEDESTAL will be paid for at the Contract unit price bid per each, which shall be full compensation for furnishing and installing all materials including shipping, delivery, tools, fittings, excavation, grading, compacted backfill, concrete foundations, contactors, circuit breakers, meters, hardware, photocells, making all required tests, and for providing all labor, tools, equipment, and incidentals required to make service pedestals complete, in place and operational, as shown on the Drawings, as specified, and as directed by the Engineer.

The accepted quantity of FLOOD LEVEL CONTROL UNIT shall be paid for at the Contract unit price bid per each, which shall be full compensation for furnishing and installing all materials including shipping, delivery, tools, fittings, excavation, grading, compacted backfill, relays, probes, fittings, hardware, conduit and/or conductors not shown as separate bid items, making all required tests, and for providing all labor, tools, equipment, and incidentals required to make flood level control complete, in place and operational, as shown on the Drawings, as specified, and as directed by the Engineer.

The accepted quantities of (Size, Type) Conduit with (#/AWG) Conductor will be paid for at the Contract unit prices bid per linear foot, which shall be full compensation for furnishing and installing all materials including shipping, delivery, tools, removal of pavement and the placing of temporary and permanent pavement patches; excavation, trenching, saw cutting, installation, bedding, backfill, conduit, conductor, pull strings, fittings, bends, clamps, anchors, stubouts, pole risers, concrete encasement, connections to existing conduit and conductors, making all required tests to ensure item is complete, in place and operational, and for providing all labor, tools, equipment, and incidentals required to complete the work as shown on the Drawings, as specified, and as directed by the Engineer. The cost of supplying and installing junction boxes as indicated on the Drawings or otherwise required in conduit shall be considered incidental to conduit installation and no additional compensation shall be allowed therefor.

Payment will be made under:

| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| --- | --- | --- |
| 672.0050 | MODIFY EXISTING SERVICE PEDESTAL | EA |
| 672.0060 | POLE AND LIGHT ASSEMBLY (11 FOOT) | EA |
| 672.0070 | POLE AND LIGHT ASSEMBLY (14.5 FOOT) | EA |
| 672.0080 | NO. 3-1/2 PULL BOX | EA |
| 672.0090 | POLE AND BRIDGE LIGHT ASSEMBLY (14.5 FOOT) | EA |
| 672.0100 | REMOVE, SALVAGE, AND RETURN LIGHT ASSEMBLY TO OWNER | EA |
| 672.0110 | 200 AMP SERVICE PEDESTAL | EA |
| 672.0120 | FLOOD LEVEL CONTROL UNIT | EA |
| 672.XXXX | (Size, Type) Conduit with (#/AWG) Conductor | LF |

END OF SECTION 672

SECTION 680 – FIBER OPTIC CABLE

**DESCRIPTION**

**680.01.01 GENERAL**

***DELETE PARAGRAPH “B” OF THIS SUBSECTION AND REPLACE WITH THE FOLLOWING:***

B. All equipment and cable selection, mounting, and installation, as well as the cable management plan for Arterial Management System (AMS) and Freeway Management System (FMS) must be approved by the Freeway & Arterial System of Transportation (FAST) Director or designee, prior to installation.

***ADD THE FOLLOWING PARAGRAPH TO THIS SUBSECTION:***

C. All equipment and cable selection, mounting, and installation, as well as the cable management plan for City of Las Vegas (CLV) City Fiber Optic (CFO) system must be approved by the CLV Transportation Engineering Division (TED) or designee, prior to installation.

***ADD THE FOLLOWING SUBSECTION TO THIS SECTION:***

* + 1. **SUBMITTALS**

A. The submittals indicated below shall be provided as specified in Section 105.02, Plans and Working Drawings.

B. The Installer (licensed Contractor or installation subcontractor) shall have experience in the furnishing, installing and testing of single mode fiber optic cable. This experience shall include 5 projects with a project value of more than $25,000 each within the past 5 years.

C. The Contractor shall submit, one day after the bid opening, a list of qualifying experience on the INSTALLER EXPERIENCE FORM, FIBER OPTIC CABLE (See Attachment 5 in the Bid Proposal Pages) [NOTE TO SPEC WRITER – REMEMBER TO SEND ATTACHMENT 5 TO THE CONTRACT SPECIALIST, ATTACHMENT 5 IS INCLUDED IN THE SPECIAL PROVISIONS FOLDER] All required information, including: project name, Date Completed, name of owner, contact person and phone number, project cost and length of the fiber optic cable installed.

D. It is required that the superintendents of the crews installing and testing the Fiber Optic Cable have a minimum of three (3) years fiber optic cable installation supervisory field experience on at least 3 of the successfully completed projects listed on the INSTALLER EXPERIENCE FORM, FIBER OPTIC CABLE.

**MATERIALS/EQUIPMENT**

**680.02.01 FIBER OPTIC OUTSIDE PLANT TRUNK CABLE (TRUNK CABLE)**

***DELETE PARAGRAPH “H” OF THIS SUBSECTION AND REPLACE WITH THE FOLLOWING:***

H. Conductive Line Locating Material:

1. In AMS and FMS conduits a #10 AWG (American Wire Gauge) THW tracer wire shall be directly adjacent to the cable in every conduit containing fiber optic cables to aid in locating of the conduit once it is in place.
2. Any other method of providing a conductive tracer wire must be approved by the FAST Director, or designee prior to installation.
3. In CFO conduits a #10 AWG THW tracer wire shall be directly adjacent to the cable in every conduit containing fiber optic cables. This #10 AWG THW Tracer Wire shall be installed within all CFO conduits (empty and with cables).
4. Any other method of providing a conductive tracer wire must be approved by the TED or designee prior to installation.

***ADD THE FOLLOWING PARAGRAPH TO THIS SUBSECTION:***

J. Cable Labels:

1. Cable labels shall be made of flame retardant material 5.5 mils in thickness and 1/4 inch minimum width. The labels shall be flexible, resistant to oil and water, and shall have the capability of being moved along the cable during future alterations. The film material shall conform to the flame retardant requirements of UL 510 and be rated at 150 degrees C.
2. Appropriate numbers and letters shall be printed on cable labels for cable function (i.e., CFO, AMS, FMS), direction of the cable (i.e, North, East, etc.) along with its next point of entry identification (i.e., SWC of XYZ St. & ABC Blvd.).

**CONSTRUCTION**

* + 1. **INSTALLATION - GENERAL**

***DELETE PARAGRAPHS “C.1” and “C.2” OF THIS SUBSECTION AND REPLACE WITH THE FOLLOWING:***

1. Certifications for AMS and FMS installations shall be approved by the FAST Director or designee prior to construction. Certifications for CFO installations shall be approved by TED or designee prior to construction.
2. Fiber optic cable shall be continuous and without splices unless approved by the FAST Director or designee for AMS and FMS installations, and TED or designee for CFO installations, unless noted otherwise on the splice details provided.

***DELETE PARAGRAPH “H.4” OF THIS SUBSECTION AND REPLACE WITH THE FOLLOWING:***

1. Two weeks prior to disconnecting any existing cables, the Contractor shall submit a schedule, for approval by the FAST Director or designee for AMS and FMS installations, and approved by TED for CFO installations, with the accurate time frames of when the existing cables are to be disconnected.

***DELETE PARAGRAPH “I” OF THIS SUBSECTION AND REPLACE WITH THE FOLLOWING:***

I. In all locations where fiber enters a pull box, for each cable entering the pull box or vault, cable slack shall be loosely looped through a figure-8 or a loose loop with a minimum of 60 feet of slack in all pull boxes smaller than a Type 100 vault, unless approved by the Engineer, prior to installation. The Contractor shall leave a minimum of 120 feet of slack per conduit entrance (240 feet total) in all Type 200 vaults or other pull boxes where fiber optic cable is to be spliced, allowing the splicing activities to take place outside the pull box above ground in a controlled environment.

***DELETE PARAGRAPH “J.2” OF THIS SUBSECTION AND REPLACE WITH THE FOLLOWING:***

1. The labeling on the fiber optic cable shall be approximately 2 feet from the entry point and shall note the direction of the cable along with its next point of entry (i.e., AMS FIBER North to XYZ St. & ABC Blvd or CFO FIBER West to ABC Blvd. & XYZ St.).

***ADD THE FOLLOWING PARAGRAPHS TO SUBSECTION “J”:***

1. A continuous cable passing through a pull box shall have two labels. A pull box with a trunk line fiber optic cable spliced with a CDCA cable shall have three labels, two on the trunk line fiber optic cable (one at each conduit entrance point) and one on the CDCA cable entry point.

***ADD THE FOLLOWING PARAGRAPHS TO THIS SUBSECTION:***

M. The contractor shall clean new and existing conduits, no more than one week prior to installation of fiber optic cable. Conduit cleaning is not required where existing cables, conductors, or innerducts within a conduit are not to be removed. Conduit cleaning is not required when both end of the conduit have a proper cap/plug that appears to have stopped water and other material from flowing into the conduit. Prior to pulling the mandrel through the conduit, the conduit shall be brushed or swabbed if required by the Engineer.

1. For PVC conduit, a metal-disc mandrel with an outer diameter not less than 90 percent of the conduit’s inside diameter shall be pulled through the conduit.
2. For HDPE conduit, a ball mandrel with an outer diameter not less than 80 percent of the conduit’s inside diameter shall be pulled through the conduit.

N. During all fiber optic cable installations, regardless of installation method, the contractor shall record the "foot marking" of installed fiber optic cable at the entrance and exit point of pull boxes on a “Fiber-Optic Cable Installation Sequential Report”. The report shall be provided to the Engineer in electronic spreadsheet format prior to final acceptance.

1. This electronic spreadsheet shall include a column that calculates the cable slack loop quantity/distance for each pull box location, based on the foot markings of cables that pass through the pull box without a fiber splice. For fiber splice locations the contractor shall also include the foot markings at the end of each cable that enters the splice enclosure. The combined quantity/distance of each cable entering the splice enclosure (i.e., between the pull box entrance and the splice enclosure, plus the distance between the splice closure and the pull box exit point), shall be used to calculate cable slack loop quantity/distance for each cable entering a splice enclosure.
2. Within this spreadsheet also add a column with the GPS coordinates for each pull box location and a column for the associated pull box number as shown on the plans. Refer to section 623 G.01.05, GLOBAL POSITIONING SYSTEM (GPS) COORDINATES for additional requirements.

O. Splicing:

1. The contractor shall perform fusion splicing of fiber optic cable at the locations shown on the splice details in the project plans. Splices shall be prepared in accordance with the manufacturer’s recommendations. Splicing shall be conducted only at splice locations shown on the project plans or in node buildings at fiber termination panel locations.
2. Fiber optic cable shall be continuous between splice points as shown on the splice details in the project plans. Additional splice points proposed by the contractor that are not indicated on the project plans are subject to approval by the Engineer, at no additional cost to the Owner.
3. The contractor shall install splice enclosures in a manner approved by the Engineer. Splice enclosures shall be installed with trunk line cable entries on the same side of the end cap allowing future Communications Distribution Cable Assembly (CDCA) and branch fiber optic cables to be installed without disturbing the trunk line seals.
4. Where the contractor is splicing to existing fiber optic cable, the contractor shall take care not to disturb existing splices. Existing splices that are damaged shall be repaired immediately by the contractor, at no additional cost to the Owner.
5. All splices and connectors shall be prepared in accordance with the manufacturer’s recommendations. Each splice between two new fibers shall introduce less than 0.03 dB attenuation.
   * 1. **TESTING**

***DELETE PARAGRAPH “A.1.e.” OF THIS SUBSECTION AND REPLACE WITH THE FOLLOWING:***

1. Submit factory results of the AMS and FMS cables for approval by the FAST Director or designee, prior to installing the cable. Submit factory results of the CFO cables for approval by the TED or designee, prior to installing the cable.

***DELETE PARAGRAPHS “A.2.d.” and “A.2.e.” OF THIS SUBSECTION AND REPLACE WITH THE FOLLOWING:***

1. Submit Optical Time Domain Reflectometer (OTDR) trace results of the AMS and FMS cables for approval by the FAST Director or designee, prior to installing the cable. Submit Optical Time Domain Reflectometer (OTDR) trace results of the CFO cables for approval by the TED or designee, prior to installing the cable.
2. OTDR results for the AMS and FMS cables shall be approved by the FAST Director or designee, prior to installation. OTDR results for the CFO cables shall be approved by TED or designee, prior to installation.

***DELETE PARAGRAPH “A.3.b.1)” OF THIS SUBSECTION AND REPLACE WITH THE FOLLOWING:***

1. OTDR Tests
2. Conduct tests using an OTDR for each fiber.
3. Demonstrate that the attenuation for each fiber strand complies with the loss budgets required by these Standards.
4. Test all fibers at 1,310 nm and 1,550 nm.
5. Submit OTDR trace results of the AMS and FMS cables for approval and acceptance by the FAST Director, or designee. Submit OTDR trace results of the CFO cables for approval and acceptance by TED, or designee.
6. All OTDR traces shall be provided in the test documentation submittal in their native format or “raw” state as they are saved on the OTDR hard drive. For example, the bi-directional .trc files on an EXFO OTDR shall be submitted above and beyond the pdf’s generated of the OTDR traces.
7. OTDR tests shall be performed in accordance with TIA/EIA-455-8 for all fibers, including new fibers, dark fibers, and existing fibers in splice enclosures that the contractor works in.
8. The contractor shall perform OTDR tests using a launch cable of a length recommended by the OTDR manufacturer. The contractor shall enter the proper OTDR parameters for operation, including wavelength, index of refraction of fiber to be tested, and pulse length. The contractor shall adjust the sensitivity to 0.01 decibel and the resolution to display the complete fiber under test. Each loss event in the OTDR table shall be set to at least 2 decimal places. The contractor shall set the range of the OTDR to capture the complete fiber trace. The contractor shall set the number of averages or time of averages on the OTDR to ensure a smooth trace with no noise at the end of the trace.
9. The contractor shall submit OTDR traces which clearly annotate the location of each loss event at a minimum of 2 decimal places and identify the maximum allowable loss and the measured loss for each event (i.e., connector, splice, and fiber path length). The contractor shall provide a table of bi-directional splice losses for each fiber at each splice point and the table shall also include the connector losses at each termination panel for each fiber for review. All measured losses that exceed the maximum allowable loss shall be clearly identified on the bi-directional splice loss table until corrective measures have been performed by the contractor and all fiber paths successfully pass the OTDR test criteria. Failed splices shall be remade and re-tested for compliance. Failed connectors shall be cleaned, and replaced if necessary, and re-tested for compliance. Failed cable segments shall be replaced and re-tested for compliance.
10. OTDR tests shall be performed as follows:
11. Bi-directional OTDR testing:

The contractor shall test each fiber strand path between fiber termination panels, in both directions, at 1310 nm and 1550 nm utilizing a fiber launch reel to ensure the reflective connector in the patch panel is measured.

In the event that a cable is pulled from point A to point B, with or without splices, but neither end is terminated, rather the ends are in a pull box for a future connection, the contractor shall test each unterminated fiber strand at each end to determine the bi-directional splice losses between the unterminated cables. There will be no front-end connector loss measurements since the cable is not terminated.

1. Uni-directional OTDR testing:

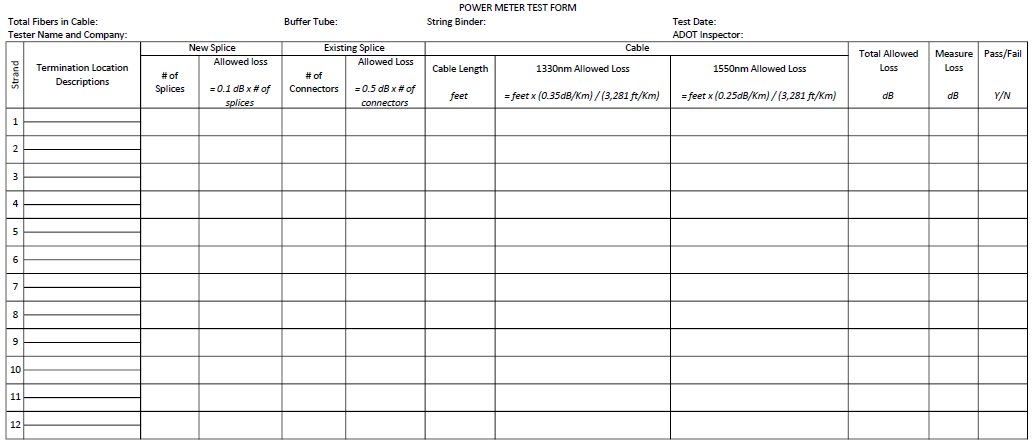
The contractor shall test each fiber strand connected to a fiber termination panel at one end and un-terminated in a splice closure at the other end utilizing a fiber launch reel at the terminated end to ensure the reflective connector in the patch panel is measured.

***DELETE PARAGRAPH “A.3.b.2)” OF THIS SUBSECTION AND REPLACE WITH THE FOLLOWING:***

1. Power meter readings are required from all fibers. Submit power meter results of the AMS and FMS cables for approval and acceptance by the FAST Director, or designee. Submit power meter results of the CFO cables for approval and acceptance by TED, or designee.

***ADD THE FOLLOWING PARAGRAPHS TO SUBSECTION “A.3.b.2)”:***

1. The contractor shall conduct Power Meter Tests for each fiber to measure installed fiber cable attenuation and demonstrate correct panel termination continuity, for example, fiber #1 at site A matches up with fiber 1 at site B.
2. Power Meter Tests shall be performed on each fiber strand path between fiber termination panels (i.e., CDCA and node termination panels). The contractor shall ensure that the light source and meter are calibrated and referenced to a zero reading when directly connected to each other, ensuring an accurate loss reading.
3. Power Meter Tests shall be performed in accordance with Method A.3 of TIA/EIA-526-7 – “Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant.” Testing shall be conducted at the cable ends in both directions using 1310 and 1550 nm wave lengths.
4. The contractor shall provide power meter testing results on a Power Meter Test Form. The contractor shall use the Power Meter Test Form illustrated below for recording the power meter results:



1. The contractor may request the Microsoft Excel spreadsheet of this form from TED. If the spreadsheet is not available, then the contract shall create one to use that is pre-approved by the Engineer prior to testing.

***DELETE PARAGRAPH “D” OF THIS SUBSECTION AND REPLACE WITH THE FOLLOWING:***

D. All fusion splices shall be measured by the fusion splicer’s internal diagnostic program when the splice is created, and shall have no greater attenuation that 0.03 db loss.

1. Additionally, all splices shall be noted on the OTDR test documentation, and shall have no greater than a 0.03 db loss.
2. All cables (including the CDCA and Trunk Line Cables) and all splices shall be tested as part of the completely installed system, and shall take place from connector to ST connector, if installed, or from the end the cable run at the outer limits of the project.
3. The use of a “loop-back” testing procedure will be acceptable, if approved by the Engineer in advance of the testing.

***ADD THE FOLLOWING PARAGRAPHS TO THIS SUBSECTION:***

E. FAST shall have in their possession all pre- and post-testing data prior to final approval and acceptance of the AMS and FMS cables by the FAST.

F. The CLV shall have in their possession all pre- and post-testing data prior to final approval and acceptance of the CFO cables by TED.

**METHOD OF MEASUREMENT**

**680.04.01 MEASUREMENT**

***DELETE THIS SUBSECTION IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:***

The quantity of FIBER OPTIC CABLE (XX-STRAND) will be measured per linear foot installed, in place, complete and operational, and successfully tested. The cable shall be measured by the marking on the exterior cable sheath. No separate measurement will be made for lubricant in this item.

The quantity of [FILL IN ITEM DESCRIPTION] will be measured per [UNIT].

No direct measurement shall be made for [FILL IN ITEM DESCRIPTION].

**BASIS OF PAYMENT**

**680.05.01 PAYMENT**

***DELETE THIS SUBSECTION IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:***

The accepted quantity of FIBER OPTIC CABLE (XX-STRAND) will be paid for at the Contract unit price bid per linear foot, which shall be full compensation for installing the cable and appurtenances, complete in place, and for providing labor, hardware, cable ties, single mode fiber optic cable, lubricant, conductive line locating material, water blocking material, and labeling, all as specified, as shown on the Drawings, and as required by Engineer. All materials required to complete the system shall be incidental to the cable including the approval, furnishing, and installation of racks and hooks in T200 vaults, and removing and replacing existing cables, for each type installed. Payment for the fiber optic cable installation shall also include the cost of all fiber optic termination strips, splices in existing splice enclosures, terminations, and labeling as incidental to the item requiring the work. Testing, warranty, documentation, and spare parts are considered incidental to the item requiring the work.

All other components of the approved Communications Distribution Cable Assembly (CDCA) and splicing in new splice enclosures shall be specified and paid under Section 681, “Fiber Optic Splice and Distribution Equipment”. Testing, temporary connectors for testing, warranty, documentation, training, and spare parts are considered incidental to the item requiring the work.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

Unless otherwise provided in the Special Provisions, no payment will be made for [FILL IN ITEM DESCRIPTION] as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items for which [FILL IN ITEM DESCRIPTION] is required.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 680.0005 | FIBER OPTIC CABLE (XX – STRAND) | LF |

END OF SECTION 680

SECTION 681 – FIBER OPTIC SPLICE AND DISTRIBUTION EQUIPMENT

**DESCRIPTION**

**681.01.01 GENERAL**

***DELETE PARAGRAPH “B” and “C” OF THIS SUBSECTION AND REPLACE WITH THE FOLLOWING:***

B. All other Arterial Management System (AMS) and Freeway Management System (FMS) equipment not used shall be delivered to the Freeway and Arterial System of Transportation (FAST) Traffic Management Center (TMC) prior to project acceptance. All other City of Las Vegas (CLV) equipment not used shall be delivered to the CLV West Service Center (WSC)

1. No partial shipments will be accepted for deliveries to the TMC and WSC, unless prior arrangements are made, and shall be labeled clearly with the project and location designation.

C. All AMS and FMS equipment shall be approved by the FAST Director or designee, prior to purchase. All CLV Fiber Optic (CFO) equipment shall be approved by the CLV Transportation Engineering Division (TED) or designee, prior to purchase.

**MATERIALS/EQUIPMENT**

**681.02.01 UNDERGROUND SPLICE ENCLOSURES**

***DELETE PARAGRAPH “A.2.” OF THIS SUBSECTION AND REPLACE WITH THE FOLLOWING:***

1. The splice enclosure shall provide an internal configuration and single end cap with a minimum of 6 ports for the appropriate backbone, trunk, and branch line cables. For splice locations requiring 144 single fusion splices or less provide a Commscope Fiber Optic Splice Closure Model No. 450-B6-6-24-6-B3V or equivalent as approved by the FAST Director for AMS and FMS cable splices, TED for CFO splices, or designee. For splice locations requiring more than 144 single fusion splices provide a Commscope Fiber Optic Splice Closure Model No. 450-D6-6-72-8-C3V or equivalent as approved by the FAST Director for AMS and FMS cable splices, TED for CFO splices, or designee.

***DELETE PARAGRAPH “C” OF THIS SUBSECTION AND REPLACE WITH THE FOLLOWING:***

C. For splice locations requiring 144 single fusion splices or less the enclosure shall have 6 stackable single fusion trays for 24 splices each to accommodate a total 144 splices, with each fusion tray designed specifically for housing 24 single fusion splices protected by heat-shrink sleeves. For splice locations requiring more than 144 single fusion splices, the enclosure shall have 8 stackable single fusion trays for 72 splices each to accommodate a total 576 splices, with each fusion tray designed specifically for housing 72 single fusion splices protected by heat-shrink sleeves.

1. The splice trays shall be easy to install and remove, and have provisions for a minimum entry of 4 buffer tubes.
2. A storage basket for storing loose buffer tubes or single fiber shall be installed and delivered with the enclosure.

***ADD THE FOLLOWING PARAGRAPH TO THIS SUBSECTION:***

E. Each splice shall be packaged in a protective heat-shrink sleeve and secured in the splice tray.

1. The heat-shrink sleeve shall be approved for use by the fiber optic cable manufacturer and installed in such a manner as to protect the fiber from scoring, dirt accumulation, moisture intrusion, and micro bending.
2. All termination plans and splicing plans shall be as directed on the Plans.
3. Following the installation, termination, and splicing of the CDCA and the Fiber Optic Splice and Distribution Equipment, The Contractor shall perform all tests on the splices that were completed, as required on the Plans.
4. Documentation shall be submitted as required in section 680.03.02 TESTING.
5. Protective covers shall be used on all optical connectors and terminations at all times until terminated.

**681.02.02 COMMUNICATIONS DISTRIBUTION CABLE ASSEMBLY (CDCA)**

***DELETE PARAGRAPH “A” OF THIS SUBSECTION AND REPLACE WITH THE FOLLOWING:***

A. The Contractor shall provide and install Single Mode CDCA Intelligent Transportation System (ITS) Drop Cable or equivalent which is factory terminated cable with epoxy filled patch panel with 12 fiber optic Lucent Connector (LC) connectors. Additionally, an approved Single-Panel Housing (SPH) pigtailed 12 strand LC duplex, single-mode (OS2), single fiber, 250 μm can be approved for specific applications by the FAST Director for AMS and FMS CDCA, TED for CFO CDCA, or associated designee.

**CONSTRUCTION**

**681.03.01 GENERAL**

***DELETE PARAGRAPH “C” OF THIS SUBSECTION AND REPLACE WITH THE FOLLOWING:***

C. The AMS CDCA shall be installed in the conduit from the traffic signal cabinet to the AMS T200 splice vault. The CFO CDCA shall be installed in the conduit from the TELECOM cabinet to the CFO T200 splice vault.

**METHOD OF MEASUREMENT**

* + 1. **measurement**

***ADD THE FOLLOWING PARAGRAPHS TO THIS SUBSECTION:***

The quantity of UNDERGROUND SPLICE ENCLOSURES and fiber optic splices will be measured per each, in place and operational, as shown on the contract drawings and as directed by the engineer.

The quantity of COMMUNICATION DISTRIBUTION CABLE ASSEMBLY will be measured per each, in place and operational, as shown on the contract drawings and as directed by the engineer.

The CLV ETHERNET SWITCH will be provided by the owner after construction has started. The contractor will be required to pick up and install the switch in each TELECOM cabinet as shown on the contract drawings and as directed by the engineer.

The quantity of [FILL IN ITEM DESCRIPTION] will be measured per [UNIT].

No direct measurement shall be made for [FILL IN ITEM DESCRIPTION].

**BASIS OF PAYMENT**

**681.05.01 PAYMENT**

***ADD THE FOLLOWING PARAGRAPHS TO THIS SUBSECTION:***

The accepted quantity of UNDERGROUND SPLICE ENCLOSURES and fiber optic splices installed complete and associated cable/hardware measured as provided above, will be paid for at the Contract unit price bid per each, which price shall be full compensation for the splicing and the underground splice closures including gel, splice trays, cable baskets, single fusion trays, sleeves and storage baskets and all work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of COMMUNICATION DISTRIBUTION CABLE ASSEMBLY installed and tested positively will be paid for at the Contract unit price bid per each, which price shall be full compensation for the cable assemblies including hardware, twelve (12) LC connectors per each assembly, labor and tools for complete installation, testing, labeling, documentation, training, warranty, splicing, and all work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of CLV ETHERNET SWITCH will be paid for at the Contract unit price bid per each, which price shall be full compensation for all materials, equipment, and labor required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include, mounting, mounting hardware, power supply unit, conductors, cabling, connections, and network management software delivered as a single shipment to City, with the Project’s name noted on the packaging.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

Unless otherwise provided in the Special Provisions, no payment will be made for [FILL IN ITEM DESCRIPTION] as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which [FILL IN ITEM DESCRIPTION] is required.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 681.0005 | UNDERGROUND SPLICE ENCLOSURE | EA |
| 681.0020 | COMMUNICATION DISTRIBUTION CABLE ASSEMBLY | EA |
| 681.0030 | CITY OF LAS VEGAS ETHERNET SWITCH | EA |

END OF SECTION 681

SECTION 682 – FIBER OPTIC TRANSCEIVER

**METHOD OF MEASUREMENT**

**682.04.01 MEASUREMENT**

***ADD THE FOLLOWING PARAGRAPHS TO THIS SUBSECTION:***

The quantity of SHELF MOUNT FIBER OPTIC TRANSCEIVERS (OTR/SH) WITH CABLES will be measured per each.

The quantity of RACK MOUNT FIBER OPTIC TRANSCEIVERS (OTR/SH) WITH CABLES will be measured per each.

The quantity of 19-INCH RACK MOUNTED FIBER OPTIC CARD CAGE will be measured per each.

The quantity of [FILL IN ITEM DESCRIPTION] will be measured per [UNIT].

No direct measurement shall be made for [FILL IN ITEM DESCRIPTION].

**BASIS OF PAYMENT**

**682.05.01 PAYMENT**

***ADD THE FOLLOWING PARAGRAPHS TO THIS SUBSECTION:***

The accepted quantity of SHELF MOUNT FIBER OPTIC TRANSCEIVERS (OTR/SH) WITH CABLES will be paid for at the contract unit price of each and shall conform to the requirements of subsection 682.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include, mounting hardware, power conversion hardware (if required), and the OTR/SH rack mountable card cage in the hub.

The accepted quantity of RACK MOUNT FIBER OPTIC TRANSCEIVERS (OTR/SH) WITH CABLES will be paid for at the contract unit price of each and shall conform to the requirements of subsection 682.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include, mounting hardware, power conversion hardware (if required), and the OTR/SH rack mountable card cage in the hub.

The accepted quantity of 19-INCH RACK MOUNTED FIBER OPTIC CARD CAGE will be paid for at the contract unit price of each and shall conform to the requirements of subsection 682.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include, mounting hardware, power conversion hardware (if required), and the OTR/SH rack mountable card cage in the hub.

Each card cage or OTR/SH will be measured as a unit for furnishing each OTR/SH, complete in delivery, in accordance to the quantities on the Bid Schedule.

The equipment delivered will be tentatively accepted pending testing by FAST. Only after a series of bench tests of the devices will the final acceptance be made and documented.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall conform to the requirements of subsection 682.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include,

Unless otherwise provided in the Special Provisions, no payment will be made for [FILL IN ITEM DESCRIPTION] as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which [FILL IN ITEM DESCRIPTION] is required.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 682.0010 | SHELF MOUNT FIBER OPTIC TRANSCEIVERS (OTR/SH) WITH CABLES | EA |
| 682.0020 | RACK MOUNT FIBER OPTIC TRANSCEIVERS (OTR/SH) WITH CABLES | EA |
| 682.0030 | 19-INCH RACK MOUNTED FIBER OPTIC CARD CAGE | EA |

END OF SECTION 682

SECTION 683 – VIDEO OPTICAL TRANSCEIVER WITH BI-DIRECTIONAL DATA CHANNEL

**METHOD OF MEASUREMENT**

**683.04.01 measurement**

***ADD THE FOLLOWING PARAGRAPHS TO THIS SUBSECTION:***

The quantity of SHELF MOUNTED VIDEO OPTICAL TRANSCEIVERS WITH CABLE will be measured per each.

The quantity of RACK MOUNTED VIDEO OPTICAL TRANSCEIVERS WITH CABLE will be measured per each.

The quantity of 19-INCH RACK MOUNTED VIDEO OPTICAL CARD CAGE will be measured for per each.

The quantity of [FILL IN ITEM DESCRIPTION] will be measured per [UNIT].

No direct measurement shall be made for [FILL IN ITEM DESCRIPTION].

**BASIS OF PAYMENT**

**683.05.01 PAYMENT**

***ADD THE FOLLOWING PARAGRAPHS TO THIS SUBSECTION:***

The accepted quantity of SHELF MOUNTED VIDEO OPTICAL TRANSCEIVERS WITH CABLE will be paid for at the contract unit price of each and shall conform to the requirements of subsection 683.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include, mounting hardware, power conversion hardware (if required), and the VOTR rack mountable card cage in the hub.

The accepted quantity of RACK MOUNTED VIDEO OPTICAL TRANSCEIVERS WITH CABLE will be paid for at the contract unit price of each and shall conform to the requirements of subsection 683.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include, mounting hardware, power conversion hardware (if required), and the VOTR rack mountable card cage in the hub.

The accepted quantity of 19-INCH RACK MOUNTED VIDEO OPTICAL CARD CAGE will be paid for at the contract unit price of each and shall conform to the requirements of subsection 683.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include, mounting hardware, power conversion hardware (if required), and the OTR/SH rack mountable card cage in the hub.

The equipment delivered will be tentatively accepted pending testing by FAST. Only after a series of bench tests of the devices will the final acceptance be made and documented.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall conform to the requirements of subsection 683.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include,

Unless otherwise provided in the Special Provisions, no payment will be made for [FILL IN ITEM DESCRIPTION] as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which [FILL IN ITEM DESCRIPTION] is required.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 683.0010 | SHELF MOUNTED VIDEO OPTICAL TRANSCEIVERS WITH CABLE | EA |
| 683.0020 | RACK MOUNTED VIDEO OPTICAL TRANSCEIVERS WITH CABLE | EA |
| 683.0030 | 19-INCH RACK MOUNTED VIDEO OPTICAL CARD CAGE | EA |

END OF SECTION 683

SECTION 684 – LAYER 2 FIELD-HARDENED ETHERNET SWITCH

**DESCRIPTION**

**684.01.01 GENERAL**

***ADD THE FOLLOWING SUBSECTIONS:***

1. Supply an Field Hardened Ethernet Switch from the following list:
   1. Ruggedcom, RST916C or approved equal
2. In locations in the field that have equipment that require a serial interface supply a Ethernet switch that also includes a serial port.

G. At DMS locations the work of installing the field hardened Ethernet switch includes all work necessary to integrate the DMS sign into the Fiber optic system.

**MATERIALS/EQUIPMENT**

**684.02.01 FUNCTIONAL REQUIREMENTS**

**ADD THE FOLLOWING TO PARAGRAPH “B14” OF THIS SUBSECTION**

* 1. All equipment supplied and installed on this project shall be labeled clearly with the project and location designation.

***ADD THE FOLLOWING TO PARAGRAPH “B” OF THIS SUBSECTION:***

1. Physical Characteristics:

A minimum of 12 Ports, *10/100/1000* Base TX, RJ-45.

4 Port, 1000 Base FX, SC.

Serial port (when needed)

The field switch shall not exceed 7.5" high x 3" wide or 5" deep.

The weight shall not exceed 5 Ibs.

Shelf mount in 19" standard equipment rack

17. Each Field Switch shall be delivered with a Three (3) Meter LC/LC Duplex 9/125 Singlemode Fiber Optic Patch Cable, and shall conform to the following specifications:

1. Connectors: (2) LC to (2) LC
2. Buffer material: PVC
3. Buffer OD: 900 µm
4. Jacket material: PVC (OFNR-rated)
5. Jacket OD: 3.0 mm
6. Jacket color: Yellow
7. Attenuation @1310 nm: 1.0 dB/km
8. Attenuation @1550 nm: 0.75 dB/km
9. Maximum tensile load: 100 N/cm
10. Loaded min. bend radius: 5 cm
11. Unloaded min. bend radius: 3 cm
12. Crush resistance: 750 N/cm
13. Impact resistance: 1000 cycles
14. Flex resistance: 5000 cycles

18. Testing requirements: Perform testing as required Subsection 105.03 and the following:

Perform the following tests for each Ethernet Switch installation:

1. SALT. Verify that after installation but prior to interconnection, the equipment operates as specified in the field. Test should Including the following:

a. The Ethernet Switch will be powered up and allowed to initialize, boot and run self- diagnostic tests as defined in the approved test procedures.

2. SST. For each Ethernet Switch location that is installed and interconnected in a system, conduct approved SSTs from the operator workstation that include the following:

1. All items in the stand-alone test
2. Transmission of data to the TMC
3. Response to all central software commands.

3. SAT. At least once per week, demonstrate that all Ethernet switches function as tested in the SST.

**METHOD OF MEASUREMENT**

* + 1. **MEASUREMENT**

***ADD THE FOLLOWING TO THIS SUBSECTION:***

The quantity of LAYER 2 FIELD-HARDENED ETHERNET SWITCH will be measured per each, delivered to the City and FAST.

The quantity of [FILL IN ITEM DESCRIPTION] will be measured per [UNIT].

No direct measurement shall be made for [FILL IN ITEM DESCRIPTION].

**BASIS OF PAYMENT**

**684.04.05 PAYMENT**

***ADD THE FOLLOWING PARAGRAPHS TO THIS SUBSECTION:***

The accepted quantity of LAYER 2 FIELD-HARDENED ETHERNET SWITCH will be paid for at the contract unit price of each and shall conform to the requirements of subsection 684.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include, mounting hardware, cabling and network management software and must be delivered as a single shipment to FAST, with the Project’s name noted on the packaging.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall conform to the requirements of subsection 684.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include,

Unless otherwise provided in the Special Provisions, no payment will be made for [FILL IN ITEM DESCRIPTION] as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which [FILL IN ITEM DESCRIPTION] is required.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 684.0010 | FIELD-HARDENED ETHERNET SWITCH | EA |

END OF SECTION 684

SECTION 687 – CLOSED CIRCUIT TELEVISION (CCTV) FIELD EQUIPMENT

**DESCRIPTION**

**MATERIALS/EQUIPMENT**

**687.02.01 FUNCTIONAL REQUIREMENTS**

***ADD THE FOLLOWING TO PARAGRAPH “K” OF THIS SUBSECTION:***

6. The delivered protocol shall conform to the current FAST protocol.

**687.02.03 WARRANTY**

***DELETE THIS SUBSECTION IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:***

Provide a minimum three-year factory warranty for all CCTV field equipment and all associated cabling. The warranty on equipment and cabling shall be offered by the manufacturer and shall be transferable to FAST at the time of acceptance. The warranty period for equipment, cabling, and work begins at the time FAST accepts the system (SAT test)

**CONSTRUCTION**

**687.03.01 CABLE HARNESS**

***ADD THE FOLLOWING PARAGRAPHS TO THIS SUBSECTION:***

D. In-Cabinet Local Controller: Each CCTV installation identified on the Plans shall include a Cohu 9300 Series i-control CCTV Control Unit, or approved equivalent, and it shall be installed neatly the respective traffic signal cabinet. It shall conform to the following specifications:

1. In-Cabinet Local Controller: Each CCTV installation identified on the Plans shall include a Cohu 9300 Series i-control CCTV Control Unit, or approved equivalent, and it shall be installed neatly the respective traffic signal cabinet. It shall conform to the following specifications:
2. Power: 110 Volts AC
3. Size: 1.75” High x 8.00” Deep x 19” Wide
4. Front Panel Control: pan/tilt, lens zoom, focus, iris
5. Extended control (via RS232 port and laptop running WinMPC): camera address, alarm ID text, camera ID text, preset positions, color balance, video tour routines, wide dynamic range adjustment, privacy zones, integration, sector zones, shutter speed, day/night mode.
6. Surge protection requirements. Install surge protectors in the CCTV cabinet for all conductors (power, data, and video) between pole mounted and cabinet mounted CCTV equipment. Ground each surge protector to the surge protector terminal block mounted to the cabinet rack. Install surge protector leads that are at least 3' in length and installed as straight as possible from the surge protector to the ground lug.

Wire, ground, and bond equipment in accordance with Section 250-86 of the NEC.

1. Coaxial Cable Surge Protector. Install 1 coaxial cable surge protector on the coaxial cable. Use surge protectors that meet the following requirements:

1. Connector BNC type
2. Attenuation 0.1 dB @ 10 MHz
3. Input/Output impedance 75 ohms nominal
4. Peak Surge Current 500 amperes minimum
5. Response Time 1 nanosecond or less

2. Power Cable Surge Protector. Install power cable surge protectors on all power conductors. At locations where the receiver/driver is integrated with the pan/tilt unit, this surge protector is not required. Use surge protectors that meet the following requirements:

1. Clamping Mode 2-stage
2. Clamping Voltage 350-volts for a 20,000-ampere, 10,000-volts

per microsecond waveform

1. Peak Clamping Current 20,000-amperes for an 8 x 20 microsecond

waveform

1. Response Time 0.5 microseconds or less
2. Number of Peak Surges 20 surges at peak current, minimum
3. Holdover Current Zero
4. Service Current Rating Adequate for the continuous load imposed

by the equipment served

10. Low Voltage Control Cable Surge Protector. Install low voltage control cable surge protectors in on each data conductor. Use surge protectors that meet the following requirements:

1. Clamping Mode 2-stage, hybrid
2. Clamping Voltage As appropriate for the specific circuit as

approved by the Engineer

1. Peak Clamping Current 4,000-amperes for an 8 x 20 microsecond

waveform

1. Response Time 30 nanoseconds or less
2. Number of Peak Surges 25 surges at peak current, minimum

**687.03.03 OPERATIONAL TESTING**

Testing Requirements. Perform testing as required in Subsection 105.03 and the following:

1. DAT. Provide certification that the window or acrylic lens will not yellow, introduce appreciable light loss, or distort over a 10 year life in a desert environment.

2. SALT. For each unit of equipment, conduct approved SALT that exercises all stand-alone (non-network) functional operations of the equipment including the following:

1. Control of focus, iris, and power on/off
2. Range of pan, tilt, zoom and digital zoom
3. Presence and quality of video signal
4. Sector text generation
5. Pan and tilt limit stops are set to the Engineer's satisfaction.

3. SST. For each camera location that is installed and interconnected in a system, conduct approved SSTs from the operator workstation that include the following:

1. All items in the stand-alone test
2. Transmission of quality video to the TMC
3. Response to all central software commands identified under functional requirements
4. Display of video images on the selected monitor
5. Horizontal and vertical resolution\*
6. Signal to noise ratio\*
7. For CCTV camera installations that have camera lowering devices, detach and secure the camera connection 5 times and verify that the signal is reestablished at the TMC each time.

\* Perform these tests if in the opinion of the Engineer the picture quality is marginal. Measure the horizontal/vertical resolution and the SIN ratio on a monitor in the TMC for a picture generated by the CCTV camera installation furthest from the TMC and at two other locations specified by the Engineer to verify compliance. The SIN ratio shall not be lower than 48 dB.

4. SAT. At least once per week, demonstrate that all CCTV system functions tested in the SST are operational. The SST requirement to raise and lower the camera 5 times is reduced to just one time during the final week of the SAT.

**METHOD OF MEASUREMENT**

**687.04.01 MEASUREMENT**

The quantity of CCTV FIELD EQUIPMENT will be measured per each.

The quantity of [FILL IN ITEM DESCRIPTION] will be measured per [UNIT].

No direct measurement shall be made for [FILL IN ITEM DESCRIPTION].

**METHOD OF PAYMENT**

**687.05.01 PAYMENT**

The accepted quantity of CCTV FIELD EQUIPMENT will be paid for at the contract unit price of each and shall conform to the requirements of subsection 687.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall conform to the requirements of subsection 687.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include,

Unless otherwise provided in the Special Provisions, no payment will be made for [FILL IN ITEM DESCRIPTION] as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which [FILL IN ITEM DESCRIPTION] is required.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 687.0010 | CCTV FIELD EQUIPMENT | EA |

END OF SECTION 687

SECTION 688 – REMOTE DATA RADIO COMMUNICATIONS SYSTEM

**METHOD OF MEASUREMENT**

**688.04.01 MEASUREMENT**

The quantity of REMOTE DATA RADIO UNIT will be measured per each.

The quantity of [FILL IN ITEM DESCRIPTION] will be measured per [UNIT].

No direct measurement shall be made for [FILL IN ITEM DESCRIPTION].

**METHOD OF PAYMENT**

**688.05.01 PAYMENT**

The accepted quantity of REMOTE DATA RADIO UNIT will be paid for at the contract unit price of each and shall conform to the requirements of subsection 688.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall conform to the requirements of subsection 688.05.01 of the Uniform Standard Specifications and shall include all materials, equipment, labor and disposal required to perform this work and all work as shown on the Plans, as specified herein and as directed by the Engineer. The above payment shall also include,

Unless otherwise provided in the Special Provisions, no payment will be made for [FILL IN ITEM DESCRIPTION] as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which [FILL IN ITEM DESCRIPTION] is required.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 688.0010 | REMOTE DATA RADIO UNIT | EA |

END OF SECTION 688

***ADD THE FOLLOWING SECTION TO DIVISION II – CONSTRUCTION DETAILS***

SECTION 690 – CURED-IN-PLACE REHABILITATION OF EXISTING SEWERS

**DESCRIPTION**

**690.01.01 GENERAL**

A. This work consists of the installation of cured-in-place pipe (CIPP) in existing sewers or CIPP sectional liners for spot repairs (CIPPSL), CIPP end and connection sealing including all labor, materials, and equipment necessary to complete the work where indicated on the Plans.

B. When cured, the sectional liner shall taper flat at the ends and produce the thinnest wall possible to mitigate flow constriction, and be capable of supporting overlapping liners for future sewer rehabilitation.

C. CIPP installation will take place prior to all manhole coating work. Lined-through manholes shall be opened prior to manhole coating work.

D. Service connections are defined as the interface of the lateral with the sewer main. Service connection sealing is not intended to be a lateral liner. No lateral work is included in the portion of the Work for CIPP.

E. Incidental work to remove and replace manhole cones, risers, frame and cover, and concrete collars necessary for the installation of the CIPP will be considered as part of the CIPP work. Refer to Section 630 “Sanitary Sewers” for manhole requirements.

F. Steam cure methods shall not be allowed.

**690.01.02 STANDARDS**

A. This section contains references to the following standards, latest editions. They are a part of this section as specified and modified. In case of conflict between the requirements of this section and those of the listed documents, the requirements affording the greatest protection to the Owner shall apply, as determined by the Engineer.

Reference Title

|  |  |
| --- | --- |
| AASHTO HS20 | Vehicle Loading Standard |
|  |  |
| ASTM D543 | Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents |
|  |  |
| ASTM D638 | Standard Test Method for Tensile Properties of Plastics |
|  |  |
| ASTM D790 | Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials |
| ASTM D2990 | Standard Test Method for Tensile, Compressive, Flexural Creep and Creep-Rupture Of Plastics |
|  |  |
| ASTM D5813 | Standard Specification for Cured-In-Place Thermosetting Resin Sewer Piping Systems |
|  |  |
| ASTM F1216 | Rehabilitation of Existing Pipelines and Conduits by Inversion and Curing of a Resin Impregnated Tube |
|  |  |
| ASTM F1743 | Rehabilitation of Existing Pipelines and Conduits by Pulled-in-Place Installation of Thermosetting Resin Pipe |
|  |  |
| ASTM F2019 | Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Pulled in Place Installation of Glass Reinforced Plastic (GRP) Cured-in-Place Thermosetting Resin Pipe (CIPP) |

**690.01.03 SUBMITTALS**

A. The submittals designated shall be provided as specified in Section 100, “General Project Requirements”.

B. Submit certification showing the Contractor is currently licensed by the appropriate licensor to perform CIPP installation. Certification shall be given to the Engineer before any materials are ordered.

C. Submit shop drawings detailing short and long-term properties (providing all supporting test data) of all component materials and composite materials, and recommendations for material storage and temperature control, CIPP handling, insertion, curing, trimming and finishing, and QA/QC procedures. The Contractor shall calculate and submit to the Engineer for review after field verification of sizes and prior to ordering any material from the manufacturer the required minimum thickness for the CIPP to be installed in each pipe reach based on the internal inspection data and the CIPP manufacturer’s specifications..

D. Submittals shall also include the following:

1. CIPP end and connection sealing materials and methods to be used to reinstate connecting sewers. Method, procedure, or information to provide either an adhesive, water-tight seal to the sewer or a water-tight mechanical seal between the cured sectional liner and sewer pipe wall which will not prohibit the installation of future, structural liners, sewer cleaning equipment, and video inspection equipment.
2. Detailed method for addressing CIPP sampling requirements including location and size of each sample, method of removal, and method of liner repair and procedure for testing CIPPSL.
3. Video Inspection reports as specified below.
4. Manufacturer’s recommended installation procedures, including resin manufacturer’s heating requirements.
5. Contractor shall submit 10,000-hour third party, 50-year Flexural Creep Modulus test data.
   1. Test shall be in accordance with ASTM D-2990 at 10,000 hours or equal test as approved by the Engineer.
   2. If approved 10,000 hour tests are not available, Contractor shall use a minimum 50% reduction (50% retention) of Flexural Modulus of Elasticity (per ASTM F 1216) for all formula calculations.
6. Certification stating CIPP tube has been manufactured in accordance with ASTM F1216 and resin is suitable for its intended use. Not applicable for CIPPSL
7. Test report of CIPP sample(s) and recent test results for CIPPSL.
8. A safety plan in accordance with Section 107, “Legal Relations and Responsibility to the Public” for all hazardous chemicals used or expected to be on-site including resin, catalyst, cleaners and repair agents.
9. A sampling plan that demonstrates pollutants are not being discharged into the sanitary sewer system.
10. Technical procedure or information regarding the control and mitigation of shrinkage and wrinkling during installation and cure of sectional liner.
11. Current certification by manufacturer to install the sectional liner. Certification shall indicate the Contractor has been licensed or certified by the manufacturer for a minimum of two(2) years.
12. Copy of previous physical properties tests for the sectional liner.
13. Copy of chemical resistance test for the sectional liner.
14. In accordance with ASTM D2990 any proposed products currently in a long term testing process shall submit current results based on 50 percent through the test duration.
15. The Contractor’s written 2-year warranties.

**MATERIALS**

**690.02.01 GENERAL**

A. The Contractor shall be responsible for control of all material and process variables to provide a finish CIPP possessing the minimum properties specified in ASTM F1216, and required herein.

B. The Contractor shall verify all measurements and dimensions prior to manufacturing the CIPP liner.

C. The outside of each CIPP liner tube shall be labeled by the liner manufacturer with the location of the liner manufacturer, the name of the project, the liner thickness, the liner diameter, the liner length, and the location where it is to be installed. The sectional liners shall not be marked by the manufacturer.

**690.02.02 DESIGN CRITERIA**

A. The liner or sectional liner shall be designed in accordance with the procedures of ASTM F1216 and/or F1743. All material properties used in design calculations shall be long-term (time-corrected) values. Alternative procedures for CIPPSL design are acceptable if they address values or properties not accounted for in F1216 or F1743 and render a structural solution as further required and stated herein.

B. The following parameters shall be assumed for the liner design for bid purposes:

1. Modulus of soil reaction, E’ = 700 psi
2. Groundwater depth equal 10 feet above top of pipe.
3. Unit weight of soil = 120 pcf
4. Live load using an AASHTO HS20 vehicle loading
5. The CIPP shall be designed for fully deteriorated conditions
6. Safety factor of 2.0
7. Ovality factor of 4 percent
8. CIPPSL design shall be based on physical property strengths represented within the sample test report.

C. The design for the CIPP shall recognize any non-uniform cross section and the liner bifurcation present at the spring line of the concrete pipe. Accounting for this condition by the use of an ovality reduction factor alone is unacceptable.

**690.02.03 COMPONENT CIPP PROPERTIES**

A. CIPP Fabric Tubing:

1. The fabric tube shall be free from tears, holes, cuts, foreign materials and other surface defects.
2. The fabric tube material shall be designed for use in gravity sanitary sewers and shall be in strict conformance with all applicable sections of ASTM F1216, F2019 or a seamless version of F2019.
3. The tube should be fabricated to a size that, when installed, will tightly fit the internal circumference and length of the original sewer pipe.
4. Allowance should be made for circumferential stretching during the installation and shrinkage of resin during curing and aging.

B. CIPPSL Laminate The liner material shall be free from tears, holes. cuts, foreign materials, and other surface defects.

1. The liner material shall be fabricated from an ECR fiberglass laminate designed for use in gravity sewers.

2. The liner shall be fabricated or neatly cut to fit the internal circumference of the sewer. When cutting the material to fit, the laminate shall overlap a minimum of 2-inches and cure monolithically per manufacturer’s recommendations.

C. Resins:

1. The resin used shall be compatible with the CIPP system used, and designed for use in gravity sewers.
2. The resin shall be a general purpose, unsaturated polyester and catalyst system compatible with the CIPP system that provides the cured physical strengths and properties specified herein.
3. Resins shall be tinted for adequate visibility suitable for internal inspection and provide positive indication of adequate liner wet-out.
4. The sectional liner shall use either a polyester resin, vinyl ester resin, or epoxy resin. The watertight seal shall either be an adhesive epoxy compound or mechanical seal.

**690.02.04 CURED CIPP PROPERTIES**

A. The physical properties of the cured CIPP or CIPPSL shall have minimum initial test values as defined in Table 1 of ASTM F1216 or ASTM F1743 and supplemented below for polyester resin. Properties for the polyester or any other enhanced resins shall be substantiated with third party test data.

1. Flexural strength: 4,500 psi per ASTM D790 or 6,500 psi sectional liner
2. Flexural modulus: 300,000 psi per ASTM D790 or 725,000 psi for section liner
3. 50-year flexural creep modulus: 150,000 psi per ASTM D2990
4. Tensile strength: 9,000 psi per ASTM D638 for sectional liner

**690.02.05 DIMENSIONS OF CIPP**

A. The Contractor shall make allowances in determining the felt tube length and circumference for stretch during installation and shrinkage during curing and aging.

1. The minimum length shall be that which continuously spans the distance from the center of the inlet manhole to the center of the outlet manhole or 2- to 4-feet for a CIPPSL based on the specifics of the repair and pipe diameter.
2. The Contractor shall verify the lengths in the field before the liner tube is cut and impregnated, except CIPPSL.
3. Individual installation runs may include one or more manhole-to-manhole sections, except CIPPSL as authorized by the Engineer.

B. The existing sewer lines may be larger than their nominal size due to corrosion of the concrete pipe. It is the Contractor’s responsibility to measure the actual inside diameter at different locations of the sewer to determine the appropriate size of CIPP liner to use.

**690.02.06 WALL THICKNESS**

A. The wall thickness of the felt tube shall be ordered to the next standard 1.5 mm incremental thickness above the minimum calculated design thickness. Unless otherwise specified to provide for excess resin migration, the gap thickness of the wetting out equipment shall be sized to allow an excess of 5 percent resin to pass during impregnation.

B. The nominal CIPP thickness shall be at least the calculated design thickness, per ASTM F1216, except where fabric layers overlap, in which case it may be in excess of this value.

C. At locations of voids in the existing pipe to be lined, the nominal wall thickness shall be increased to provide the minimum design thickness taking into consideration stretch and expansion of the liner into the void area. Void locations shall be accurately determined during video inspection.

**690.02.07 CHEMICAL RESISTANCE**

A. The cured pipe shall be resistant to a variety of chemical effluents as described in ASTM D543.

1. Testing for chemical resistance may be performed on the sample of the finished product prior to this contract, provided a certified affidavit, signed by an officer of the company, is submitted stating the resin the tests apply to and the resin submitted for this project are the same.
2. Finished and cured CIPP liner properties shall perform as specified.
3. Previous test data will not be acceptable.

B. Chemical resistance test results shall be provided in accordance with Test Method D543 on samples of the cured liner material that are the same as that proposed for installation.

* + - 1. Exposure should be for a minimum of one month at 73.4 degrees F.
      2. During this period, the CIPP test specimens should lose no more than 20 percent of their initial flexural strength and flexural modulus when tested in accordance with Section 8 of ASTM F1216, when subjected to the following solutions:

|  |  |
| --- | --- |
| Chemical Solution | Concentration, percent |
| Tap Water (pH 6-9) | 100 |
| Nitric Acid | 5 |
| Phosphoric Acid | 10 |
| Sulfuric Acid | 10 |
| Gasoline | 100 |
| Vegetable Oil | 100 |
| Detergent | 0.1 |
| Soap | 0.1 |

C. The Contractor shall be responsible for all costs associated with the chemical resistance tests.

D. Proof of meeting the requirements for the design specified shall be provided to the Engineer for approval at least 7 days prior to ordering any material.

**690.02.08 CIPP END AND CONNECTION SEAL**

1. CIPP End Seal: Use epoxy sealant compatible with liner for end seal. Coat all concrete or vitrified clay surfaces.
2. Connection Seal: Use epoxy sealant or lateral connection sealing system that is compatible with CIPP liner system for the connection seal.
3. Sectional Liners: Use an adhesive epoxy compound or mechanical seal to provide a watertight seal

**690.02.09 ALLOWED CIPP AND END CONNECTION SEAL MANUFACTURERS**

A. The following manufacturers of CIPP will be allowed:

1. Inliner Technologies
2. Insituform Technologies, Inc.
3. Applied Felts
4. Pipenology
5. COSMIC CIPPSL or Quick Seal
6. Or equal.

B. The following manufacturers of CIPP end and connection sealing will be allowed:

1. Neopoxy
2. COSMIC A/B Epoxy Paste (UV Cure sectional liners)
3. Or equal.

C. The following lateral connection sealing system manufacturers are allowed:

1. Top Hat
2. Or equal.

**CONSTRUCTION**

**690.03.01 STORAGE AND DELIVERY**

A. The Contractor shall be responsible for the delivery, storage and handling of all materials for CIPP and end and connection sealing material in accordance with the written requirements of the manufacturer.

B. Contractor shall exercise adequate care during transportation, handling and installation to ensure the CIPP material is not torn, cut, or otherwise damaged. If any part or parts of the CIPP material becomes torn, cut or otherwise damaged before or during insertion, it shall be repaired or replaced in accordance with the manufacturer’s recommendations and approval by the Engineer before proceeding.

**690.03.02 PREPARATORY PROCEDURES**

A. Sewer Bypassing and Dewatering. The Contractor shall meet the requirements for bypassing and flow diversion in Section 695 “Diversion of Sewage Flows”.

B. Water Lines for CIPP Work: Water lines used for installation of CIPP shall meet the same requirements as bypass pipes under Section 695 “Diversion of Sewage Flow”.

C. Sewer Cleaning. Prior to CIPP tube or CIPPSL installation, the Contractor shall clean the existing sewer in accordance with Section 692 “Sewer Pipe and Structure Cleaning”. The Contractor shall clear the existing sewer of obstructions such as solids or collapsed pipe or intrusions that will prevent or hinder CIPP liner installation.

D. Internal Inspection:

1. The interior of the sewer shall be carefully inspected in accordance with Section 693 “Internal Inspection of Sewer and Storm Drain Facilities”, to determine the location of conditions that may prevent proper installation of CIPP.
2. Contractor shall furnish television inspection report material to the Engineer within 1 week of inspection.

E. Odor Control:

1. At each location within the project, prior to diversion of flows, the Contractor shall initiate the odor control measures submitted and approved in Section 695 “Diversion of Sewage Flows”.

F. Host Pipe Repair:

1. Prior to insertion of the liner, the Contractor shall take any remediation actions necessary to prepare the host pipe for insertion of the liner.
2. This will include removal of obstructions, intrusions, or smoothing of surfaces in order to ensure a proper fit and full expansion of the liner to the host pipe.
3. Host pipe preparation recommendations shall be made by the contractor after reviewing the video inspection.
4. This work shall be included in the price for the CIPP liner Pay Item(s).

G. Structural Defect Repair:

1. Sections of the existing host pipe which have shifted, dropped, or severely deteriorated (greater than 2” loss of diameter), shall be ground down, grouted, or otherwise repaired to provide a smooth continuous surface which will not reduce the cross-sectional area of the interior of the relined pipe or reduce wall thickness to less than the minimum specified thickness.
2. Recommendations for the structural defect repair method shall be made by the Contractor after reviewing the video inspection.

**690.03.03 TRIMMING INTRUDING LATERALS**

* + 1. Contractor shall trim intruding lateral so that the service connection is flush with the internal pipe wall. Lateral cutting shall be documented by internal inspection methods.

B. Contractor shall ensure that existing pipe is not damaged during cutting operations.

**690.03.04 INSTALLATION CIPP TUBE**

A. The Contractor shall designate the location where the CIPP tube will be impregnated with resin (“wet-out”). Locations shall be subject to approval by the Engineer. The Contractor shall allow the Engineer to inspect the materials and “wet-out” procedure.

B. If the “wet-out” location is not at project site, the impregnated CIPP tube shall be transported to site under controlled environmental conditions.

1. Transport vehicles shall include a tamper resistant, sealed temperature recording device which records the temperature of the liner at all times after leaving the wet-out site.
2. The Contractor shall decide when to transport the resin impregnated CIPP tube and when to commence installation depending on prevailing weather conditions, so as to not jeopardize the installation or be detrimental to the long term performance of the CIPP.

C. The liner will be installed by the inversion tube method.

D. The resin-impregnated tube shall be lowered into the insertion pit through an inversion tube and reducer if needed.

1. The CIPP liner shall be installed through existing manholes.
2. There shall be no separate payment for additional or enhanced access to facilitate the Contractor’s CIPP liner installation process.

E. For CIPP liner thicknesses greater than 0.75 inch, or where the existing pipe, soil and groundwater combination is likely to provide a significant heat sink, affecting the temperature gradient across the CIPP liner material, the temperature of the exotherm shall be monitored by remote temperature sensors placed at the interface of the existing pipe and the CIPP.

1. A minimum of two temperature sensors shall be installed, one at either end of the length being lined.
2. The curing process shall not be terminated until the temperature sensor readings indicated that a satisfactory cure has been completed.
3. Any extended cure times shall not adversely affect the properties of the CIPP lining material.
4. The water shall be evacuated from the pipe at a controlled rate to prevent negative pressure in the pipe and negative impacts to downstream facilities.

F. The curing process shall follow a step cure or similar approach recommended by the manufacturer and approved by the Engineer, and shall be held at the top step for an adequate length of time to ensure that the design physical properties are attained.

* 1. Circulation water shall cool down to at least 100 degrees F for 1 hour before releasing the hydrostatic head.
  2. The rate of temperature rise and fall during heating and cooling shall not exceed 2 degrees F per minute.
  3. The circulation water shall be filtered through a carbon filter treatment system, approved by the Engineer, prior to release into the sanitary sewer system.
  4. The Contractor shall provide a sampling plan to the Engineer that demonstrates pollutants are not being discharged into the sanitary sewer system.

G. Reinstatement of service laterals:

1. After the curing is complete, existing service connections shall be reinstated.
2. Reinstate service laterals using only remote internal methods (prior to CIPP acceptance).
3. Where the CIPP liner does not create dimples at the service connections or in other ways indicate the locations, the exact location shall be determined from the internal inspection data. It shall be the Contractor’s responsibility to accurately locate and reinstate all service connections after the CIPP installation and curing has been completed. All service connections shall be reinstated to a minimum of 95% of the original opening, matching the invert of the lateral.

H. The Contractor shall seal the end points of the liner so that no leakage of fluids may infiltrate between the liner and the existing pipe.

I. The Contractor shall apply either epoxy sealant or lateral connection sealing system (after CIPP acceptance) to completely seal area around opening of the liner and the connection. The installation of the connection seal shall not, in any way, damage or adversely affect the CIPP in any way. If damage to the CIPP liner does occur, the Contractor shall repair or replace the area at no additional cost to the Owner. Contractor shall trim loose or hanging/intruding pipe connection seals to be flush with the internal pipe wall. The Contractor shall not fold the hanging/intruding material.

J The Contractor shall inspect the CIPP after installation as required in 690.03.07.

**690.03.05 INSTALLATION SECTIONAL LINER**

A. The material shall be factory-impregnated with resin (wet-out) by the material manufacturer and shall be packed suitable for transport to the field for installation. The resin shall be in a state to resist wash off during transport/installation and shall be capable of being installed during wet and/or live flow conditions.

B. The resin impregnated tube shall be folded/wrapped per manufacturer’s instructions and loaded on a pressure apparatus for transport and installation.

C. The pressure apparatus, either attached to a robotic device or pulled in by winch, shall be positioned with a television camera to the location of the defect. The pressure apparatus shall include a bladder which shall inflate in the sewer, effectively seating the repair against the sewer pipe wall.

D. Air pressure, supplied to the pressure apparatus through an air hose, shall be used to expand the resin impregnated sectional liner against the sewer pipe wall.

E. The pressure shall be adjusted per manufacturer’s requirements to hold the laminate against the sewer pipe wall. Care shall be taken during the installation to not over-stress the tube.

F. After pull in is completed, recommended pressure is maintained on the impregnated tube for the duration of the curing process.

G. The Liner shall be cured in place by the manufacturer’s suggested resin technology, using either a polyester resin, vinyl ester resin, or epoxy-resin with a watertight seal comprised of either an adhesive epoxy compound or rubberized seal.

H. Curing method shall be compatible with resin selected. The initial cure shall be deemed complete when the liner has been exposed to UV light, heat source, or held in place for the time period specified by the manufacturer.

I. The Contractor shall cool (if heat cured) the hardened liner before relieving the pressure in the pressure apparatus. Care shall be taken to maintain proper pressure throughout the cure and cool-down period.

J. The finished liner shall be free of dry spots, lifts, and delamination. The repair shall not inhibit the closed circuit television post video inspection of the sewer. Any frayed ends of the liner shall be removed prior to acceptance.

H. Contractor shall maintain a visible, written log of all activities in accordance with manufacturer’s recommendations and shall include time of insertion, bladder pressure and requirements, required cure time, actual cure time, and cool-down duration.

**690.03.06 FINISHED PRODUCT**

A. The finished CIPP shall be continuous over the entire length of a manhole to manhole section of pipe, except for sectional liner point repairs.

B. Defects such as foreign inclusions, dry spots, pinholes, delamination, lifts, seam separation, lateral overcuts, and wrinkling beyond the specification allowances, determined by the Engineer as affecting the integrity or strength of the CIPP, or as adversely affecting the hydraulic capacity of the pipe, shall be repaired or replaced at the Contractor’s expense. Method of repair shall be proposed by the Contractor and submitted to the Engineer for review and approval.

C. Wrinkles in the finished CIPP which cause a backwater of one (1) inch or more or a reduction in cross sectional area of 5% of the diameter are unacceptable and shall be removed or repaired by the Contractor at no additional cost to the Owner.

1. If a void between the wrinkle and the pipe exists, the Contractor shall repair or replace that section of the pipe at no additional cost to the Owner.
2. Methods of repair shall be proposed by the Contractor and submitted to the Engineer for review and approval.

D. Separations of liner seams in the finished liner pipe are unacceptable and shall be removed or repaired by the Contractor at no additional cost to the Owner.

1. If a separation of a liner seam exists, the Contractor shall repair or replace that section of the pipe at no additional cost to the Owner.
2. Methods of repair shall be proposed by the Contractor and submitted to the Engineer for approval.

E. Wrinkles in the finished CIPP that reduce the structural integrity of the CIPP are unacceptable and shall be removed or repaired by the Contractor at no additional cost to the Owner.

1. If a void between the wrinkle and the pipe exists, the Contractor shall repair or replace that section of the pipe at no additional cost to the Owner.
2. Methods of repair shall be proposed by the Contractor and submitted to the Engineer for review and approval.

**690.03.07 CIPP LINER SAMPLING AND TESTING**

A. Contractor shall prepare a sample of the installed CIPP liner for subsequent testing of its physical properties.

1. Sampling shall be performed for each separate installation of CIPP on one (1) test per batch-order of sectional liner. As an example – one sample from each pipeline reach where the liner is installed shall be provided.
2. The Owner reserves the right to take five (5) random core samples of the installed CIPP liner at no additional cost in accordance with the procedures in ASTM D5813, as is applicable. The method of repair will be as recommended by the Manufacturer.
3. The minimum wall thickness shall be determined at a minimum of three locations on a cut section of the CIPP lining using a method of measurement accurate to the nearest 0.005 inch or one (1) test per batch order of sectional liner not taken from actual live installation. The acceptable measured wall thickness shall not be less than 5%, or greater than 10%, of the minimum design thickness.
4. The sample shall be prepared using the flat plate sampling method in accordance with the procedures in ASTM F1216.
5. The flat plate sample shall be large enough to provide five sample specimens each for short term flexural (bending) properties, as per ASTM D790. The sample will be clamped in a mold and placed in the downtube during the curing of the CIPP tube.
6. The sample shall be removed after all the water is removed from the cured pipe tube. The samples shall be identified by: Date, Project Name, Size, Thickness, Location, Resin and Catalyst. The cured sample shall be tested by an independent testing laboratory as recommended by the CIPP liner manufacturer and approved by the Engineer for the short term flexural (bending) properties and tensile properties, per ASTM D790 and ASTM D638, respectively. The sample shall be double bagged and sealed.
7. The Contractor shall provide liner test results for long-term properties in accordance with ASTM D2990.
8. The Contractor shall be responsible for any deviation from the specified physical properties and those evaluated through testing. Failure to meet the specified physical properties shall result in the CIPP liner being considered defective work and shall be rejected.
9. The Contractor shall be responsible for all costs associated with the testing of the liner physical properties.

**690.03.08 ACCEPTANCE**

A. Before the removal of the diversion of sewage flow, internal inspection of the CIPP-lined or sectional lined pipe, after all liner end and connection sealing is completed, as specified in Section 693 “Internal Inspection of Sewer and Storm Drain Facilities” will be reviewed by the Engineer for pipe lining acceptance.

**690.03.09 CLEANUP**

A. Following inspection, the Contractor shall clean up the entire project area. All excess material and debris, not incorporated into the permanent installation, shall be disposed off site by the Contractor at a site approved by the Engineer.

**METHOD OF MEASUREMENT**

**690.04.01 MEASUREMENT**

The quantity of XX-INCH CURED-IN-PLACE PIPE LINER will be measured per linear foot, measured from the end of pipe or inside face of structures or actual length installed if lined through the manholes.

The quantity of [FILL IN ITEM DESCRIPTION] will be measured per [UNIT].

No direct measurement shall be made for CIPP end and connection sealing, host pipe repair, structural repair, or lateral repair [ADD ANY INCIDENTALS SPECIFIC TO THIS PROJECT HERE].

**BASIS OF PAYMENT**

**690.05.01 PAYMENT**

The accepted quantity of [XX-INCH DIAMETER CURED-IN-PLACE PIPE LINER] shall be paid for at the contract unit price per linear foot of CIPP liner installed and shall include all materials, equipment and labor required including, but not limited to, design and installation of the liner and end/connection sealing; sewer cleaning; video inspection before and after pipe lining operations; CIPP end and connection sealing; any repair of the existing pipe necessary to ensure proper installation of the lining (including repair of damage during cleaning); removal and replacement of manhole cone, riser, frame/cover, and concrete collar; removal and restoration of pavement; plantmix bituminous surface; tack and prime coat; traffic striping, pavement markings, and curb markings; pavement markers; sampling; testing; clean up and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer. Payments will be based on the liner installed, tested and approved. Partial payments for liner material delivered but not yet installed will not be made. No payment will be made for liner installations deemed deficient by the Engineer.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

Unless otherwise provided in the Special Provisions, no payment will be made for [FILL IN ITEM DESCRIPTION] as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which [FILL IN ITEM DESCRIPTION] is required.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 690.XXXX | XX-INCH CURED-IN-PLACE PIPE LINER | LF |

**END OF SECTION 690**

SECTION 691 – MANHOLE REHABILITATION AND CORROSION PROTECTIVE COATING

**DESCRIPTION**

**691.01.01 GENERAL**

1. This section specifies the coating systems used for rehabilitation of existing access manholes and new concrete sanitary sewer manholes.
2. Where required by the approved plans, existing manholes shall be rehabilitated and an approved corrosion protective coating applied to their interior surfaces, as specified herein.
3. The approved coating system shall be applied to all exposed concrete, grout, mortar, and cementitious surfaces within the manhole, including bench, channel from above the spring line, risers, cones, adjusting rings, etc. Coating of the metallic manhole frame and cover shall not be required. Corroded manhole frame and cover shall be replaced as noted in the Drawings.
4. Manhole coating work shall take place after CIPP lining work.

**691.01.02 DEFINITIONS**

A. Specific coating terminology used in this section is in accordance with definitions contained in ASTM D16, ASTM D3960, and the following definitions:

1. Coating Systems.

a. In this specification, the words “coating” (or “coatings”) and “lining” (or “linings”) are used interchangeably. Similarly, “to coat” is used interchangeably with “to line” (or other variations of these words).

b. All components together as a unit used to repair the manhole and protect against further corrosion.

c. These components include, as applicable: defect filler and resurfacing materials, material used to repair invert and bench, infiltration control, primer and finish coats

d. The word “manhole” shall mean “sewer structure” and shall encompass sewer manholes, sewage lift station wet wells, sewer diversion structures, sewer junction structures, and other sewer structures. It also encompasses sewer pipes (or portions thereof) that are located within the sewer structure, but does not include sewer pipes (or portions thereof) that are located outside of the limits of the structure.

e. “Existing manholes” shall mean those manholes not constructed as part of this project.

f. “Rehabilitating” existing manholes by applying corrosion protective coating shall include the following activities:

1. Cleaning the manhole and removing corroded/deteriorated materials from the manhole and preparing the manhole per the approved coating systems manufacturer’s specifications.
2. Applying one of the approved coating systems, as specified herein.
3. Testing the finished surface coating, as required herein.
4. Other related activities, as noted herein.

2. Dry Film Thickness (DFT).

a. The thickness of one fully cured continuous application of coating.

3. Certified Applicator.

a. The person, who is certified by the approved coating system manufacturer assigned by the Contractor to apply the specified coating system.

4. Coating Systems Manufacturer.

a. The manufacturer of the various components that comprise the Coating Systems.

5. Manufacturer’s Representative

a. A representative authorized to act on behalf of the manufacturer regarding technical and commercial issues, which includes Third Party Inspector approved by the Engineer

**691.01.03 REFERENCES**

1. This section contains references to the following standards, latest editions. They are a part of this section as specified and modified. Where a referenced document contains references to other standards the requirements affording the greatest protection to the Owner shall apply, as determined by the Engineer.

|  |  |
| --- | --- |
| Reference | Title |
|  |  |
| ASTM D16 | Standard Terminology Relating to Paint, Varnish, Lacquer, and Related Products |
|  |  |
| ASTM D3960 | Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paint and Related Coatings |
|  |  |
| ASTM D7234 | Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers |
|  |  |
| ATSM D4787 | Standard Practice for Continuity Verification of Liquid or Sheet Linings Applied to Concrete Substrates |
|  |  |
| OSHA 29CFR | Occupational Safety and Health Administration (OSHA), 1926/1910 Safety and Health Standards |
|  |  |
| SSPC | Steel Structures Painting Council Specifications |
|  |  |
| ICRI | International Concrete Repair Institute |

**691.01.04 MANUFACTURER'S REPRESENTATIVE**

A. The Manufacturer’s Representative shall provide field inspections per Section 691.03.01 C.

B. The Manufacturer’s Representative shall be present, and shall verify in writing that the proper procedures and equipment are used by the applicator and that the coating is being applied per the Coating System Application plan.

**691.01.05 CERTIFIED APPLICATOR**

A. The coating system shall be applied by an Applicator certified by the Coatings System Manufacturer.

1. The certification program shall include an annual renewal.

2. The Contractor shall provide evidence that the personnel performing the coating application for each project received the manufacturer’s training for certification.

B. The Applicator shall appoint a Quality Assurance Manager to take full responsibility for the quality of the work. The Quality Assurance Manager shall be fully certified by the Coatings System Manufacturer.

**691.01.06 SUBMITTALS**

A. The submittals designated below shall be provided:

B. Submit certificate of responsibility attesting that the Contractor accepts responsibility for products and the installation of the products specified herein.

C. Submit Manufacturer’s Certification attesting that the Applicator is qualified and approved to install the products specified herein.

1. The coating applicator shall also submit a certification letter from the manufacturer of the product (i.e., one of the approved products listed in this specification) that the applicator intends to install in the manholes. The certification letter shall state that the coating applicator has been trained and is certified and approved by the manufacturer to apply the manufacturer's coating in sewer manholes.

2. Certification and qualifications for testing for holidays and other discontinuities.

D. Submit manufacturer’s written warranty per 691.02.03.

1. Before materials are delivered to the job site submit manufacturer specifications containing instructions and quality control procedures meeting the following requirements:

1. Instructions must be written and published by the manufacturer for the purpose of giving complete instruction for the use and application of the proposed coating for the conditions for which the coating is specified.

2. The Contractor shall furnish Material Safety Data Sheets (MSDS) for all products used in the coating system.

3. Limitations, exceptions, precautions, and requirements that may adversely affect the performance of the coating system shall be clearly and completely stated in the instructions. If the manufacturer’s requirements differ from these specifications, the instructions shall clearly state where deviations are required. Temperature and humidity limitations for minimum and maximum conditions are to be included. Approval by the Engineer is required prior to the acceptance of any manufacturer deviations from these specifications.

4. For all coating system components, the Contractor shall provide the manufacturer's application instructions, which shall include the following:

a. Surface preparation (including repairs and resurfacing) recommendations.

b. Primer type, where required.

c. Application of primer and final coating.

d. Maximum dry and wet film thickness.

e. Minimum and maximum curing time between coats, including atmospheric conditions for each.

f. Curing Methods.

g. Curing time before submergence in liquid.

h. Ventilation requirements.

i. Minimum atmospheric conditions during which the coating shall be applied.

j. Allowable application methods.

k. Maximum allowable moisture content.

l. Maximum storage life.

m. Special equipment.

n. Testing procedures for dry film thickness, holiday testing, adhesion testing, and acceptance test.

1. Coating System Application Plan shall be prepared that includes a description of the following:

1. Quality Assurance Procedures

a. Detailed duties of the Applicator’s Quality Assurance Manager.

b. Detailed duties of the Manufacturer’s Representative.

c. List of application and testing equipment to be used, including inspections confirming satisfactory condition of equipment.

d. Correct storage and handling of coating materials, and the necessary safety requirements.

2. Criteria for acceptance of the preparation of concrete and manhole surfaces.

3. Plan for sewage diversion (when required) as specified in Section 695 “Diversion of Sewage Flows”.

4. Method and material for sealing active leaks.

5. Detailed environmental provisions such as shading from the sun and other conditions that adversely affect coating application.

6. Detailed scheduling provisions for environmental considerations such as working at night.

**MATERIALS**

**691.02.01 COATING SYSTEM**

A. Coating Systems shall be compatible with the surface preparation methods as specified herein. Any limitations or deviations requested by the manufacturer shall be approved in writing by the Engineer prior to surface preparation.

B. Coatings shall be applied within two (2) months of their date of manufacture unless the manufacturer’s requirements are more stringent.

C. Thicknesses specified herein are the minimum dry film thickness required and does not include the primer thickness, unless otherwise noted. A minimum thickness of 125 mils is required. Ground water depth of ten feet from the top of the manhole bench shall be used to determine the coating thickness. Provide greater thickness where recommended by the manufacturer.

D. Primer shall be as recommended by the manufacturer for each installation.

E. Defect filler and repair materials shall be as recommended by the manufacturer for each installation.

F. Manhole infiltration control material such as chimney seal shall be as recommended by the manufacturer for each installation, and shall be covered under the same warranty as the rest of the coating system.

**691.02.02 APPROVED MANUFACTURERS**

A. The approved corrosion protective coating systems for application to existing manholes shall be as listed below in paragraph B.

B. The approved coating systems has an underlayment material and a surface coating material:

1. Epoxy Tec Epoxy Coating
2. Raven Lining Systems – Raven 405 – Spray on Epoxy Liner
3. Sauereisen – SewerGard No. 210S and 210X – Spray on Epoxy Liner
4. Permacast – COR+GARD – Spray on Epoxy Liner
5. Warren Environmental 301-14 Spray on Epoxy Liner and 301-18 Epoxy Mastic
6. Sherwin-Williams – Dura-Plate 6100
7. Vortex Companies – Structure Gaurd
8. The underlayment material and the surface coating material installed in any one manhole shall be from the same manufacturer.
9. Sprayable or trowelable formulations of the products listed above are acceptable. If "sprayable", the product shall be applied by an airless sprayer or spincaster. In addition, if applied by airless sprayer or spincaster, the final underlayment layer and the final surface coating layer shall both be trowel finished before setting. The Contractor shall not re-use or apply rebounded, spilled or over-sprayed material.
10. No substitutions outside of the foregoing list of products and manufacturers are permitted. All coating systems shall be applied in accordance with these specifications.

**691.02.03 WARRANTY**

A. The Coating Manufacturer shall provide a written warranty to cover workmanship and materials for each manhole coated with an approved corrosion protective coating for a period of not less than five (5) years from the date of final acceptance of the project. The warranty shall be delivered to the Engineer prior to and as a condition of final acceptance for this project.

1. Coating failure is defined as blistering, cracking, embrittlement, or softening, or failure to adhere to the substrate.

2. The warranty shall also apply to any repair materials, primers, or other products used in the application and shall conform with Section 11 of the General Conditions.

3. By executing this contract, the Contractor certifies and agrees that any testing performed by the City during construction (e.g., spark testing, adhesion testing and/or other testing) shall not in any way modify the warranty, nor relieve the Contractor’s responsibility for responding and correcting defects during the warranty period.

**691.02.04 ENVIRONMENTAL CONDITIONS**

A. The products furnished under this section will be installed in sanitary sewer access manholes, junction structures, and wastewater conveyance channels.

B. The products will be exposed to the extremes in temperatures and humidity.

C. In addition, the products will be exposed to corrosive, abrasive and reactive liquids and gasses associated with wastewater conveyance.

D. The products will be immersed or intermittently immersed in wastewater and the product surfaces are subject to splashing of wastewater.

**691.02.05 PRODUCT DATA**

A. Before materials are delivered to the job site, the Contractor shall provide the following information.

B. The Contractor shall furnish Material Safety Data Sheets (MSDS) for all products used in the coating system.

C. For all coating system components, the Contractor shall provide the manufacturer’s application instructions, which shall include the following:

1. Surface preparation recommendations.

2. Primer type, where required.

3. Maximum dry and wet film thickness.

4. Minimum and maximum curing time between coats, including atmospheric conditions for each.

5. Curing time before submergence in liquid.

6. Thinner to be used with coating material.

7. Ventilation requirements.

8. Minimum atmospheric conditions during which the coating shall be applied.

9. Allowable application methods.

10. Maximum allowable moisture content.

11. Maximum storage life.

D. List of materials proposed to be used under this section and manufacturer’s data for each material.

**CONSTRUCTION**

**691.03.01 GENERAL**

A. Coating products shall not be used until the Engineer has inspected the materials and equipment.

B. Coatings shall only be applied by a Manufacturer’s Certified Applicator.

C. A Manufacturer’s Representative must be present during the first 25 percent of installations for the project or as deemed necessary by the Engineer and Owner. For the remaining construction period, the Manufacturer’s Representative must be available either by phone or person for the project, if deemed necessary by the Engineer and/or Owner to resolve any issues.

**691.03.02 SAFETY AND VENTILATION REQUIREMENTS**

A. Requirements for safety and ventilation shall be in accordance with SSPC Paint Application Guide No. 3, and all applicable federal, state and local regulations.

**691.03.03 SEWAGE FLOW AND DIVERSION**

A. If the approved plans and project specifications do not require sewer bypass pumping for this project, sewer flows will be allowed to continue in the existing sewer lines during the manhole coating work identified in this section. The Contractor shall not impede or restrict said flows. In some cases, the City may (at the City’s sole discretion) be able to reduce flows in existing sewer lines by effecting upstream sewer diversions. Prior to working in manholes on existing sewer lines, the Contractor shall coordinate with the Engineer to determine if the City desires to put said diversions into effect for one or more of the existing manholes included in this project. If so, the Contractor shall coordinate with the Engineer a minimum of 48 hours prior to working on said manholes so that the City’s staff can put said diversions into effect. The Contractor shall also coordinate with the Engineer to notify the City when said diversions are no longer needed.

B. If the approved plans or project specifications require sewer bypass pumping for this project (whether specifically identified as being for the manhole rehabilitation and corrosion protective coating work or not) and if said sewer bypass pump-around removes flow from any manholes to be rehabilitated and/or coated as part of this project, said sewer bypass pump-around operations shall remain in effect until the requirements of this specification are fully satisfied for those manholes.

C. The Contractor shall use whatever means necessary to prevent foreign material from entering the sewer lines and/or sewer flows. The Contractor shall remove from the sewer lines any material that enters the sewer lines due to his operations at no cost to the City.

**691.03.04 CLEANING AND PREPARATION**

A. Manufacturer’s inspection prior to coating application shall include surface cleaning and preparation that meets the Manufacturer’s written instructions. Refer to Section 692 “Sewer Pipe and Structure Cleaning”.

B. Prior to coating application, Contractor shall notify Engineer of any noticeable disparity in the surfaces that may interfere with the proper preparation, or application of the coating system.

C. Existing Liner Removal

1. The entire manhole interior including frame, walls, and bench shall be cleaned prior to rehabilitation using either abrasive blasting and high-pressure water blast as recommended by the coating and/or repair product manufacturer.

2. Unless otherwise noted on the plans, for existing manholes lined with an existing PVC liner (e.g., T-lock liner), the Contractor shall remove the existing PVC liner prior to other cleaning activities. If the "tees" (i.e., the portion of the PVC liner that is embedded in the concrete) are not "strongly embedded" in the concrete, the Contractor shall entirely remove the tees from the concrete and shall remove both the PVC liner sheet and the tees from the manhole. For the purposes of making this determination, "strongly embedded" shall be defined as embedded within the concrete well enough that when the PVC liner is cut into strips (i.e., by cutting the PVC liner parallel to the tees at a point midway between each line of tees) and a pulling force of 100 pounds is applied to each strip incrementally along the length of each strip to pull said tees from the concrete. Tees that remain firmly embedded in the concrete after doing so are judged to be "strongly embedded". The Contractor shall cut PVC Liner Sheet loose from tees and the remaining tees embedded in the concrete shall be cut flush with surface of the existing manhole wall. No portion of the remaining tees shall protrude above the surface after surface preparation for coating is complete. The Contractor may at his own discretion remove even strongly embedded tees from the concrete.

3. Unless otherwise noted, existing or new PVC liners on pipelines connecting to or passing through the manhole shall be left intact and in-place.

4. Unless otherwise noted on the plans, for existing manholes lined or coated with a previously applied cured-in-place corrosion protective coating, the Contractor shall entirely remove the existing liner/coating (including any underlayment layers) prior to performing other cleaning activities.

D. Surface Preparation

1. Prior to application of the approved coating, all portions of the manhole to be coated shall be cleaned of all dust, loose particles, corroded or damaged materials, oils, grease, curing compounds, chemical contaminants, and previously applied paints, and insecticide coatings. The Contractor shall clean the manhole by abrasive blasting, and/or water blasting. Abrasive blasting may be either wet or dry. Abrasive blasting equipment shall be rated for a minimum of 90 psi. Water blasting shall be performed with water blasting equipment capable of a minimum of 5,000- to 10,000-psi at 4 gpm. The Contractor shall remove all sand or other abrasive material and debris from the manhole with an industrial vacuum cleaner or other means approved by the Engineer.

2. Other manhole cleaning methods may be used **in addition to** abrasive blasting and/or water blasting, subject to Engineer approval, as necessary to properly clean and prepare the manhole, but **shall not be used as a substitute for** abrasive blasting and/or water blasting. Other methods are high pressure water jetting, shot blasting, grinding, mechanical removal methods, chemical cleaning, detergent cleaning, hot water blasting and acid etching. If chemical cleaning or acid-etching are used, the substrate shall be neutralized and washed of residue. The Contractor shall use whatever methods are required to properly clean and prepare the manhole for the coating system.

3. The Contractor shall be aware that manhole cleaning and preparation activities (e.g., water blasting and abrasive blasting) may cause damage to certain materials and finishes. The Contractor shall be solely responsible to protect portions of the manhole (including appurtenances and attachments) that are not slated for such cleaning and preparation activities from damage and shall be responsible to repair any damage caused by the cleaning and preparation activities.

4. The Engineer shall approve all chemicals used for this project prior to their use. Chemical use shall conform to local, state and federal laws and regulations.

5. A manhole suitably prepared for coating shall have all loose, soft, discolored or otherwise deteriorated material removed from the manhole and the surface profile of the manhole shall be in accordance with ICRI Guidelines No. 03732. Expose aggregate and obtain a uniform surface texture resembling an ICRI – CPS (Concrete Surface Profile) #4-6. The Engineer may use one or more of the following observations/tests to determine whether the manhole substrate has been properly cleaned and prepared:

a. Visual appearance of the manhole – The prepared substrate shall have the appearance of sound concrete, free from discolored, white, chalky and cracked areas.

b. Aural observations – When struck with a metal hammer or similar metal tool, the prepared substrate shall exhibit the characteristic sound of solid, competent concrete (or brick). Care should be taken not to fracture sound concrete.

c. Mechanical abrasion tests – The substrate should be competent enough such that it cannot be scraped off with the claw of a hammer or similar metal tool.

d. pH testing – The Engineer may use wetted litmus paper applied to the surface of the substrate to ensure that the pH of the substrate is 7 or higher.

e. Phenolthalein testing – The Engineer may apply a few drops of phenolthalein to the surface of the concrete, which if the concrete is competent should yield a purple color.

6. The Engineer is not obligated to use all of the above tests, but may do so at the City's sole discretion. Often visual, mechanical and/or aural observations and tests alone will be adequate, but the pH and/or phenolthalein tests may be used if there is still some uncertainty.

7. If after cleaning, a new or existing manhole does not meet these requirements, the Engineer shall have authority to require additional cleaning effort and/or increased blasting pressure as required to adequately prepare the manhole. If necessary, the Engineer may also require acid etching of the concrete surface to create the desired texture. For existing manholes, the Engineer may also require mechanical removal of deteriorated concrete or other substrate materials.

8. A mild chlorine solution may be used to neutralize the surface to diminish microbiological bacteria growth prior to final rinse and coating system if approved by the Manufacturer’s Representative.

9. The time between manhole cleaning and preparation activities and application of the first coating layer shall be within the coating manufacturer’s recommendation.

E. Manhole Step Removal

1. Unless otherwise directed by the Engineer, manhole steps shall be cut flush with wall surface.

2. Voids or holes remaining from removal of the steps shall be filled and troweled flush with the wall using a manhole patching material approved by the Manufacturer’s Representative.

F. Debris Removal

1. Contractor shall also remove all dirt, rocks, rust, spalled masonry (including mortar, concrete), roots, sludge, grease grit, and other deleterious materials and debris from the interior of the junction structure and access manholes.

2. Debris from cleaning operations shall be collected within the manhole and disposed of at the APEX landfill.

3. Hauling containers shall be watertight.

4. Refer to Section 692 “Sewer and Structure Cleaning”.

1. Defects

1. Any visible water infiltration or seepage through seams in the existing manhole walls shall be eliminated using a material approved by the Manufacturer’s Representative and compatible with the underlayment material (in the case of existing manholes) or the primer coat and finish surface coating material (in the case of new manholes). A letter from the underlayment material manufacturer and finish surface coating material manufacturer stating that the material used to stop the infiltration is compatible with and will adhere to their product is required before any such material can be used.

2. The area between the manhole frame and the manhole grade ring and any other area that might exhibit movement or cracking due to expansion and contraction, shall be grouted with a watertight, expansive grout, approved for use by the Manufacturer’s Representative. No coating shall be applied over the grout and the manhole frame. Chimney seal shall be applied over the grout and the grade ring coating as recommended by the Manufacturer.

3. If directed by the Engineer, the Contractor shall restore the profile surface to the original thickness, and replace corroded or missing reinforcement in a manner to be proposed by the Contractor and reviewed and approved by the Engineer.

**691.03.05 DELIVERY AND STORAGE**

A. Materials shall be delivered to the job site in their original, unopened containers. Each container shall bear the manufacturer's name, coating type, batch number, date of manufacture, storage life, and special handling directions.

B. Materials shall be stored in enclosed structures and shall be protected from weather and excessive heat or cold. Flammable materials shall be stored in accordance with state and local codes. Materials exceeding the storage life recommended by the manufacturer shall be rejected and they shall be removed from the site, and replaced at no additional cost to the Owner.

* + 1. **COATING APPLICATION**

A. Underlayment Material Application

1. Prior to any surface coating work in existing manholes, the Contractor shall fill all voids (including any "ruts" left by the removal of PVC liner tees) and restore the manhole surface to an even and uniform surface profile using one of the underlayment materials listed in “APPROVED MANUFACTURERS” herein in accordance with the manufacturers recommendation.

2. The underlayment, if required, shall be installed over a clean surface prepared in accordance with the requirements of this specification and Section 692, “Sewer Pipe and Structure Cleaning”. The Contractor shall employ whatever means necessary (e.g., humidity control, temperature control, additional blasting, mechanical surface preparation, etc.) to ensure proper curing of the underlayment layer, strong adherence of the underlayment layer to the prepared manhole surface, and strong adherence to any layer installed over the underlayment layer.

3. After installation, the underlayment shall be free of trowel marks and irregularities.

4. The underlayment shall be applied throughout the entire manhole at a minimum 250 mil total cured thickness.

5. This paragraph shall apply only to those manholes where an adhesion test (or tests) has been requested by the City. (Refer to the section herein titled "ADHESION TESTING"): For such manholes the Contractor shall test the underlayment layer for proper adhesion to the underlying substrate in accordance with the section herein titled, "ADHESION TESTING ". Only if the underlayment layer in a manhole passes the adhesion test(s) in that manhole shall the Contractor progress to the next step of surface coating application. If the underlayment layer does not pass the adhesion test (or tests), the Contractor shall perform the remedial and re-testing steps discussed in the "ADHESION TESTING" section before progressing to the next step of surface coating application.

B. Surface Coating Application

1. Unless otherwise specified, the finish coat shall not be applied until other work in the area is complete and until the previous primer or underlayment coat has been accepted. The Contractor shall request approval authorization at all Inspection Hold Points.

2. All coatings shall be applied in strict accordance with the manufacturer’s requirements and recommendations.

3. Test prepared surfaces after cleaning but prior to application of the epoxy coating system to determine pH and moisture content of the concrete, as required according to manufacturer’s recommendations.

4. Ensure that the moisture content of the surface is in accordance with the coating manufacturer’s recommendations and/or requirements. If moisture content of the surface is not in accordance with the coating manufacturer’s recommendations and/or requirements, Contractor shall bring surface up to the coating manufacture’s recommendations and/or requirements at no additional cost to the Owner.

5. The approved surface coating shall be mixed in a clean, dry mixing container.

6. Ensure that pump, hoses, gun, tip, and pressure are properly matched for the coating to be applied. Ensure that the application equipment has been properly cleaned prior to application of coating. Test spray pattern for uniformity of distribution.

7. The prime and finish coat (as applicable) shall be a contrasting color. The color of the final coat shall be chosen by the Engineer, if different colors are available.

8. The Contractor shall ensure strong adherence of the surface coating layer(s) to any underlying and overlying layers and proper curing of the surface coating layer(s). If the surface coating is applied in two or more layers, the time between applications of the various layers shall be controlled to ensure proper bond between layers.

9. For all coatings, trowel marks and other surface irregularities shall be removed by using a short nap mohair paint roller. The short nap mohair shall be dampened with water. Excess water shall be shaken off prior to use.

10. The Contractor shall follow coating manufacturer’s requirements for bonding the coating systems to the installed sewer liner, if applicable.

11. The coating shall be applied to a minimum thickness of 125 mil. The authorized Engineer shall verify and measure film thickness.

12. The Contractor shall install coating key-ins as recommended by the coating manufacturer.

13. Compound that has begun to set shall not be recovered by adding additional liquid but shall be discarded.

14. Protect surfaces from rapid drying due to heavy wind or hot sun.

15. Drying time between multiple coats shall be as recommended by coating manufacturer. The recoat time cannot exceed manufacturers recommended hours or the surface must be power washed with Trisodiumphosphate (TSP) at 4,000 psi in order to remove amine blush prior to recoat.

16. Cure coatings in strict accordance with the manufacturer’s recommendations, prior to putting into service.

17. Imperfections, including but not limited to pinholes and bubbles, observed in the liner are not acceptable and shall be repaired per manufacturer’s recommendations. This requirement is independent of Spark (Holiday) Test results.

**691.03.07 INSPECTION HOLD POINTS**

A. At certain stages in the coating application process, the Contractor shall request approval from the Engineer, to proceed with the next stage of the installation.

1. The Contractor shall provide 24 hour notice that approval of an Inspection Hold Point is needed.

2. The Engineer shall respond to the approval request within 24 hours.

3. Failure to receive authorization from the Engineer at one of the designated Inspection Hold Points, may prevent the acceptance of the work by the Engineer.

B. The following are the designated Inspection Hold Points for each installation:

At each manhole, the Engineer shall inspect and accept the work completed to-date at the completion of each Hold Point listed below before the Contractor shall commerce work on the next Hold Point:

1. Completion of the cleaning and surface preparation activities.

2. Completion of all void-filling activities and underlayment application, prior to surface coating application, with the associated adhesion testing of the underlayment layer.

3. Completion of the surface coating installation prior to testing.

4. Adhesion/bond testing of the finished coating system.

5. Spark (Holiday) testing of the final surface coating.

6. Final clean-up and inspection.

**691.03.08 DEFECT REPAIR**

A. All surface defects identified by the Manufacturer’s Representative or Engineer including tie holds, any honeycombing or otherwise defective concrete shall be repaired. All voids, holes, and rough or irregular surfaces shall be filled.

B. The Contractor shall use only approved repair and fill material (i.e., epoxy mastic or concrete bonding agent) recommended by the coating manufacturer to repair or fill all defects.

1. Areas to be patched shall be cleaned per manufacturer recommendations.

2. Minor honeycombed or otherwise defective areas shall be removed to solid concrete. The edges of the cut shall be perpendicular to the surface of the concrete.

3. Patches on exposed surfaces shall be finished to match the adjoining surfaces after they have set.

4. Finishes shall be equal in workmanship, texture and general appearance to that of the adjacent undamaged concrete.

5. Concrete with honeycombing which exposes the reinforcing steel or with defects that affect the structural strength shall be repaired. The proposed repair method shall be approved by the Engineer.

**691.03.09 TESTING**

A. Adhesion Testing

Adhesion testing will be performed at two different stages: 1) Adhesion of the underlayment layer to the underlying substrate shall be tested before the surface coating layer(s) are applied. 2) After the surface coating layer(s) have been applied, all adhesions in the coating system shall be tested.

1. A minimum of three (3) adhesion tests performed at different elevations, randomly selected by the Inspector, is required for every five (5) access sewer manholes rehabilitated.

2. The manholes to be subjected to adhesion testing and the specific test locations within each manhole shall be selected by the Engineer. The Engineer shall be present to observe all adhesion testing.

3. The need to repeat an adhesion test due to an error in the performance of the adhesion testing (e.g., a dolly coming off prematurely) or due to a failure in the coating system before the required full test pressure is applied (i.e., a "not pass" test result) shall not count as a completed test for the purposes of determining compliance with the minimum number of tests required per Item No. 1.

4. Adhesion testing of the underlayment layer shall conform to the following: After the underlayment layer has cured for a minimum of 4 hours but before the surface coating has been applied over the underlayment layer, the Contractor shall test the underlayment layer for proper adhesion to the underlying substrate. The Contractor will perform the adhesion testing in-place and in accordance with ASTM Standard D­7234 and the requirements as dictated in the remainder of this section.

5. Adhesion testing of the finished coating system shall conform to the following: After the approved coating has been applied to all specified surfaces and has adequately cured (as determined by the manufacturer, but no more than 4 days), the Contractor shall test the finished coating system for adequate adhesion between the underlying substrate and the coating system and between the various layers of the coating system. Said test shall be performed in-place and in accordance with ASTM Standard D7234 and the requirements as dictated in the remainder of this section.

The remaining paragraphs of this section apply to both the adhesion testing of the underlayment layer and the adhesion testing of the finished coating system:

6. The Contractor shall perform the adhesion testing discussed in this section using a DeFelsko Positest Pull-off Adhesion Tester Model AT-M or AT-A. The adhesion tester shall be obtained by the Contractor. The Contractor shall be responsible to purchase and provide enough appropriately sized dollies (as sold by DeFelsko, one 20 millimeter dolly for each adhesion test, not re-usable) and adhesive for the dollies to perform all of the required tests. The Contractor shall also provide the equipment and tools to core drill around the test location, as discussed later in this section.

7. The Contractor shall first core drill the manhole surface (using a circle-cutting "hole saw" type drill bit that leaves the center of the drill area intact) around the perimeter of the dolly and shall then glue the test dolly to the surface of the manhole at the test location selected by the Engineer. The Contractor may lightly sand the coating surface with sandpaper at the test location to improve dolly adhesion. After the adhesive has set, the Contractor shall test the dolly for adhesion to the surface of the manhole by pulling on it by hand. If the dolly comes off, the Contractor shall re-adhere the dolly, using different glue if necessary. After the dolly is properly set, the drill bit shall penetrate through the layers to be tested, but shall not penetrate more than 1/8-inch into the underlying substrate. The diameter of the drilled circle shall match (1/8-inch +/-) the diameter of the test dolly.

8. The adhesion testing machine shall then be attached to the dolly and each test location shall be tested. Align the device according to the manufacturer’s instructions and set the force indicator to zero. Each test location shall be tested to a minimum pulling stress of 250 psi.

9. Increase the load to the fixture in a smooth and continuous manner, at a uniform rate of less than 30 psi per second so that failure occurs or the maximum stress is reached before 30 seconds. If delamination or any other failure occurs before reaching 250 psi, the Adhesion Test is Failed. Record the force attained at failure. The following user rates are built into the tester:

|  |  |  |
| --- | --- | --- |
| Dolly Size | PSI Rates | Maximum Pull-Off Pressure |
| 20 mm | 30, 50, 100, 150, 180 | 3,000 psi |

Designate cohesive substrate failure by the quantity and type of substrate removed and coating failures by the layers which they occur. The Engineer may require additional testing and/or remedial action on any failed test. Remedial action may include removing the entire coating system (or whatever components of it have been installed in the manhole to that point) from the entire manhole, re-cleaning of the manhole, re-application of the coating system to all required surfaces and re-testing. Said retesting and remedial action shall be at no additional cost to the City.

10. After the adhesion tests have been performed, the Contractor shall mechanically grind down the test locations to the underlying substrate and re-apply the underlayment and/or coating system (whatever has been installed up to that point in the manhole) in accordance with these specifications to patch the area. The Contractor shall not use acetone, MEK or other chemicals to dissolve the underlayment or coating system as a substitute for mechanical grinding down of the test area.

B. Spark (Holiday) Testing

Whereas adhesion testing is required at two stages of the project work in each manhole, spark testing is required only on the fully installed coating system.

1. After the manhole is properly cleaned and prepared, the Contractor shall drill a hole no larger than 1/2-inch in diameter that penetrates a minimum of 2-inches into the concrete (or other manhole wall surface type). The Contractor shall then install a 3/8-inch diameter stainless steel expansion bolt into the hole. The bolt shall penetrate a minimum of 2-inches into the manhole wall, but shall be long enough that a minimum of 1-inch length (but no more than 2-inches length) of the bolt will be exposed after the finished manhole coating system is installed. The hex-head end of the bolt shall be the exposed end. Unless otherwise directed by the Engineer, the bolt shall be installed on the manhole riser section at a location approximately 12-inches below the point where the manhole cone and manhole riser meet. The Engineer will direct the Contractor where to install the bolt around the circumferential perimeter of the manhole. The various layers of the coating system shall be installed securely up to and around the base of the bolt to seal the bolt penetration off as a pathway for corrosion. This bolt will be used during the spark testing of the manhole discussed later in this specification to provide grounding for said spark testing.

2. After the approved coating has been applied to all specified surfaces, the Contractor shall spark test the coated surfaces in accordance with ASTM D-4787. The Contractor shall provide all equipment and materials necessary to perform said testing, which equipment and materials shall remain the property of the Contractor.

3. Testing shall be performed with a wire brush-type test wand (the squeegee-type is not acceptable) with a minimum test voltage of 100 volts per mil (where 1 mil = 1/1000-inch) of finished surface coat thickness. For example, a minimum of 12,500 volts shall be used for a surface coat thickness of 1/8-inch (125 mils). The Contractor will use the stainless steel bolt installed during the cleaning and surface preparation activities as a grounding rod for the spark testing equipment.

4. As a test of the proper functioning of the spark testing equipment, the Engineer may require the Contractor to drill a hole through the coating system into the underlying concrete substrate and to demonstrate to the Engineer that the spark testing equipment can "find" the hole. The Contractor shall then patch and repair the hole. At the Engineer's discretion, one such quality control test may be required for each manhole. Unless otherwise determined by the Engineer, any adjustments to the spark testing methodology (e.g., adjusting the grounding method, increasing the test voltage, etc.) required to "find" the known holiday (hole) shall remain in effect for the remainder of the spark testing of that manhole.

5. The entire surface of the manhole shall then be spark tested. Any imperfections found in the coating system shall be ground down and refilled. Use of a chemical solvent such as acetone or MEK in lieu of mechanical grinding down the area shall not be permitted. Repaired areas shall be re-tested. Said testing, repairs and re­testing shall continue until all portions of the manhole pass the spark test as specified herein.

6. The Contractor shall perform repairs and re-testing. The Engineer shall observe and approve of all testing and retesting. In addition, the Contractor shall provide certification for each manhole stating that the coating is free of holes or other imperfections.

**691.03.10 CLEANUP**

A. Upon completion of coating, the Contractor shall remove surplus materials, protective coverings, and accumulated rubbish, and thoroughly clean all surfaces and repair any overspray, splashes, splatters or other coating-related damage.

B. Surfaces damaged resulting from this clean up shall also be cleaned, repaired and refinished to the original or required condition.

***Note to Spec Writer – Section 693 is to be used on all projects with new sewer and storm drain pipelines and structures, rehabilitated manholes, and rehabilitated sewer lines.***

1. Internal video inspection shall be performed by the Contractor per Section 693 – INTERNAL INSPECTION OF SEWER AND STORM DRAIN FACILITIES.

**METHOD OF MEASUREMENT**

**691.04.01 MEASUREMENT**

[NOTE TO SPEC WRITER. DELETE UNUSED ITEMS BUT DO NOT RENUMBER. THIS SECTION HAS THE BID ITEMS STANDARDISED]

The quantity of the following will be measured per each:

* Coat Existing 48-INCH manhole (≥5 DEPTH AND <10 Depth)
* Coat Existing 48-INCH manhole (≥10 DEPTH AND <15 Depth)
* Coat Existing 48-INCH manhole (≥15 DEPTH AND <20 Depth)
* Coat Existing 60‑INCH manhole (≥5 DEPTH AND <10 Depth)
* Coat Existing 60-INCH manhole (≥10 DEPTH AND <15 Depth)
* Coat Existing 60-INCH manhole (≥15 DEPTH AND <20 Depth)
* Coat Existing 60-INCH manhole (≥30 DEPTH AND <35 Depth)
* Coat Existing 72-INCH manhole (≥20 DEPTH AND <25 Depth)
* Coat Existing 60-INCH manhole (≥20 DEPTH AND <25 Depth)
* Coat Existing 60-INCH manhole (≥25 DEPTH AND <30 Depth)

will be measured per EACH.

The quantity of REPLACE CONCRETE GRADE RING, shall be measured each, and shall only be measured for rehabilitation replacement and will only be measured when shown on the pans. Measurement will not be provided for removal or restoration of grade rings to facilitate CIPP installation.

**BASIS OF PAYMENT**

**691.05.01 PAYMENT**

The accepted quantity of the following shall be paid for at the contract unit price per each coating system applied:

* Coat Existing 48-INCH manhole (≥5 DEPTH AND <10 Depth)
* Coat Existing 48-INCH manhole (≥10 DEPTH AND <15 Depth)
* Coat Existing 48-INCH manhole (≥15 DEPTH AND <20 Depth)
* Coat Existing 60‑INCH manhole (≥5 DEPTH AND <10 Depth)
* Coat Existing 60-INCH manhole (≥10 DEPTH AND <15 Depth)
* Coat Existing 60-INCH manhole (≥15 DEPTH AND <20 Depth)
* Coat Existing 60-INCH manhole (≥20 DEPTH AND <25 Depth)
* Coat Existing 72-INCH manhole (≥20 DEPTH AND <25 Depth)
* Coat Existing 60-INCH manhole (≥25 DEPTH AND <30 Depth)
* Coat Existing 60-INCH manhole (≥30 DEPTH AND <35 Depth)

shall be paid for at the contract unit price per each coating system applied and shall be full compensation for all labor, equipment and materials to complete the work including surface preparation, existing coating removal, chimney seal, grout, structure cleaning, testing equipment, sampling and testing and any other repair necessary to ensure proper bonding of coating to the inside of the existing structure, on-site visits of the Manufacturer’s Representative, video inspection, and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer. Payments will be based on the existing access manholes and/or junction structures coated tested and approved. Partial payments for coating material delivered but not installed will not be made.

Payment will be made under:[NOTE TO SPEC WRITER. DELETE UNUSED ITEMS BUT DO NOT RENUMBER. THIS SECTION HAS THE BID ITEMS STANDARDISED].

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 691.0005 | Coat Existing 48-INCH manhole (≥5 DEPTH AND <10 Depth) | Ea |
| 691.0010 | Coat Existing 48-INCH manhole (≥10 DEPTH AND <15 Depth) | Ea |
| 691.0020 | Coat Existing 48-INCH manhole (≥15 DEPTH AND <20 Depth) | Ea |
| 691.0050 | Coat Existing 60-INCH manhole (≥5 DEPTH AND <10 Depth) | Ea |
| 691.0060 | Coat Existing 60-INCH manhole (≥10 DEPTH AND <15 Depth) | Ea |
| 691.0070 | Coat Existing 60-INCH manhole (≥15 DEPTH AND <20 Depth) | Ea |
| 691.0080 | Coat Existing 60-INCH manhole (≥20 DEPTH AND <25 Depth) | Ea |
| 691.0130 | Coat Existing 72-INCH manhole (≥20 DEPTH AND <25 Depth) | Ea |
| 691.0220 | Coat Existing 60-INCH manhole (≥25 DEPTH AND <30 Depth) | Ea |
| 691.0230 | Coat Existing 60-INCH manhole (≥30 DEPTH AND <35 Depth) | Ea |

END OF SECTION 691

***ADD THE FOLLOWING SECTION TO DIVISION II – CONSTRUCTION DETAILS***

SECTION 692 – SEWER PIPE AND STRUCTURE CLEANING

**DESCRIPTION**

**692.01.01 GENERAL**

1. A. This section specifies the requirements for cleaning of the sewers and sewer structures prior to video inspection, quality assurance inspection, and rehabilitation.

**692.01.02 REQUIREMENTS**

1. The work to be done under this Contract consists of furnishing all labor and equipment to remove and dispose of the accumulated sediments and clean the sewers and sewer structures as specified.
2. The Contractor shall clean existing sewers and sewer structures to be inspected or lined and prepare the surfaces for installation of liner or coating system or repair grout.
3. Cleaning of the sewer pipe with high-pressure hydraulic cleaning equipment, shall be required prior to installation of cured-in-place pipe (CIPP) liner in the existing pipelines, and manhole coating systems.
4. All materials dislodged during cleaning shall be removed from the work area and carried to an approved disposal site.
5. Cleaning of the sewer is required prior to video inspection of the sewer to view current line conditions.

**692.01.03 SUBMITTALS**

1. A letter shall be provided to the Engineer identifying the methods the Contractor plans to employ to remove sediment, debris, grease, scale, encrustations, and roots throughout the sewer to be lined and in the sewer structures to be repaired or coated. The letter shall include the following:
2. A detailed explanation of the cleaning process and a schedule of activities.
3. References where the Contractor has used the identified cleaning method successfully in the past 3 years.
4. A list of the actions planned to mitigate impact to the public during the cleaning operation.
5. The Contractor shall submit a copy of the certification document providing for the safe transport of the material cleaned from the project sewers.
6. The Contractor will provide copies of the dump site receipts to the Engineer.

**MATERIALS**

**692.02.01 CHEMICAL ADDITIVES**

1. No chemicals shall be used without written approval of the Engineer. In no case shall any chemical additive be used which might be considered hazardous, or might be considered detrimental to organisms or equipment of a wastewater treatment plant, or detrimental to old or new pipe materials.

**692.02.02 EQUIPMENT**

1. Equipment shall be capable of removing dirt, grease, rocks, sand, roots, and obstructions from pipelines and manholes.
2. High-Velocity, Hydro Cleaning Equipment:
3. High-Pressure Hose: 700 feet, minimum;
4. Hydraulically driven hose reel;
5. High Velocity Nozzle:
6. Two, minimum; and
7. Capable of producing scouring action from 10 degrees to 45 degrees in lines to be cleaned.
8. High-velocity Gun: Capable of producing flows ranging from fine spray to long distance solid stream;
9. Water Tank: 1,000-gallon storage, minimum;
10. Auxiliary engines and pumps;
11. Equipment Operating Controls: Locate above ground; and
12. Working Pressure: Minimum 2,000 pounds per square inch at 35 gallons per minute.
13. Mechanically-powered Equipment
14. Bucket Machine:
15. Furnish with buckets in pairs, and with sufficient dragging power to perform work efficiently;
16. Use V-belts for power transmission or have overload device. No direct drive machines permitted; and
17. Equip with take-up drum and minimum 700 feet of cable.
18. If debris volumes in the pipeline are too large to remove with hydraulic jet cleaning equipment, cleaning shall be performed by the Contractor using a bucket machine.

**CONSTRUCTION**

**692.03.01 GENERAL**

1. The Contractor shall at all times conduct its work so as to prevent any blockage and minimize surcharging in the sewer manholes and connecting sewer pipelines. Damage to existing facilities as a result of the Contractor’s work shall be promptly repaired in kind at the Contractor’s expense.
2. When using hydraulically propelled cleaning tools that depend on water pressure to provide cleaning force, or tools that retard flow are used, take precautions to ensure that water pressure created does not damage or cause flooding of public or private property

**692.03.02 SEWER BYPASSING AND DEWATERING**

1. The sewer flow shall be bypassed during the cleaning of the sewers as specified in Section 695, “Diversion of Sewage Flow”.

**692.03.03 CLEANING**

1. Cleaning shall remove all sediment, rocks, debris, roots, grease accumulations and obstructions from the sewer to be lined and from the sewer structures to be coated.
2. Cleaning of the sewer and structure interior surfaces shall remove all grease, scale, and encrustation so that no foreign intrusion shall cause imperfections in the lining (e.g., bumps, folds, dimples).
3. During initial pipe cleaning, make a minimum of two passes through pipe segment.
4. During final pipe cleaning, make a minimum of one pass through the pipe segment.
5. Begin pipe cleaning at upstream end of system and proceed in downstream direction.
6. Structure Cleaning:
7. The entire manhole interior including frame, walls, and bench shall be cleaned prior to rehabilitation using either abrasive blasting and/or high-pressure water blast as recommended by the coating and/or repair product manufacturer, and approved by the Engineer, prior to coating installation. Where mechanical cleaning is accomplished by blast cleaning, the abrasive used shall be washed, graded and free of contaminants, which might interfere with the adhesion of the coatings. The air used for blast cleaning shall be sufficiently free of oil and moisture to not cause detrimental contamination of the surfaces to be coated. All concrete or mortar that is not sound or has been damaged by chemical exposure shall be removed to a sound, neutralized surface.
8. All contaminants including oil, grease, incompatible existing coatings, waxes, form release, curing compounds, efflorescence, sealers, salts, or other contaminants shall be removed. Detergent water cleaning and hot water blasting may be necessary to remove oils, grease or other hydrocarbon residues from the concrete. A mild chlorine solution may be used to neutralize the surface to a ph of 7 in order to diminish microbiological bacteria growth prior to final rinse and coating system.
9. Contractor shall also remove all dirt, rocks, rust, spalled masonry (including mortar and concrete), roots, sludge, grease grit and other deleterious materials and debris from the interior manhole. The manhole shall be restored to the original surface profile. The finished interior surface shall consist of sound concrete or brick with adequate profile and porosity to provide a strong bond between the necessary repair materials and/or coating and the substrate. The first procedure upon entering each structure will be to blast all specified surfaces by low-pressure water cleaning followed by a low-pressure application of trisodiumphosphate (TSP). When all grease, oil and loose contaminated debris has been removed, the surface will be acid etched with a 20 percent muriatic acid solution to clean and open the pores of the substrate. The surface will then be water blasted by the use of hand held wand again, at 5,000 – 10,000 psi using turbo tip nozzles. The wash water shall include a dilute solution of chlorine to diminish microbiological bacteria growth and to kill any bacteria residing on or in the surface. The surface will be rinsed with copious amounts of clean potable water and then tested at this point to ensure that the pH is within acceptable limits (not to exceed 8.5). These tests will be performed with litmus paper on various areas within the structure. All tests will be retained for review by the Engineer.
10. Contractor shall also be responsible for any additional surface preparation beyond water blasting as required by the coating manufacturer. Where additional preparation is required, including abrasive blasting, shotblasting, grinding, scarifying or acid etching, the Contractor shall provide all labor, materials, and equipment as necessary, and at no additional cost to the Owner. Solid blast materials shall be collected, removed and disposed of in the same manner as other cleaning debris.
11. Any sediment or debris from cleaning operations larger than U.S. No. 8 sieve shall not be deposited downstream in the sewer main.
12. Sedimentation deposit downstream, as determined by the Engineer, shall be removed at no cost to the City.
13. The Contractor shall be thoroughly familiar with all phases of sewer and structure cleaning to ensure the completion of this Project without causing a health hazard or damage to the sewage system, public and private properties.
14. The Contractor shall clean the sewer and structures so that there are no visible rocks, debris, roots, grease accumulation and obstructions.
15. The Contractor shall clean the pipe and structures to ensure proper installation of the sewer liner and structures coating system and repair work.
16. The Contractor shall clean all exposed rebar to remove areas of corrosion down to solid steel and solid concrete.
17. Supply water for performing high-velocity hydro cleaning or flushing: Water may be obtained from the Las Vegas Valley Water District or City of North Las Vegas public water system. The Contractor shall obtain any necessary approval from and pay all permit fees to the Las Vegas Valley Water District or City of North Las Vegas prior to commencement of Work.
    * 1. **DISPOSAL OF SEDIMENTS**
18. The Contractor shall be responsible for obtaining all necessary permits and approval from all regulatory agencies required to perform the work, transporting and disposing, including all disposal fees, of any sediments and material removed from the sewer or structures. Remove sediments and material from cleaning operation at the end of each workday. Off-site disposal of all material removed from the sewer shall be the Contractor’s responsibility.
19. All sediment and debris removed from the sewer shall be disposed off-site in the APEX landfill. Hauling containers shall be watertight and shall be certified by the Clark County Health District. On-site stockpiling of removed material will not be permitted.

**METHOD OF MEASUREMENT**

**692.04.01 MEASUREMENT**

No unit of measurement will be made for SEWER PIPE AND STRUCTURE CLEANING.

The quantity of [FILL IN ITEM DESCRIPTION] will be measured per [UNIT].

No direct measurement shall be made for [FILL IN ITEM DESCRIPTION].

**BASIS OF PAYMENT**

**692.05.01 PAYMENT**

Unless otherwise provided in the Special Provisions, no payment will be made for SEWER PIPE AND STRUCTURE CLEANING as such. The cost thereof shall be considered as included in the unit price bid for construction or installation of the items to which such SEWER PIPE AND STRUCTURE CLEANING is required.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

Unless otherwise provided in the Special Provisions, no payment will be made for [FILL IN ITEM DESCRIPTION] as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which [FILL IN ITEM DESCRIPTION] is required.

**END OF SECTION 692**

***ADD THE FOLLOWING SECTION TO DIVISION II – CONSTRUCTION DETAILS***

***Note to Spec Writer – This section is to be used on all projects with new sewer and storm drain pipelines and structures, rehabilitated manholes, and rehabilitated sewer lines.***

SECTION 693 – INTERNAL INSPECTION OF SEWER AND STORM DRAIN FACILITIES

**DESCRIPTION**

**693.01.01 GENERAL**

1. This specification defines the requirements for internal internal video inspection of new storm drain pipelines and structures including manholes and drop inlets, new sewer pipelines including replacements per DSCWCS SD-18, sewer manholes, rehabilitated sewer manholes and existing sewer pipelines before and after rehabilitation.
2. Video inspection equipment and field operator(s) of inspection equipment must have current National Association of Sewer Service Companies (NASSCO) Pipeline Assessment and Certification Program (PACP) Certification and/or Manhole Assessment and Certification Program (MACP) Certification.
3. The Contractor shall inspect the storm drain and/or sewer facility interiors, including manholes and drop inlets, using a color closed circuit television (CCTV) camera or scanner and document the inspection with location and date information, image title information, and hard copy inspection logs. The internal inspection shall be performed after the installation has been completed, including lateral connections, backfill compaction testing, deflection testing, manhole installation, and defects corrected, for new facility installation but prior to being placed into service.
4. All inspection documentation shall include the location referenced to the project survey control specifically the referenced facility stationing.
5. For sanitary sewer, complete documentation shall be submitted to the Engineer for review and approval prior to removing bypass and releasing flows into the system unless otherwise approved by the Engineer requires 2 working days per 1,000 linear feet of sewer televised, or a minimum of 5 working days, whichever is longer, for review.
6. For storm drain, complete documentation shall be submitted to the Engineer for review and approval prior to final completion. Engineer requires 2 working days per 1,000 linear feet of storm drain televised, or a minimum of 8 working days, whichever is longer, for review.
7. For sewer pipeline rehabilitation:
8. The first internal inspection shall be performed after cleaning the sewer and prior to lining the pipe.
9. The second internal inspection shall be performed in the same direction as the previous inspection after the lining of the sewer has been completed to ensure proper installation.
10. The third internal inspection of the sewer shall be performed in the same direction as the previous inspection, approximately 1-month prior to the end of the 2-year warranty period. This final internal inspection may be performed while the sewer is active.
11. The Contractor shall be responsible for properly inspecting the pipe or providing approval of the finished inspection image.

**693.01.02 SUBMITTALS**

A. The Contractor shall submit the following information for review at the Pre-Construction Conference following notification of award of the Contract:

1. An example of work consisting of one digital submittal of previous inspection work complete with inspection log(s) meeting the requirements of this specification.
   1. The digital submittal shall show operational and structural defects in facilities that are of the same size as the facilities in this Project.
   2. The submittal will be reviewed to determine if the quality of the internal image is acceptable and if defects were properly identified and documented.
   3. Samples shall be with the same camera and lighting equipment proposed for the work.
      1. One copy of the finished digital submittals, including standard inspection reports shall be submitted to the Engineer within 5 days of inspection. For rehabilitation of sewer pipelines, the inspection reports showing the existing sewer pipelines after cleaning and the sewer pipelines after liner installation, shall be submitted to the Engineer within 5 days of inspection.
2. The Engineer will review the inspection data, not for accuracy of content, but to make sure that the required information is provided and the recording is of acceptable quality.
3. If the Engineer determines that the inspection is defective or not of adequate quality, the Contractor shall inspect again at no additional cost to the Owner.

C. Quality Control Submittals at the pre-construction conference:

1. List of staff and equipment compliant with NASSCO PACP and/or MACP standards.
2. NASSCO PACP and/or MACP certifications for operators and supervisors who will be assigned to the work.

**MATERIALS**

**693.02.01 TELEVISION INSPECTION CAMERA**

1. For sewer facilities - camera shall be nationally-recognized testing laboratory (NRTL) certified for a normal sewer environment. Camera shall be explosion proof and certified for hazardous environments when gas meter readings of the manhole airspace indicate an LEL less than 10 percent.
2. Equipment shall be operative in 100 percent humidity conditions.
3. Resolution: 460 lines per inch, minimum, color image.
4. Camera shall be self-propelled; equipped with tag line suitable for pulling camera backwards.
5. For storm drain pipe, camera shall:
   1. Be operative in 100 percent humidity conditions.
   2. Have resolution of 460 lines per inch minimum, with a color image.
   3. Be self-propelled; equipped with tag line suitable for pulling camera backwards.
6. For structures including manholes and drop inlets, camera shall:
   1. Be operative in 100 percent humidity conditions.
   2. Have resolution of 460 lines per inch minimum, with a color image.
7. Lighting intensity shall be remote controlled and shall be adjusted to minimize reflective glare.
8. Lighting and camera quality shall provide a clear, in-focus picture of the entire inside periphery of the facility being inspected.

**693.02.02 DIGITAL STORAGE MEDIUM**

A. The inspection shall be recorded, stored and submitted on external hard drive in high quality MPG format formatted for use with Microsoft PC systems. Other software formats which require proprietary viewers, must have those viewers included with each submittal.

* + 1. **FOOTAGE COUNTER**

1. A footage counter device, which measures the distance traveled by the camera in the sewer or storm drain facility, shall be accurate to plus or minus 2 feet in 1,000 feet.
2. The footage counter shall be calibrated each day prior to start of work using walking meter, roll-a-tape, or other suitable device.

**693.02.04 CAMERA TILTING**

A. For conventional CCTV cameras, a pan and tilt unit, with adjustable supports specifically designed and constructed for operation in connection with pipe and/or structure inspection.

**693.02.05 FIELD DATA ACQUISITION SYSTEM**

A. User’s manual and office copy of the software for the field data acquisition system, used to provide electronic date files, shall be provided to the Engineer prior to start of the internal inspection work. System shall be certified for NASSCO PACP and/or MACP Coding System.

1. WinCan
2. Granite XP
3. PipeLogix
4. Or equal.

**CONSTRUCTION**

**693.03.01 FLOW IN SEWER AND STORM DRAIN FACILITIES**

1. Video inspections are to be performed only while no flow is in the pipe except when potable water is introduced to detect sags in new pipelines, unless otherwise approved by these specifications or the Engineer.
2. The bypassing requirements for sewer rehabilitation facilities are provided in Section 695 “Diversion of Sewage Flow”.
3. Flow may be present in pipes for video inspection of manholes and drop inlets.

**693.03.02 INSPECTION METHODS**

1. Verbal Commentary: None required
2. Access:
3. The Engineer shall have access to observe the monitor and all other operations at all times.
4. The system of cabling employed to transport the camera and transmit its signal shall not obstruct the camera’s view.
5. Inspection Rate for Pipe Facilities:
6. The camera shall be pulled through the rehabilitated sewer or new sewer in the downstream direction. If inspecting in the downstream direction is not possible, reverse inspection is permitted. All inspections at each location shall be in the same direction.
7. Storm drain facilities may be pulled through either direction, but all inspections at each location shall be in the same direction.
8. Line segments shall be televised complete from structure to structure in a continuous run. Image stream must clearly show the camera starting and ending at the upstream and downstream structures, unless a defect(s) does not allow it. Do not record partial televising of a segment and then record another partial run.
9. Maximum rate of travel for conventional CCTV cameras shall be 30 feet per minute when recording. The camera shall be stopped for a minimum of 5 seconds at each pipe defect.
10. Inspection Rate for Structures:
    1. Structures including manholes and drop inlets shall be performed from rim to invert in a continuous run.
    2. Maximum rate of travel for conventional CCTV cameras shall be 30 feet per minute along the line of sight of the camera and all interior surfaces shall be shown clearly in the image. The camera shall be stopped for a minimum of 5 seconds at each defect.
11. Image Perspective:
12. The camera image shall be down the center axis of the pipe/structure when the camera is in motion.
13. The Contractor is required to provide a 360-degree view of the pipe/structure interior.
14. The Contractor shall provide opening screen with correct information of the entire pipe/structure segment inspected.
15. Continuous Footage Readings:
    1. Visible on image at all times;
    2. Record defect locations to the nearest one-half foot (e.g. 2.5 feet); and
    3. Line segment recording will be rejected if continuous footage meter is inaccurate, not visible, or leave doubt as to the total length/depth of pipe/structure inspected.
16. Points of interest shall also be shown on the video and shall include, but not be limited to all joints for new facilities, defects, encrustations, mineral deposits, debris, sediment, any location determined not to be clean. For rehabilitated sewer proper liner installation and defects in any rehabilitated pipe including, but not limited to, bumps, folds, tears, dimples, etc.
17. Defect Coding: National Association of Sewer Service Companies (NASSCO) Pipeline Assessment and Certification Program (PACP) and Manhole Assessment and Certification Program (MACP) coding system, latest version, shall be used to document all defects visible on the image recordings. Do not include defect codes on image at any time.
18. Quality Control:
19. The Engineer will review digital submittals and logs to ensure compliance with the requirements listed in this specification and contract documents. If, in the opinion of the Engineer, the inspection is not acceptable, re-inspection will be completed by the Contractor at no additional cost to the Owner.
20. For sewer rehabilitation, if the sewer line is determined not to be adequately cleaned, as required in Section 692 “Sewer Pipe and Structure Cleaning”, it shall be re-cleaned and video inspected by the Contractor at no additional cost to the Contracting Agency.
21. For sewer rehabilitation, if any portion of the liner is determined not acceptable, the liner shall be repaired or replaced, whichever the Engineer deems appropriate, and re-inspected by video at no additional cost to the Contracting Agency.
22. The Contractor shall be responsible for modifications to his equipment and/or inspection procedures to achieve inspection data of acceptable quality. No work shall commence prior to approval of the material by the Engineer. Once accepted, the inspection data shall serve as a standard for the remaining work.
23. Contractor shall maintain an electronic copy of all inspection documentation for the duration of the work and warranty period.

**METHOD OF MEASUREMENT**

**693.04.01 MEASUREMENT**

No unit of measurement will be made for Internal Inspection of Sewer and Storm Drain Facilities.

The quantity of [FILL IN ITEM DESCRIPTION] will be measured per [UNIT].

No direct measurement shall be made for [FILL IN ITEM DESCRIPTION].

**BASIS OF PAYMENT**

**693.05.01 PAYMENT**

Unless otherwise provided in the Special Provisions, no payment will be made for Internal Inspection of Sewer and Storm Drain Facilities as such. The cost thereof shall be considered as included in the price bid for CIPP liner, sewer pipelines, sewer manholes, storm drain pipelines, and structures, or for which such Internal Inspection is required.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

Unless otherwise provided in the Special Provisions, no payment will be made for [FILL IN ITEM DESCRIPTION] as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which [FILL IN ITEM DESCRIPTION] is required.

END OF SECTION 693

***ADD THE FOLLOWING SECTION TO DIVISION II – CONSTRUCTION DETAILS***

SECTION 695 – DIVERSION OF SEWAGE FLOW

**DESCRIPTION**

**695.01.01 GENERAL**

A. This section describes the existing conditions for temporary bypassing and dewatering of sewers during internal video inspection, cleaning operations, rehabilitation and removal and/or replacement or point repairs of the pipes and manholes.

B. The Contractor is responsible for the design of all pump equipment, piping, power, collection and distribution elements to achieve the bypassing of existing sewage from intake point to discharge point.

C. The quantity of sewage to be bypassed from point to point shall be the sum of all flows entering the pipeline before the point of discharge. [NOTE TO SPEC WRITER: IF FLOWS ARE ON PLANS USE (refer to the contract Plans for flow values).]

**695.01.02 REQUIREMENTS**

A. The Contractor or Subcontractor performing the Bypass Pumping work on this project, should have an “A” (General Engineering) classification license or “A-15” (Sewers, Drains, and Pipes) classification license.

B. The actual design of the bypass arrangement shall be prepared by the Contractor, and shall be submitted to the Engineer to determine conformance to project objectives. Design for maintaining access will be prepared by the Contractor and submitted to the controlling agency for approval. Lay flat hoses may not be authorized at all locations. Above ground installations will require ramps for these purposes.

C. Contractor shall provide labor, materials, and supervision to temporarily bypass flow around the Contractor’s work in accordance with the specific needs of the work being performed.

D. The Contractor shall be required to prepare a temporary traffic control plan for the bypass equipment and piping in accordance with Section 624 “Accommodations for Public Traffic”. Pedestrian access and handicapped accessible routes must be maintained.

E. Requirements for temporary bypass pumping or flow diversion within City of Las Vegas (CLV) rights of way for purposes of installing bypass equipment including, but not limited to, bypass piping shall comply with the requirements of CLV. CLV permit requirements apply.

F. Requirements for temporary bypass pumping or flow diversion within Nevada Department of Transportation (NDOT) rights of way for purposes of installing bypass equipment including, but not limited to, bypass piping shall comply with the requirements of NDOT. NDOT encroachment permit requirements apply.

G. Requirements for temporary bypass pumping or flow diversion within Clark County (CC) rights of way for purposes of installing bypass equipment including, but not limited to, bypass piping shall comply with the requirements of CC. CC permit requirements apply.

H. Requirements for temporary bypass pumping or flow diversion within City of North Las Vegas (CNLV) rights of way for purposes of installing bypass equipment including, but not limited to, bypass piping shall comply with the requirements of CNLV. CNLV permit requirements apply.

I. The Contractor’s bypass plan must consider existing speed limits and allowable reductions in determining the location of piping and reduce speed at each location where the piping crosses perpendicular to lanes of traffic by 10 mph.

J. Contractor shall keep all driveway access to adjoining properties accessible to the public and fire and emergency vehicles. Final designs for maintaining access will be prepared by the Contractor and submitted to the controlling agency for approval as part of the Traffic Control Plan.

K. At each project site the Contractor shall have the entire bypassing system in place and tested before bypassing any sewage.

L. The Contractor shall notify the Engineer 48 hours prior to shutting down or bypassing any of the pipelines or lift stations.

M. The bypassed flow shall be continuously metered. The bypass equipments shall be continuously monitored to ensure proper operation at all times.

N. For purposes of bypass pumping lateral flows, right of entry onto private property is not permitted without property owner/homeowner association permission. Contractor shall be responsible to acquire this permission. Laterals shown on Drawings are from best available documents. Internal inspection may identify additional laterals not shown on the Drawings that may require bypass pumping.

**695.01.03 DEFINITIONS**

A. Average Flow: flow values based upon equivalent residential units (ERU) or mean flow value as determined by a 7-day flow monitoring.

B. Cumulative Average Flow: the summation of tributary average flow values contributing to flow at a given point.

C. Peak Flow: a product of Cumulative Average Flow and the corresponding Peak Flow Factor.

**MATERIALS**

**695.02.01 SUBMITTALS**

A. Prepare a detailed bypass pumping plan, prepared and sealed by a Nevada licensed professional engineer, that describes the measures to be used to control flows. Submit the plan to and obtain approval from the Engineer prior to beginning bypass pumping work. Contractor’s plan shall include, but not be limited to the following:

1. Drawings indicating the scheme and location of pumps, suction manhole, suction piping, discharge manhole, discharge piping, temporary sewer plugs, flow diversion structures, dams, odor control, and related materials and equipment for each of the bypass pumping sites.

a. Plan shall show location of all bypass pumping systems, including odor control, and shall discuss phasing, reuse, and movement of systems during construction as applicable.

b. Bypass pumping plan shall designate which system/setup will be used where and when applicable.

c. Structures and equipment within the public right-of-way shall be identified as such on the plans.

1. Right-of-Way ownership.
2. Vehicular and pedestrian access to public and private facilities shall be coordinated with the traffic control plan. The traffic control plan shall show how vehicles and pedestrians will be protected from injury resulting from bypass operations.
3. Contractor performed flow monitoring results.
4. Capacities and sizes of pumps, standby equipment, and power requirements if applicable.
5. Key operational control factors, (i.e., maximum flow elevations upstream of dams).
6. Design calculations proving adequacy of the system and selected equipment, including static lift, friction losses, fitting losses, flow velocity, pump curves identifying operating range and duty point, and pipe thickness calculations. Pipe thicknesses calculations shall assume an H20 live loading at crossings.
7. Sewer plugging method and type of plug.
8. Method of noise control for each pump and generator.
9. Thrust restraint block sizes and locations were space is limited.
10. Method of securing and bracing of sewer plug shall be submitted at a minimum, the plug must attach to a cable/chain which is then connected/tied off to an immobile object, as approved by the Owner.
11. Temporary pipe supports and anchoring required.
12. Staffing plan including name and qualifications for on-site operators. Trained bypass pumping personnel (pump operator) shall be present during the entire bypass operation. Logs shall be maintained by the bypass pumping personnel. Submit bypass pumping personnel qualifications for agency review and approval.
13. Odor control system manufacturer information.
14. Site layout showing all major components.
15. Wet weather event procedures.
16. An emergency response plan that addresses containment, notification procedures, and equipment failure procedures. An emergency contact list with 24 hour phone numbers shall be submitted and updated as needed.
17. Schedule including durations and dates for each sequence.
18. Protection method for existing utilities.

B. Number and size of pumps used in bypass pumping shall be such that if the largest pump is out of service, bypass flows will be maintained during the bypass operation.

C. Contractor shall field verify minimum, maximum, and average flow to be bypassed.

**695.02.02 PRODUCTS**

A. Contractor shall provide temporary pumps, conduits, and other equipment to bypass sewer flow around the Contractor’s work area as required by the work, and during video inspection and cleaning activities.

1. Contractor shall furnish all necessary labor and supervision to set up and operate the pumping and bypass system.
2. Engines shall be equipped with devices such as (but not limited to) mufflers and/or plywood/Styrofoam noise panels enclosing the engines to keep the noise level within limits specified by the Owner.
3. Pumps and bypass lines shall be of adequate capacity and size to handle the Peak Flow.
4. Bypass lines, fittings and all accessories shall withstand twice the maximum pressure of the system or 50 psi whichever is greater.

B. Contractor shall maintain on site, sufficient equipment and materials to ensure continuous and successful operation of the bypass and dewatering systems.

1. The Contractor shall have redundant bypass pumps, generator and pipe on site, manifold, connected and ready to operate immediately.
2. The Contractor shall have standby pumps on site for 100% redundancy of the bypass system design flow or Peak Flow, whichever is greater.
3. Standby pumps shall be plumbed, fueled and operational at all times.
4. The Contractor shall maintain on site a sufficient number of valves, tees, elbows, connections, tools, sewer plugs, piping, and other parts or system hardware to ensure immediate repair or modification of any part of the system as necessary.
5. In order to determine bypass pipe capacity, the Contractor shall use a maximum velocity of 10 feet/second.
   * 1. All pumps, generators and other equipment shall be placed on a new containment unit to protect against spills of petroleum products used by the equipment.
     2. Odor control during bypass operations shall be in accordance with Section 696 “Environmental Control Sanitary Sewer Rehabilitation”.

**CONSTRUCTION**

**695.03.01 AVAILABLE FLOW DATA**

A Estimated flow data for the sewers to be rehabilitated in the project sites, if available, is located on the Plans.

B. Flow data for service laterals, when available, is shown on the Plans.

C. The Contractor shall determine flow data not available or not shown.

D. It is anticipated that the work may be performed during the months when the Las Vegas valley experiences monsoon seasonal rain events.

1. It is likely that these events will influence the quantity of flow in the sewer lines.
2. Evidence exists suggesting that the sewer lines proposed for rehabilitation have flowed full in the past. The Contractor must consider this possibility when planning his diversion operations.

**695.03.02 OPERATIONS**

A. In areas where flows are bypassed, all bypass flows shall be discharged as approved by the Engineer.

B. No bypassing to the ground surface, receiving waters, storm drains, or bypassing which results in soil or groundwater contamination or any potential health hazards shall be permitted.

C. In the event of any sewage spill the Contractor will be responsible for the prompt cleanup and disinfecting of the spill as called for in his spillage cleanup plan. The Contractor is required to immediately notify the Owner in the event of any sewage spill per the emergency response plan.

D. The Contractor shall compensate the Owner for the cost of any fines levied as the result of a spill or unauthorized discharge.

**695.03.03 LEAKAGE TESTING AND INSPECTION**

1. The bypass pumping system shall be tested prior to being placed in service to insure there are no leaks.

B. The testing procedure shall be as follows:

1. The test shall run for a period of 24 hours.
2. The Contractor shall fill the line with water.
3. The line shall be sealed on the discharge end.
4. The Contractor shall pressurize the line to twice the maximum pressure of the system or 50 psi whichever is greater.
5. The Contractor shall walk the line every hour and keep a log of the findings.The line may be put in service if after the 24 hour period the pressure has been maintained and there are no observable leaks.
6. The Contractor shall inspect the entire bypass pumping and piping system for leaks or spills on an hourly basis.
7. For internal pipeline bypasses, the Contractor will inspect plugs and/or other diversion methods (gates, stop logs, etc) to ensure seal on a daily basis. The Contractor will also inspect the next 3 manholes on the bypass pipeline downstream of the internal diversion location during peak flow timeframe to ensure no surcharging is occurring on a daily basis. The Owner may require additional inspection further downstream in the bypass pumping plan.
8. The Contractor shall create an inspection log and shall enter the time of the inspections, the condition of the piping, and the name of the inspector into the log for review by the Engineer.

**695.03.04 DISMANTLING OF BYPASS PUMPING SYSTEM**

1. The bypass pumping system shall be cleaned and disinfected prior to being dismantled.
2. The Contractor shall alternate flushing and purging of the system to remove all loose material.
3. After the Contractor has cleaned the pipe, and prior to dismantling of the piping, the Contractor shall disinfect the pipe with 10% chlorine and water solution.

B. Disturbed Areas: Upon completion of bypass pumping operation, clean disturbed areas, restoring to original condition, including, but not limited to, pavement restoration, restoration of the striping and traffic control devices, landscaping, and private property improvements restoration, at least equal to that which existed prior to start of Work.

**695.03.05 SCHEDULING**

A. The bypassing system shall not be shut down between shifts, on holidays or weekends, or during work stoppages without written permission from the Engineer.

B. The bypass system shall have a trained and qualified attendant 24 hours per day, 7 days per week, whose only duty is to maintain the bypass pumping system until the bypassing of the specific pipeline is no longer required. The attendant shall be qualified to both operate and repair any and all problems that may occur.

C. The attendant shall have a cellular phone for communication between the Engineer, Owner, and the site in the event of emergencies. The cellular phone number shall be provided to the Engineer at the beginning of the project.

**695.03.06 FLOW CONDITIONS**

A. The Contractor is responsible for intercepting the flows at locations suitable to achieve the goal of dewatering the sewer lines scheduled for work.

B. The Owner may allow diversion of sewer flow that will reduce the amount entering the system.

1. The Contractor shall obtain permits from the Owner in order to install plugs and pumps and other equipment at specified locations to accomplish the diversions.
2. Flow values shown on the Plans reflect monitored or estimated flow.

**METHOD OF MEASUREMENT**

**695.04.01 MEASUREMENT**

The quantity of DIVERSION OF SEWAGE FLOW will be measured by lump sum.

The quantity of [FILL IN ITEM DESCRIPTION] will be measured per [UNIT].

No direct measurement shall be made for [FILL IN ITEM DESCRIPTION].

**BASIS OF PAYMENT**

**695.05.01 PAYMENT**

The accepted quantity of DIVERSION OF SEWAGE FLOW will be paid for at the contract unit price of lump sum and shall include all materials, equipment, labor and personnel necessary to dewater the sewer lines for the selected rehabilitation work, reliable, and operational system including, but not limited to, preparation of a bypass pumping plan; plugging sanitary sewer lines, temporary pumping of sewage; providing (as necessary) and closing stop logs and/or valves wherever applicable; furnishing, installing, testing, operating and maintaining bypass pumps and pump lines including spares, moving, handling and reinstalling pumps and lines as required to facilitate the construction; cleaning and disinfecting of piping prior to dismantling; maintaining storm flow to existing drop inlets; installation; excavation (regardless of depth); shoring; dewatering; backfill; aggregate base materials; granular backfill; select backfill; compaction; concrete; reinforcing steel; grout; removal; and restoration of pavement; plantmix bituminous surface; tack and prime coat; permanent and temporary patch; traffic striping, pavement markings, and curb markings; pavement markers; temporary pavement striping tape; repair damaged landscaping; repair of damaged irrigation system; private property improvements restoration; removal and reinstallation of existing manhole components; maintenance and restoration of trenches; sleeves and appurtenant facilities; handling all sewage not diverted; providing odor control; replace damaged traffic loops; repair or replace damaged existing utilities; disposal of all excess unsuitable material including disposal fees and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer. No additional payment will be made for multiple diversion operations.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

Unless otherwise provided in the Special Provisions, no payment will be made for [FILL IN ITEM DESCRIPTION] as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which [FILL IN ITEM DESCRIPTION] is required.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 695.0000 | DIVERSION OF SEWAGE FLOW | LS |

**END OF SECTION 695**

***ADD THE FOLLOWING SECTION TO DIVISION II – CONSTRUCTION DETAILS***

SECTION 696 – ENVIRONMENTAL CONTROL SANITARY SEWER REHABILITATION

**DESCRIPTION**

**696.01.01 GENERAL**

A. The Contractor shall provide and maintain methods, equipment, and temporary construction, as necessary to provide controls over environmental conditions at the construction site and adjacent areas.

B. The Contractor shall remove physical evidence of temporary facilities at completion of work.

C. Raw sewage releases are not permitted. The Contractor shall be responsible for all consequences and damages caused by the overflow due to the Contractor’s work activities.

D. Contractor shall give both verbal and written notification to the Engineer immediately in the event of any sewage spill and written notification within 4 hours.

**CONSTRUCTION**

**696.03.01 TRAFFIC CONTROL**

A. The Contractor shall select its transportation routes for hauling materials, equipment, or imported products based on the existing condition of the pipelines and impacts on local traffic and the work being performed. The transportation routes shall be documented in a traffic control plan.

B. All streets, traffic ways, and sidewalks shall be kept open in a safe manner for the passage of traffic and pedestrians during the construction period unless otherwise approved by the Engineer.

C. When required to cross, obstruct or close a street, traffic way, or sidewalk for a short duration that is approved by the Engineer, the Contractor shall provide and maintain suitable bridges, detours or other approved temporary routes for the accommodation of vehicular and pedestrian traffic. Closings shall be for the shortest time practical, and passage shall be restored immediately after completion of construction.

D. Contractor shall give the Engineer 24 hours advance notice of his proposed operations within any public right-of-ways and temporary roadway closings.

E. Contractor shall provide signs, signals, barricades, flares, lights and all other equipment, service and personnel required to regulate and protect all traffic, and warn of hazards.

1. All such work shall conform to requirements of the Contracting Agency having jurisdiction and the MUTCD.
2. Remove temporary equipment and facilities when no longer required and restore grounds to original condition, or condition specified by the Engineer.

F. The Contractor shall provide a Traffic Control Plan and implement traffic control around all work as part of this contract in accordance with Section 624 “Accommodations for Public Traffic”.

**696.03.02 ODOR CONTROL**

A. The Contractor shall employ methods and procedures that mitigate the generation and discharge of objectionable odors to the surface environment at all times as described below.

1. Chemical containment shall be provided for all chemicals.
2. Contractor shall provide minimum of two (2) chemical feed pumps (one primary and one backup) sized to provide constant dosing at chemical manufacturer’s recommended rates.
3. When possible, the Contractor shall add ferric chloride from a location upstream that will allow 10 to 15 minutes reaction time before the flow enters the work area.

a. If upstream sewage stream is within a private system, permission must be granted from system owner for chemical dosing.

b. Contractor is responsible for gaining permission from system owner of private system and all associated costs.

1. The chemical dosing shall reduce odors generated from the wastewater stream to an undetectable level.
2. If this is not accomplished by adding the ferric chloride only, additional control is required.

a. The Contractor shall add hydrogen peroxide downstream to the flow that has been dosed with ferric chloride. The chemical dosing rate shall be as recommended by the manufacturer.

b. When possible, the hydrogen peroxide shall be added to allow a 5-minute reaction time before flow enters the work area. The chemical dosing rate shall be as recommended by the manufacturer.

i. If upstream sewage stream is within a private system, permission must be granted from system owner for chemical dosing.

ii. Contractor is responsible for gaining permission from system owner of private system and all associated costs.

1. Contractor shall maintain the MSDS certifications on-site for each chemical.
2. All manufacturer recommended piping, valves and safety equipment necessary for successful completion of the work and safety of personnel shall be provided by the Contractor.
3. Additional odor control considerations are covered in section 697 “Styrene Controls”.

**696.03.03 ODOR CONCENTRATION MONITORING**

1. It shall be the responsibility of the Contractor to continuously measure wastewater streams and headspace odorant concentrations to provide sufficient equipment, chemicals and labor to control odors generated by the sewer rehabilitation work. The initial measurements taken by the Contractor shall include but not be limited to: BOD, liquid stream temperature, street level hydrogen sulfide, liquid stream pH, and time and date.
2. In addition to initial monitoring and during the first week of each new flow bypassing setup the Contractor shall monitor each of the above parameters at least four (4) times daily (minimum of 4 hours required between monitoring), and during subsequent weeks monitoring during the peak daily flow will be required.
3. The Engineer reserves the right to request monitoring data at any time. Odor control monitoring logs shall be submitted to the Engineer on a monthly basis. Additional odor concentration monitoring considerations are covered in section 697 “Styrene Controls”.

**696.03.04 CHEMICAL FEED SITE REQUIREMENTS**

1. Chemical Feed Site requirements shall include temporary chemical feed locations which add chemicals directly to the sanitary sewer flows. This may include multiple chemical addition locations along the pipelines being rehabilitated. Chemical manufacturer’s recommended safety equipment shall also be included to provide adequate protection to contracting personnel and the local community. Sufficient safeguards shall be provided to prevent tampering with stored chemicals at each feed site.
2. When possible, the Contractor shall add the chemical from an upstream location that will allow proper reaction time, as specified herein or recommended by the manufacturer, before the flow enters the Work area. Each feed site shall be capable of delivering adequate amounts of chemical to maintain headspace hydrogen sulfide concentrations at the bypass location to an average of not more than 10 PPM. One chemical feed pump shall be used as a primary pump, with the second chemical feed pump as backup in the event of failure of the first chemical feed pump. The Contractor shall adjust the liquid feed rate as field conditions warrant and as recommended by the chemical manufacturer in order to reduce hydrogen sulfide-related odors to the concentration specified in this Section.

**METHOD OF MEASUREMENT**

**696.04.01 MEASUREMENT**

No measurement will be made for Environmental Control Sanitary Sewer Rehabilitation.

The quantity of [FILL IN ITEM DESCRIPTION] will be measured per [UNIT].

No direct measurement shall be made for [FILL IN ITEM DESCRIPTION].

**BASIS OF PAYMENT**

**696.05.01 PAYMENT**

Unless otherwise provided in the Special Provisions, no payment will be made for Environmental Control Sanitary Sewer Rehabilitation as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which such Environmental Control Sanitary Sewer Rehabilitation is required.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

Unless otherwise provided in the Special Provisions, no payment will be made for [FILL IN ITEM DESCRIPTION] as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which [FILL IN ITEM DESCRIPTION] is required.

END OF SECTION 696

***ADD THE FOLLOWING SECTION TO DIVISION II – CONSTRUCTION DETAILS***

SECTION 697 – STYRENE ENVIRONMENTAL CONTROL

**DESCRIPTION**

**697.01.01 GENERAL**

1. The Contractor shall provide and maintain methods, equipment, and temporary construction, as necessary to provide monitoring and controls for styrene emissions at the construction site and adjacent areas.
2. Reference:

OSHA Standard Subpart H (1910.106) Flammable Liquid Storage and Dispensing Operations of Polyester Resin

OSHA Standard 1910 Subpart Z (1910.1000) Air contaminants

OSHA Standard 1926 Subpart D Gases, Vapors, Fumes, Dusts and Mists

1. A minimum of 72 hours prior to the work on any manhole, cleanout, service lateral, or line segment, Contractor to distribute a door-to-door Owner approved Homeowner Notification door hanger describing the work to be performed, if the property is potentially tied to the section of line where work is being performed, based upon information provided by the Owner and site pre-inspection.
2. The Contractor shall include information regarding the potential for styrene odors from the work in the notifications as specified above. The notification should list the potential causes of odors such as sewer gases (hydrogen sulfide), and chemical emissions (styrene).

**CONSTRUCTION**

**697.03.01 STYRENE ODOR CONTROL**

A. The Contractor shall employ methods and procedures that mitigate the generation and discharge of objectionable odors from styrene emissions to the atmosphere at all times.

1. All manufacturer recommended procedures and safety equipment necessary for successful completion of the work and safety of personnel shall be provided by the Contractor.

B. The Contractor shall employ methods and procedures to monitor and mitigate releases of styrene emissions to the atmosphere. The current published exposure standard for styrene monomer is a Time Weighted Average (TWA) of 50 Parts Per Million (ppm) with a Short-Term Exposure Limit (STEL) of 100 ppm.

C. Photoionization detectors (PID), colorimetric gas detection tubes or approved equal can be utilized to assess styrene atmospheric levels, applied in accordance with manufacturer recommendations. All equipment used shall be classified for styrene detection. If required, all equipment shall be calibrated as indicated and as often as required by the manufacturer. For monitoring variations in exposure, equipment that records and stores the styrene concentration is required. Contractor shall reference current published exposure limit and recommendations at time of work being performed. Reference OSHA Standards listed in 700.01.01 General A.

1. The CIPP process shall follow manufacturer’s recommendations to minimize release of styrene odors.
2. The Contractor can submit for approval the use of styrene free vinyl ester resin in place of the polyester resin for the project. The use of this resin would not require monitoring specified in this Section.
3. The Contractor shall manage the site with good housekeeping practices, including prevention measures and clean-up procedures from spills, drips or other incidents during the CIPP process.
4. The ambient air at the liner truck or storage unit and each manhole or access point shall be monitored throughout the installation, curing and cool down processes to confirm levels are less than the current published voluntary occupational limit of 50 ppm for TWA and time of exposure. Onsite mitigation methods (in accordance with OSHA Standard 1926, Subpart D) and personal protective equipment to protect against inhalation (in accordance with OSHA Standard 1910) shall be implemented should levels reach or exceed this limit.
5. Prior to the installation of the liner the Contractor shall contact property owners to request that water is run in all drain systems to ensure p-traps are not dry and vents are not blocked to prevent migration of odors into the property. Contractor is not obligated to confirm property owners comply with this request.
6. In addition to notification of property owners with connections to the segment being rehabilitated, the Contractor shall provide notification of property owners upstream and downstream for 250 feet to inform them of the potential for odors.
7. Notification of property owners regarding the work shall include information on the potential smell from styrene odors. Contractor to provide monitoring if requested by property owner to confirm the atmospheric reading for styrene is less than currently published exposure limit of 50 ppm TWA and time of exposure.
   1. Work around childcare facilities and schools requires coordination of construction schedules to limit installation to after school hours or provide air monitoring inside the school or facility.
   2. Work around hospitals, nursing homes and emergency care facilities requires coordination with facility staff to take precautions to ensure odors do not migrate up lateral connections. This can include verifying water has been run through drains prior to installation of the liner.
8. The Contractor shall not release water until the curing water temperature has cooled to a specified temperature (typically 100o F, or as required by treatment operations) prior to discharge of cooled water.
9. For small diameter sewers, 8-inch diameter and less, the discharge of cure water shall be regulated to provide adequate dilution of the process cure water to minimize impact on the Treatment Plant.
10. For water cured liners, the Contractor shall monitor the downstream manholes for styrene odors during the discharge of the process cure water.
11. Methodologies to mitigate styrene odors during the CIPP process may include:
    1. An extended cool down period to achieve cooler process water discharge temperatures of 100o F or less.
    2. The approved venting measures with the use of fans/blowers at the access points to disperse emissions and mitigate resulting odors.
12. Results of monitoring shall be recorded in a log electronically that includes information such as but not limited to: concentration, location of sample, date and time.

**697.03.03 ODOR CONCENTRATION AIR MONITORING**

1. It shall be the responsibility of the Contractor to continuously measure wastewater streams headspace odorant concentrations and atmospheric conditions to provide sufficient equipment, chemicals and labor to control styrene odors generated by the sewer rehabilitation work and ensure a safe working environment in accordance with OSHA standards listed in 700.01.01 General A. The initial styrene concentration measurements, to establish baseline atmospheric conditions, taken by the Contractor prior to beginning the CIPP work shall be recorded and results provided to the Engineer.
2. Monitoring of exposure limits (parts per million and time) for VOC (volatile organic compound) emissions shall be in accordance with published regulatory guidelines from the Environmental Protection Agency (EPA), the National Institute for Occupational Safety and Health (NIOSH) and the Occupational Safety and Health Administration (OSHA).
3. For styrene, air monitoring should be performed at the initial opening of the liner truck or storage unit door, and at both liner installation and finish access points, to ensure a safe work environment for those entering the liner truck or storage unit and working around the installation and exit points, with monitoring continuously performed throughout the rehabilitation process.
4. To limit exposure to styrene emissions for workers, at the initial opening of the liner transport truck or storage unit door, suitable Personal Protection Equipment (PPE) in accordance with OSHA Standard – 1910 should be worn by persons immediately entering the truck or storage unit throughout the liner rehabilitation process. Barriers should be placed around the liner truck or storage unit as a precaution to indicate that these areas are typical for higher concentrations of styrene.
5. In addition to initial monitoring and during the first day of each new flow bypass setup the Contractor shall monitor styrene levels a minimum of four (4) times daily (minimum of 4 hours required between monitoring).
6. The Engineer reserves the right to request monitoring data at any time. Engineer shall be notified immediately of any property owner odor complaints and provided copies of monitoring of the property. Styrene Odor control and air monitoring logs shall be submitted to the Engineer on a weekly basis and prior to completion of the segment.
7. Contractor shall notify the City immediately when monitored levels exceed the published exposure limit of 50 ppm (TWA) and/or 100 ppm (SEL). Once a level exceeding published exposure limits is logged, Contractor shall implement onsite mitigation methods (in accordance with OSHA Standard 1926, Subpart D) and personal protective equipment to protect against inhalation (in accordance with OSHA Standard 1910) shall be implemented for all onsite employees.
8. In the event that styrene related odors become an issue as it relates to the public, masking agents employed by the contractor and approved by the City and/or Engineer shall be implemented, only after confirming the logged exposure limit has not been reached and/or exceeded at any monitoring location throughout the CIPP process.

**METHOD OF MEASUREMENT**

**697.04.01 MEASUREMENT**

No measurement will be made for Styrene Environmental Control Sanitary Sewer Rehabilitation. Compliance with this specification shall be considered subsidiary to the project work.

**BASIS OF PAYMENT**

**697.05.01 PAYMENT**

Unless otherwise provided in the Special Provisions, no payment will be made for Styrene Environmental Control Sanitary Sewer Rehabilitation as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which such Styrene Environmental Control Sanitary Sewer Rehabilitation is required.

END OF SECTION 697

ADD THE FOLLOWING SECTION TO DIVISION II – CONSTRUCTION DETAILS

SECTION 699 - SITE FURNISHINGS

**DESCRIPTION**

**699.01.01 GENERAL**

A. This special provision covers the quality and kind of materials to be used in the installation of:

1. Removable Bollards
2. Street Benches
3. Trash Receptacles
4. Basketball Goals
5. LIST MORE AS NEEDED

**MATERIALS**

**699.02.01 REMOVABLE BOLLARDS**

A. Removable Bollards shall be a Fair Weather, Urban Systems, Inc. Model number B-1, 4-inches by 36-inches with receiver lock and cover; color shall be forest green or approved equal.

**699.02.02 STREET BENCHES**

B. Street Benches shall be concrete benches per Model #QI-VIC-84B, smooth finish with gloss sealer by Quick Crete products (1-909-737-6240) or approved equal. Benches shall be glued down with epoxy.

**699.02.03 TRASH RECEPTACLES**

C. Trash Receptacles shall be concrete trash receptacles per Model #QS-PS2532W-A21, smooth stained concrete with standard gloss sealer, cast and painted “City of Las Vegas” text (script letter, 2-1/2 inches high, one side only) Steel lids including cable and bolts, Q-GL27 galvanized 30 gallon liner, with standard 2 inch diameter drain hole by Quick Crete products (1-909-737-6240) or approved equal. Trash Receptacles shall be glued down with epoxy.

**699.02.04 BASKETBALL GOALS**

Basketball goals shall be comprised of the following components:

1. Post: Minimum 5-9/16 inches outside diameter (OD), 16 ft. high galvanized steel pipe. Heavy-duty 6 ft. extension frame, welded construction of 1-5/8 inches OD pipe. All pipe to be Schedule 40. Extension frame is to have a minimum of two braces with 6 bolts per brace.
2. Backboard: Regulation steel fan 35 inches x 54 inches, ¼ inch steel plate, hot dipped galvanized.
3. Goal Ring: L. A. Steelcraft Model 600 Double Ring Goal or approved equal. Rims to be set at 10 feet from surface.
4. Nylon net: The contractor shall lace the net onto the rim.

**699.02.05 PRODUCT DATA**

A. The Contractor shall submit within seven calendar days after receipt of Notice to Proceed, five complete sets of the material and equipment submittals, including Manufacturer’s name and address; specific trade names; catalog and model numbers; illustrations and descriptive material, clearly marked as to proposed items for approval by the Owner’s representative.

B. Approval of the submittal shall be the Contractor’s authorization to order the required material(s).

C. There will be no deviation from the approved submittals without the written authorization of the Owner’s representative.

**CONSTRUCTION**

**699.03.01 BLANK**

**METHOD OF MEASUREMENT**

**699.04.01 MEASUREMENT**

The quantity of [FILL IN ITEM DESCRIPTION] will be measured per [UNIT].

No direct measurement shall be made for [FILL IN ITEM DESCRIPTION].

**BASIS OF PAYMENT**

**699.05.01 PAYMENT**

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

Unless otherwise provided in the Special Provisions, no payment will be made for [FILL IN ITEM DESCRIPTION] as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which [FILL IN ITEM DESCRIPTION] is required.

All pay items will be in accordance with Subsection 109.02, Scope of Work.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 699.0010 | STREET BENCH | EA |

END OF SECTION 699

SECTION 703 – BITUMINOUS MATERIALS

**PHYSICAL PROPERTIES AND TESTS**

***DELETE TABLES 7, 8, AND 9 AND REPLACE WITH THE FOLLOWING:***

| **TABLE 7**  **UNIFORM PACIFIC COAST SPECIFICATIONS FOR CATIONIC EMULSIFIED ASPHALT** | | | | | | | | | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Test** | **Test Method** | | **Rapid Setting** | | | | | **Medium Setting** | | | | | | **Slow Setting** | | | | **Quick Setting6** | |
| **AASHTO** | **ASTM** | **CRS-1** | | **CRS-2** | | | **CMS-2S** | | **CMS-2** | | **CMS-2h** | | **CSS-1** | | **CSS-1h** | | **CQS-1h** | |
| **Min.** | **Max.** | **Min.** | | **Max.** | **Min.** | **Max.** | **Min.** | **Max.** | **Min.** | **Max.** | **Min.** | **Max.** | **Min.** | **Max.** | **Min.** | **Max.** |
| **Test on Emulsions** | | | | | | | | | | | | | | | | | | | |
| Viscosity SSF @ 77°F, sec. | T59 | D88 | -- | -- | | -- | -- | -- | -- | -- | -- | -- | -- | 20 | 100 | 20 | 100 | 20 | 100 |
| Viscosity SSF @ 122°F, sec. | T59 | D88 | 20 | 100 | | 100 | 400 | 50 | 450 | 50 | 450 | 50 | 450 | -- | -- | -- | -- | -- | -- |
| Settlement, 5 days, %1 | T59 | D244 | -- | 5 | | -- | 5 | -- | 5 | -- | 5 | -- | 5 | -- | 5 | -- | 5 | -- | 5 |
| Storage Stability, 1 day2 | T59 | D244 | -- | 1 | | -- | 1 | -- | 1 | -- | 1 | -- | 1 | -- | 1 | -- | 1 | -- | 1 |
| Demulsibility, 35 ml 0.8% sodium dioctyl sulfosuccinate, %3 | T59 | D244 | 40 | -- | | 40 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Coating Ability/Water Resistance: | T59 | D244 | -- | -- | | -- | -- | -- | -- | -- | -- |  |  | -- | -- | -- | -- | -- | -- |
| Coating, dry aggregate | -- | -- | | -- | -- | Good | -- | Good | -- | Good | -- | -- | -- | -- | -- | -- | -- |
| Coating, after spraying | -- | -- | | -- | -- | Fair | -- | Fair | -- | Fair | -- | -- | -- | -- | -- | -- | -- |
| Coating, wet aggregate | -- | -- | | -- | -- | Fair | -- | Fair | -- | Fair | -- | -- | -- | -- | -- | -- | -- |
| Coating, after spraying | -- | -- | | -- | -- | Fair | -- | Fair | -- | Fair | -- | -- | -- | -- | -- | -- | -- |
| Particle Charge Test | T59 | D244 | Positive | | | Positive | | Positive | | Positive | | Positive | | Positive5 | | Positive5 | | Positive | |
| Sieve Test, % | T59 | D244 | -- | 0.10 | | -- | 0.10 | -- | 0.10 | -- | 0.10 | -- | .10 | -- | 0.10 | -- | 0.10 | -- | 0.10 |
| Cement Mixing Test, % | T59 | D244 | -- | -- | | -- | -- | -- | -- | -- | -- | -- | -- | -- | 2.0 | -- | 2.0 | -- | -- |
| **Distillation** | | | | | | | | | | | | | | | | | | | |
| Oil Distillate by volume of emulsion, % | T59 | D244 | -- | 3 | | -- | 3 | -- | 20 | -- | 12 | -- | 12 | -- | -- | -- | -- | -- | -- |
| Asphalt Residue, % | T59 | D244 | 60 | -- | | 65 | -- | 60 | -- | 65 | -- | 65 | -- | 57 | -- | 57 | -- | 65 | -- |
| Asphalt Residue, % Microsurfacing | T59 | D244 | 60 | -- | | 65 | -- | 60 | -- | 65 | -- | 65 | -- | 57 | -- | 57 | -- | 65 | -- |
| **Tests on Residue from Distillate Test**4 | | | | | | | | | | | | | | | | | | | |
| Penetration, 77°F, 100g, 5sec. | T49 | D5 | 100 | 250 | | 100 | 250 | 100 | 250 | 100 | 250 | 40 | 90 | 100 | 250 | 40 | 90 | 35 | 50 |
| Ductility, 77°F, 5cm/min., cm | T51 | D113 | 40 | -- | | 40 | -- | 40 | -- | 40 | -- | 40 | -- | 40 | -- | 40 | -- | 40 | -- |
| Solubility in Trichloroethylene, % | T44 | D2042 | 97.5 | -- | | 97.5 | -- | 97.5 | -- | 97.5 | -- | 97.5 | -- | 97.5 | -- | 97.5 | -- | 97.5 | -- |
| Softening Point | T53 | D36 |  |  | |  |  |  |  |  |  |  |  |  |  |  |  | 135 | |

1 The test requirement for settlement may be waived when the emulsified asphalt is used in less than 5 days time; or the purchaser may require that the settlement test be run from the time the sample is received until it is used, if the elapsed time is less than 5 days.

2 The 24 hour (1 day) storage stability test may be used instead of the 5 day settlement test.

3 The demulsibility test shall be made within 30 days from date of shipment.

4 A harder base asphalt meeting current paving asphalt specifications may be specified with the provision that the test requirements on the Residue from Distillation be waived.

5 Must meet a pH requirement of 6.7 maximum (ASTM E 70) if the Particle Charge Test result is inconclusive. 3

6 Does not apply to polymer modified emulsion

|  |  |  |
| --- | --- | --- |
| **SPECIFICATION FOR SLURRY SEAL MIX**  **TABLE 8** | | |
| **TEST ON MIXTURE**  Residual Asphalt, % of dry wt. of aggregate  Consistency, flow  Wet Cohesion, 30 minute set  Wet Cohesion, 60 minute set  Set Time, 30 minutes  Excess Asphalt by LWT & Sand Adhesion  Wet Stripping, % coating  Wet track Abrasion (6-day soak)  Wet track Abrasion (1-hour soak)  System Compatibility  Mix time @ 77°F  Mix time @ 104°F | **TEST METHOD**  ASTM D3910/ISSA T106  ISSA T139  ISSA T139  ASTM D3910  ASTM T109  ASTM T114  ASTM D3910/ISSA T100  ASTM D3910/ISSA T100  ISSA T115  ASTM D-3910/ISSA T113  ASTM D-3910/ISSA T113 | **REQUIREMENTS**  8.8 - 13.5  2 - 3 cm  12 -13 kg/cm  20 - 21 kg/cm  Negative  50 g/ft² max.  90 min.  75 g/ft² max.  75 g/ft² max.  pass  Controllable to 180  sec minimum  Controllable to 180  sec minimum |

|  |  |  |
| --- | --- | --- |
| **SPECIFICATION FOR MICRO-SURFACING MIX**  **TABLE 9** | | |
| **TEST ON MIXTURE**  Residual Asphalt, % of dry wt. of aggregate  Wet Cohesion, 30-minute set  Wet Cohesion, 60-minute set  Excess Asphalt by LWT & Sand Adhesion  Wet Stripping, % coating  Wet track Abrasion (6-day soak)  Wet track Abrasion (1-hour soak)  Mix time @ 77°F  Mix time @ 104°F  Lateral Displacement  Classification Compatibility | **TEST METHOD**  ISSA T139  ISSA T139  ISSA T109  ISSA T114  ASTM D3910/ISSA T100  ASTM D3910/ISSA T100 ASTM D3910/ISSA T113  ASTM D3910/ISSA T113  ISSA T147  ISSA T144 | **REQUIREMENTS**  6.5 - 9.5  12 kg/cm  20 kg/cm  50 g/ft² max.  90 min.  75 g/ft² max.  50 g/ft² max.  Controllable to 120  sec minimum Controllable to 120  sec minimum  5% Max.  (AAA, BAA) 11 grade points minimum |

***ADD THE FOLLOWING TO THIS SUBSECTION:***

**703.03.08 RUBBER-ASPHALT CRACK SEALANT**

A. The material shall pour readily over its specified application temperatures and penetrate a ¼ inch minimum width crack for the entire ambient temperature range recommended by the manufacturer for application of the material.

B. The product shall cure sufficiently within 30 minutes of application, over the manufacturer’s recommended ambient temperature range for use, to allow normal traffic without tracking or pullout.

C. The crack sealant shall conform to the requirements of Table 7

D. The Contractor shall submit test data for each lot of material delivered, in writing, verifying conformance with the listed materials specifications. The Contractor, at his own expense, shall have one sample tested by an acceptable independent testing laboratory. This samples shall be taken at a time and location designated by the Engineer.

***ADD THE FOLLOWING TABLE:***

|  |  |  |
| --- | --- | --- |
| **TABLE 11 – RUBBER ASPHALT CRACK SEALANT** | | |
| **Test** | **Test Method** | **Requirements** |
| Ductility | ASTM D113 | 77° F, 5 cm/minute, 30 cm minimum |
| Penetration | ASTM D5 | 77° F, 150 g/5 second, 40 maximum |
| Resilience | ASTM D5329 | 77° F, 30% minimum |
| Flow | ASTM D5329 | 3 mm @ 140° F maximum |
| Softening Point | ASTM D36 | 210° F minimum |

**GENERAL REQUIREMENTS:**

1. Weight per gallon at 77° F, not to exceed 10.3 pounds

2. Flexibility 1 inch mandrel, bend 90 degrees, conditioned to 20° F, time to bend = 2 seconds. (1/8 inch by 1 inch by 4 inch long sample)

END OF SECTION 703

SECTION 705 – AGGREGATES FOR BITUMINOUS COURSES

**REQUIREMENTS**

**PHYSICAL PROPERTIES AND TESTS**

**705.03.04 COMMERCIAL MINERAL FILLER**

***DELETE TABLE 5 AND REPLACE WITH THE FOLLOWING:***

|  |  |  |
| --- | --- | --- |
| **TABLE 5 – MINERAL FILLER AGGREGATE GRADATION** | | |
| **Property** | **Test Method** | **Specification** | |
| Sand Equivalent | AASHTO T176/  ASTM D2419 | 60 Minimum for Slurry and  65 Minimum for Microsurfacing | |
| Plasticity Index | ASTM D 4318 | NP | |
| Soundness, % | AASHTO 104/  ASTM C88 | 15 Maximum (using NA2SO4) | |
| Abrasion Resistance, % | AASHTO T96/  ASTM C131 | 30 Maximum. The abrasion shall be run on the aggregate before it is crushed. | |

**705.03.06 SAND BLOTTER**

***DELETE TABLE 12 aND REPLACE WITH THE FOLLOWING:***

|  |  |  |
| --- | --- | --- |
| **TABLE 12 - ISSA, TYPE III GRADATION** | | |
| **Sieve Size** | **Mix Design Range (Percent By Weight Passing Each Sieve)** | **Stockpile Tolerance** |
| 3/8-inch | 100 | 0 |
| No. 4 | 70 - 90 | ±5% |
| No. 8 | 45 - 70 | ±5% |
| No. 16 | 28 - 50 | ±3% |
| No. 30 | 19 - 34 | ±3% |
| No. 50 | 12 - 25 | ±3% |
| No. 100 | 7 - 18 | ±2% |
| No. 200 | 5 - 15 | ±2% |

END OF SECTION 705

SECTION 714 – PAINT AND PAVEMENT MARKINGS

**REQUIREMENTS**

**714.02.01 CERTIFICATIONS**

***DELETE PARAGRAPH “C” OF THIS SUBSECTION AND REPLACE WITH THE FOLLOWING:***

1. Manufacturer’s lab test results must be supplied upon request of the Engineer. No pavement marking material shall be used which is not on the Qualified Products List established by the Nevada Department of Transportation.

ADD THE FOLLOWING SUBSECTION:

**714.03.15 PREFORMED THERMOPLASTIC PAVEMENT MARKINGS**

* + 1. A durable, high skid resistant, retroreflective pavement marking material suitable for use as interstate shields, route shields, bike path, roadway, intersection, airport, commercial or private pavement delineation and markings.
       1. The markings must be a resilient white, yellow or other color thermoplastic product, with uniformly distributed glass beads throughout the entire cross sectional area. The markings must be resistant to the detrimental effects of motor fuel, lubricants, hydraulic fluids etc. Lines, legends and symbols are capable of being affixed to bituminous and/or Portland cement concrete pavements by the use of the normal heat of a propane torch.
       2. The markings must be capable of conforming to pavement contours, breaks and faults through the action of traffic at normal pavement temperatures. The markings shall have resealing characteristics, such that is capable of fusing with itself and previously applied thermoplastic when heated with the torch.
       3. The markings shall not have a minimum ambient and road temperature requirements for application, storage, or handling.
    2. Manufacturing Control and ISO Certification: The manufacturer must be ISO 9001:2008 certified and provide proof of current certification. The scope of the certification shall include manufacture of reflective highway markings.
    3. Material: Must be composed of an ester modified rosin resistant to degradation by motor fuels, lubricants etc. in conjunction with aggregates, pigments, binders, abrasives, and glass beads which have been factory produced as a finished product, and meets the requirements of the current edition of the Manual on Uniform Traffic Control Devices for Streets and Highways. The thermoplastic material conforms to AASHTO designation M249, with the exception of the relevant differences due to the material being supplied in a preformed state.
       1. Graded Glass Beads:
          1. The material must contain a minimum of thirty percent (30%) intermixed graded glass beads by weight. The intermixed beads shall conform to AASHTO designation M247, with minimum 80% true spheres and the index of refraction shall not be less than 1.50.
          2. The material must have factory applied coated surface beads and abrasives in addition to the intermixed beads at a rate of 1 lb. (± 10%) per 10 sq. ft. These factory applied coated surface beads shall meet the following gradation:

|  |  |  |  |
| --- | --- | --- | --- |
| Size Gradation | | Retained % | Passing % |
| US Mesh | Um |
| 12 | 1700 | 0-2% | 98-100% |
| 14 | 1400 | 0-6% | 94-100% |
| 16 | 1180 | 2-25% | 75-98% |
| 18 | 1000 | 28-63% | 37-72% |
| 20 | 850 | 63-72% | 28-37% |
| 30 | 600 | 67-77% | 23-33% |
| 50 | 300 | 89-95% | 5-11% |
| 80 | 200 | 97-100% | 0-3% |

* + - 1. Pigments:
         1. White: The material shall be manufactured with sufficient titanium dioxide pigment to meet FHWA Docket No. FHWA-99-6190 Table 5 and Table 6 as revised and corrected.
         2. Red, Blue, and Yellow: The material shall be manufactured with sufficient pigment to meet FHWA Docket No. FHWA-99-6190 Table 5 and Table 6 as revised and corrected. The yellow pigments must be organic and must be heavy-metal free.
         3. Other Colors: The pigment must be heavy-metal free.
      2. Heating indicators: The top surface of the material (same side as the factory applied surface beads) shall have regularly spaced indents. These indents shall act as a visual cue during application that the material has reached a molten state so satisfactory adhesion and proper bead embedment has been achieved and a post-application visual cue that the installation procedures have been followed.
      3. Skid Resistance: The surface, with properly applied and embedded surface beads, must provide a minimum skid resistance value of 45 BPN when tested according to ASTM: E 303.
      4. Thickness: The material must be supplied at a minimum thickness of 90 mils (2.29mm).
      5. Retroreflectivity: The preformed retroreflective markings materials upon application shall exhibit adequate and uniform nighttime retroreflectivity when tested in accordance with ASTM # 1710. The applied material must have an initial minimum intensity reading of 500 mcd·m-2·lx-1 for white and 300 mcd·m-2·lx-1 for yellow as measured with a Delta pavement marking retroreflectometer

Note: Initial retroreflection and skid resistance are affected by the amount of heat applied during installation. When ambient temperatures are such that greater amounts of heat are required for proper installation, initial retroreflection and skid resistance levels may be affected.

* + - 1. Environmental Resistance: The material must be resistant to deterioration due to exposure to sunlight, water, salt or adverse weather conditions and impervious to oil and gasoline.
    1. Application
       1. Asphalt: The materials shall be applied using the propane torch method recommended by the manufacturer. The material must be able to be applied without minimum requirements for ambient and road temperatures and without any preheating of the pavement to a specific temperature. The material must be able to be applied without the use of a thermometer. The pavement shall be clean, dry and free of debris. Supplier must enclose application instructions with each box/package.
       2. Portland Concrete: The same application procedure shall be used as described under section D.1 above. However, a compatible primer sealer may be applied before application to assure proper adhesion.
    2. Packaging: The preformed thermoplastic markings shall be placed in protective plastic film with cardboard stiffeners where necessary to prevent damage in transit. Linear material must be cut to a maximum of 3-ft long pieces. Legends and symbols must also be supplied in flat pieces. The cartons in which packed shall be non-returnable and shall not exceed 40 inches in length and 25 inches in width, and be labeled for the ease of identification. The weight of individual carton must not exceed seventy (70) pounds. A protective film around the box must be applied in order to protect material from rain or premature aging.
    3. Handling: The preformed thermoplastic markings shall not be brittle and shall be sufficiently cohesive and flexible at temperatures exceeding 10°C (50°F) for one person to carry without danger of fracturing the material before installation.
    4. Technical Services: The successful bidder shall provide technical services as required.

END OF SECTION 714