BID FOR

NORTH TRUCKEE DRAIN REALIGNMENT PHASE 1

BID #13/14-007
PWP #WA-2014-011

BIDS DUE NOT LATER THAN: 1:45 PM ON NOVEMBER 20, 2013

PUBLIC BID OPENING: 2:00 PM ON NOVEMBER 20, 2013

[NOTE: TIME BIDS ARE DUE IS DIFFERENT FROM BID OPENING TIME]

431 PRATER WAY
P.O. BOX 857
SPARKS, NV 89432-0857

Company Name: _____

CITY OF SPARKS
NOTICE TO BIDDERS
NORTH TRUCKEE DRAIN REALIGNMENT PHASE 1
BID #13/14-007 / PWP #WA-2014-011

NOTICE IS HEREBY GIVEN that the City of Sparks, Nevada, will receive written sealed bids only, for the project listed above. Said bids must be in the hands of the Contracts and Risk Manager at 431 Prater Way, Sparks, Nevada, NO LATER THAN **1:45 PM ON NOVEMBER 20, 2013.** Bids postmarked prior to, but not received until after this deadline will not be accepted. Vendor bid response submittals may not be sent to the City of Sparks via the Internet/e-mail and will not be entertained for award by the City of Sparks. The right is reserved to reject any Bid/Proposal or to accept the Bid/Proposal which is deemed by the City of Sparks to be in the best interest of the City of Sparks. The City of Sparks reserves the right to waive any irregularities and/or informalities in the bid process.

All Bids are to be marked clearly on the outside. Bids will be opened and publicly read at **2:00 PM ON NOVEMBER 20, 2013**, at Sparks City Hall, 431 Prater Way Sparks, NV 89431.

PROJECT DESCRIPTION: Installation of 3,314 feet of 10'x14' parallel reinforced concrete box culvert; installation and relocation of sanitary sewer piping, lift station, and associated infrastructure; installation and relocation of storm drain piping and associated infrastructure; installation and relocation of water main and associated improvements; select demolition and replacement of utility service lines and conduits; excavation, backfilling and grading the site; placement of asphaltic pavement and concrete flatwork; traffic control; and other activities for a complete installation and site restoration.

PRE-BID MEETING: A non-mandatory pre-bid meeting will be held at 9:00AM on October 31, 2013 at Sparks City Hall (Downstairs Training Room); 431 Prater Way, Sparks, NV 89431.

BONDING/LICENSING: A Bid Bond in the amount of 5% of bid amount is required. This bid bond will function as a penalty in the event the successful bidder fails to enter into a written contract with the City in accordance with the bid documents. Additionally, the City will be entitled to actual damages, if any. Prospective bidders will be required to have a current Contractor's License under the Nevada State Law for the type of work specified herein.

The work to be performed under this Contract shall be commenced by the successful Bidder after all executed Contract documents have been submitted, and after being notified to proceed by the City of Sparks.

Bid documents and specifications may be obtained from the City of Sparks website. Please visit http://www.cityofsparks.us/bids to obtain complete bid documents. There is no cost to use the system or obtain plans, but registration at the site is required. It is the responsibility of all potential bidders/responders to monitor the Purchasing Division's website for any changing information prior to submitting their bid/proposal. The City of Sparks will not be responsible for the timeliness or completeness of information provided by any 3rd party bid listing or re-selling service. For further information, contact the Purchasing Division at (775) 353-2273. The individual responsible for coordinating this bid is: Dan Marran, CPPO, C.P.M. – Contracts and Risk Manager

Reno Gazette Journal Legal Notices Section
Publish Date: October 23, 2013
Proof of publication required

Bidder's Checklist

Bidders are instructed to complete and return the following forms in order for their bids to be complete. Failure to return the following items may result in your bid being declared "non-responsive."

1. _____ Bid Item Schedule
2. _____ Bidder Information Sheets
3. _____ Subcontractor Information Form (5% list due with bid submittal)
4. _____ Acknowledgement and Execution Form
5. _____ Certification Regarding Debarment
6. _____ **NEW:** "Certificate of Eligibility" Concerning Use of Local Preference, if Contractor wishes to potentially apply their preference.
7. _____ Bid Bond
8. _____ Signed Bid Addenda (if applicable)

CITY OF SPARKS
BID ITEM SCHEDULE

BID # 13/14-007
BID TITLE: North Truckee Drain Realignment Project – Phase 1

PRICES must be valid for 90 calendar days after the bid opening.

COMPLETION of this project is expected **PURSUANT TO CONTRACT DOCUMENTS**.

BIDDER acknowledges receipt of _____ Addenda.

_____ _____
Bidder Name (signature)

Item No.	Quantity	Unit	Description	Unit Price	Total Price
BASE BID ITEMS					
1	1	LS	Mobilization / Demobilization / Insurance / Bonds / Surveying & Staking	$ _____ /LS	$ _____
2	1	LS	Clear and Grubbing	$ _____ /LS	$ _____
3	1	LS	Traffic Control	$ _____ /LS	$ _____
4	1	LS	Dewatering	$ _____ /LS	$ _____
5	19,556	SY	Removal of Plantmix Bituminous Surface	$ _____ /SY	$ _____
6	1	LS	Removal of Portland Cement Concrete (PCC) Items	$ _____ /LS	$ _____
7	1,498	LF	Removal of Small Diameter Pipe (<13")	$ _____ /LF	$ _____
8	906	LF	Removal of Large Diameter Pipe (>13")	$ _____ /LF	$ _____
9	10	EA	Removal of Small Concrete Structures (Manholes or Drop Inlets)	$ _____ /EA	$ _____
10	80	LF	Removal of Private Asbestos (Transite) Water Main (6”)	$ _____ /LF	$ _____

Item No.	Quantity	Unit	Description	Unit Price	Total Price
11	160	LF	Remove Small Diameter Water Line (1.25 & 2” PVC)	$ _____ /LF	$ _____
12	320	LF	Remove Water Lines (6” & 8” PVC)	$ _____ /LF	$ _____
13	4	EA	Remove and Salvage Fire Hydrant	$ _____ /EA	$ _____
14	1	LS	Construct Sanitary Sewer Lift Station	$ _____ /LS	$ _____
15	10	EA	Construct Precast 48" Type 1-A Manhole	$ _____ /EA	$ _____
16	2	EA	Cast in Place or Precast Reinforced Concrete Manhole and Riser for RCB (2x48")	$ _____ /EA	$ _____
17	14	EA	Lockable Hinged 24" Manhole Covers	$ _____ /EA	$ _____
18	8	EA	Construct Type 3R Drop Inlet	$ _____ /EA	$ _____
19	1,551	LF	Construct Small Diameter (<13") Gravity & Force Mains for Sanitary Sewer & Storm Drains	$ _____ /LF	$ _____
20	775	LF	Construct Large Diameter (>13") Gravity Mains for Storm Drains	$ _____ /LF	$ _____
21	106	LF	Construct 18" RCP Storm Drain with Concrete Pipe Anchors	$ _____ /LF	$ _____
22	708	LF	Construct Small Diameter Water Lines (1.25” & 2” HDPE)	$ _____ /LF	$ _____
23	429	LF	Construct 8” DIP Water Line	$ _____ /LF	$ _____
24	1	EA	Construct Small Backflow Preventer (1.25”)	$ _____ /EA	$ _____
25	1	EA	Construct Large Backflow Preventer (8”)	$ _____ /EA	$ _____
26	3	EA	Install Fire Hydrant	$ _____ /EA	$ _____

Item No.	Quantity	Unit	Description	Unit Price	Total Price
27	484	LF	Remove and Replace Permanent Concrete Barrier Rail	$ _____ /LF	$ _____
28	114	LF	Remove and Replace Chain Link Fence	$ _____ /LF	$ _____
29			NOT USED		
30	1,403	LF	Construct and Install Reinforced Concrete Box (2-14'x10')	$ _____ /LF	$ _____
31	206	LF	Construct and Install Reinforced Concrete Box (2-14'x10') - Greg Street	$ _____ /LF	$ _____
32	3	EA	Cast In Place Access Vaults for 2-14'x10' RCB	$ _____ /EA	$ _____
33	70	LF	Type A PCC Curb	$ _____ /LF	$ _____
34	46	LF	24" Type 1 PCC Curb and Gutter	$ _____ /LF	$ _____
35	111	LF	Type 3 PCC Curb and Gutter	$ _____ /LF	$ _____
36	1,237	SF	3' & 6' Reinforced PCC Valley Gutter and Driveway	$ _____ /SF	$ _____
37	7,280	SY	Plantmix Bituminous Pavement – Larkin Circle (5" AC on 8" Aggregate Base)	$ _____ /SY	$ _____
38	8,220	SY	Plantmix Bituminous Pavement – Misc (3" AC on 6" Aggregate Base)	$ _____ /SY	$ _____
39	8,007	SY	Portland Cement Concrete Pavement - Greg St (10.5" PCC on 6" Aggregate Base)	$ _____ /SY	$ _____
40	1,650	LF	Place 4" Dashed White Pavement Markings (Type II Paint)	$ _____ /LF	$ _____
41	3,001	LF	Place 4" Solid White Pavement Markings (Type II Paint)	$ _____ /LF	$ _____
42	2,478	LF	Place 4" Double Solid Yellow Pavement Markings (Type II Paint)	$ _____ /LF	$ _____

Item No.	Quantity	Unit	Description	Unit Price	Total Price
43	100	LF	Place 8" Solid White Pavement Markings (Type II Paint)	$ _____ /LF	$ _____
44	313	LF	Place Red Curb Markings (Type II Paint)	$ _____ /LF	$ _____
45	90	LF	Place 24" Solid White Stop Bar Stripe (Preformed Thermoplastic)	$ _____ /LF	$ _____
46	5	EA	Install Fire Hydrant Marker (Blue Reflector)	$ _____ /EA	$ _____
47	1	EA	Place 8' High White Directional Arrow (Preformed Thermoplastic)	$ _____ /EA	$ _____
48	1	LS	Landscaping and Irrigation Repair/Restoration	$ _____ /LS	$ _____
49	2	EA	Remove & Replace Concrete Masonry Unit (CMU) Trash Enclosure (CONTINGENT ITEM)	$ _____ /EA	$ _____
50	1,000	CY	Overexcavate Unsuitable Material and Backfill with Class C Fill (CONTINGENT ITEM)	$ _____ /CY	$ _____
51	1,000	CY	Overexcavate Unsuitable Material & Backfill with Structural Fill (CONTINGENT ITEM)	$ _____ /CY	$ _____
52	FA	FA	Force Account – General (CONTINGENT ITEM)	$ 500,000	$ 500,000
53	FA	FA	Force Account – Hazardous Materials (Soils) (CONTINGENT ITEM)	$ 50,000	$ 50,000
Total Base Bid Price _____dollars (written total base bid price including items 1 through 53)					$ _____

Item No.	Quantity	Unit	Description	Unit Price	Total Price
ALTERNATE A BID ITEMS					
54	458	LF	Construct TMWA Water Main (12" DIP)	$ _____ /LF	$ _____
55	131	LF	Construct TMWA Water Main (16" DIP)	$ _____ /LF	$ _____
56	146	LF	Relocate Existing Meters and Construct Small TMWA Water Lines (1.25” & 2” HDPE)	$ _____ /LF	$ _____
57	6	EA	Construct TMWA Sleeves and Couplings (12” DIP)	$ _____ /EA	$ _____
58	1	EA	Install TMWA 4” Flush Valve Assembly on 12” Transite Water Main	$ _____ /EA	$ _____
59	216	LF	Remove TMWA Asbestos Concrete (Transite) Water Main (8"-16")	$ _____ /LF	$ _____
Total Alternate A Bid Price _____dollars (written total Alternate A bid price items 54 through 59)					$ _____

ALTERNATE B BID ITEMS					
60	1	LS	NVE Electrical Mobilization, Bonds and Insurance	$ _____ /LS	$ _____
61	1	LS	NVE Electrical Demobilization and Cleanup	$ _____ /LS	$ _____
62	1	LS	NVE Electrical Traffic Control	$ _____ /LS	$ _____
63	1,255	LF	NVE Electrical Excavate and Backfill Electrical Trench for 1-4” Conduit	$ _____ /LF	$ _____

Item No.	Quantity	Unit	Description	Unit Price	Total Price
64	20	LF	NVE Electrical Excavate and Backfill Electrical Trench for 1-3” Conduit	$ _____ /LF	$ _____
65	2,550	SF	NVE Electrical Remove and Replace AC	$ _____ /SF	$ _____
66	1,255	LF	NVE Electrical Install 1-4” Condit	$ _____ /LF	$ _____
67	20	LF	NVE Electrical Install 1-3” Condit	$ _____ /LF	$ _____
68	1	EA	NVE Electrical Install Concrete Vault with Lid	$ _____ /EA	$ _____
69	2	EA	NVE Electrical Dig Pole Hole 7’ Deep and Backfill	$ _____ /EA	$ _____
70	1	EA	NVE Electrical Dig Anchor Hole 6’ Deep and Backfill	$ _____ /EA	$ _____
71	1	EA	NVE Electrical Install Riser with 1-4” Conduit	$ _____ /EA	$ _____
72	1	EA	NVE Electrical Install Riser with 1-3” Conduit	$ _____ /EA	$ _____
Total Alternate B Bid Price _____dollars (written total Alternate B bid price items 60 through 72)					$ _____

ALTERNATE C BID ITEMS					
73	100	LF	NVE Gas Support Relocation of Gas Main (8" Steel)	$ _____ /LF	$ _____
74	460	LF	NVE Gas Construct and Install Gas Main (4” PE)	$ _____ /LF	$ _____
75	405	LF	NVE Gas Construct and Install Gas Service (2” PE)	$ _____ /LF	$ _____

Item No.	Quantity	Unit	Description	Unit Price	Total Price
76	3	EA	NVE Gas Additional Excavation Support	$ _____ /EA	$ _____
Total Alternate C Bid Price _____dollars (written total Alternate C bid price items 73 through 76)					$ _____

Total Bid Price _____dollars (written total bid price of all items)	$ _____

The quantity of the above contingent item(s) of work, as set forth on the quote schedules represent no actual estimate, are nominal only and may be greatly increased or decreased or reduced to zero. The increase or reduction of these quantity as compared with that set forth on the informal quote schedule shall not constitute a basis for claim by the Contractor for extra payment or damages.

City of Sparks reserves the right and privilege to accept or reject any or all quotes or parts thereof, based solely on the judgment of representatives of the City of Sparks.

PLEASE NOTE: Bid ranking, evaluation and award recommendation will be made using the "Total Base Bid Price." Determination of use of any or all of the bid alternates in the final contract to be awarded will only be determined after the apparent low bidder is identified using the "Total Base Bid Price."

Bidder Information

COMPANY INFORMATION:

Company Name:
Contact Name:
Address:
City:
State / Zip Code:
Telephone Number including area code:
Fax Number including area code:
E-mail:

COMPANY BACKGROUND

1) Has your company ever failed to complete any contracts awarded to it? No___ Yes___ (If yes, please provide details.)

2) Has your company filed any arbitration request or law suits on contracts awarded within the last five years? No___ Yes___ (If yes, please provide details.)

3) Does your company now have any legal suits or arbitration claims pending or outstanding against it or any officers relating to the performance of a public contract? No___ Yes___ (If yes, please provide details.)

4) Does your company now employ any officers or principals who were with another firm when that company failed to complete a contract within the last five years? No___ Yes___ (If yes, please provide details.)

5) Has your company had a contract partially or completely terminated for default (cause) within the past five years? No___ Yes___ (If yes, please provide details.

6) Has your company been found non-responsible on a government bid within the last five years? No___ Yes___ (If yes, please provide details.)

Bidder Information

CONTRACTOR LICENSE INFORMATION:

Nevada State Contractor's License Number (If Applicable):
License Classification(s):
Limitation(s) of License:
Date Issued:
Date of Expiration:
Name of Licensee:
City, State, Zip Code of Licensee:
Telephone Number of Licensee:

BUSINESS LICENSING INFORMATION All vendors doing business within the City of Sparks are required to obtain and maintain a current business license from the City of Sparks prior to commencement of work (Sparks Municipal Code Section 5.08.020A). Vendor(s) awarded a contract resulting from this bid shall be required to obtain a current business license if they do not already hold one.

City of Sparks Business License Number:
Date Issued:
Date of Expiration:
Name of Licensee:
City, State, Zip Code of Licensee:
Telephone Number of Licensee:
Taxpayer Identification Number:

Bidder Information

DISCLOSURE OF PRINCIPALS:

a) **Individual and/or Partnership:**

Owner 1) Name:
Address:
City, State, Zip Code:
Telephone Number:
Owner 2) Name:
Address:
City, State, Zip Code:
Telephone Number:
Other 1) Title:
Name
Other 2) Title:
Name:

b) **Corporation:**

State in which Company is Incorporated:
Date Incorporated:
Name of Corporation:
Address
City, State, Zip Code:
Telephone Number:
President's Name:
Vice-President's Name:
Other 1) Name:
Title:

SUBCONTRACTOR DETAIL
SUBCONTRACTORS EXCEEDING FIVE PERCENT OF BID AMOUNT

INSTRUCTIONS: Per NRS 338.141, Bidder submits the following names of First-Tier Subcontractors who will provide to Bidder labor or a portion of the Work or improvements for which Subcontractor will be paid an amount exceeding five percent (5%) of the Bid Price. The Bidder shall list the name of a Subcontractor for each portion of the Work, the value of which exceeds five percent (5%) of the Bid Price. **If Bidder will perform more than 1% of the Work, BIDDER SHALL ALSO LIST HIS NAME and description of the work that the prime contractor will perform in the space provided below.**

Name of Subcontractor	Address	
Phone	Nevada Contractor License #	Limit of License
Description & Value of Work:		
Name of Subcontractor	Address	
Phone	Nevada Contractor License #	Limit of License
Description & Value of Work:		
Name of Subcontractor	Address	
Phone	Nevada Contractor License #	Limit of License
Description & Value of Work:		
Name of Subcontractor	Address	
Phone	Nevada Contractor License #	Limit of License
Description & Value of Work:		
Name of Subcontractor	Address	
Phone	Nevada Contractor License #	Limit of License
Description & Value of Work:		
Name of Subcontractor	Address	
Phone	Nevada Contractor License #	Limit of License
Description & Value of Work:		

Bidder Name: ___________________________ **Authorized Signature:** _________________________

SUBCONTRACTOR DETAIL
SUBCONTRACTORS EXCEEDING ONE PERCENT OF BID AMOUNT OR $50,000

INSTRUCTIONS: In compliance with NRS 338.141, Bidder submits the following names of First-Tier Subcontractors who will provide to Bidder labor or a portion of the Work or improvements for which Subcontractor will be paid an amount exceeding one percent (1%) of the Bid or $50,000, whichever is greater. The Bidder shall list the name of a Subcontractor for each portion of any of the Work the value of which exceeds one percent (1%) of the Bid Price.

Since all Subcontractors listed on the Bidder's 5% Subcontractor Information Form are over 1% of the Bid amount, those Subcontractors shall automatically be deemed incorporated into this 1% Subcontractor Information form and need not be re-listed below.

Information provided must be submitted within two (2) hours after the completion of the opening of the bids (Per NRS 338.141). Bidder shall enter "**NONE**" under "**Name of Subcontractor**" if not utilizing subcontractors exceeding this amount. This form must be complete in all respects. If, additional space is needed, attach a separate page. The bidder may elect to submit this information with the bid proposal and, in that case, the bidder will be considered as having submitted this information within the above two hours.

Name of Subcontractor	Address	
Phone	Nevada Contractor License #	Limit of License
Description & Value of Work:		
Name of Subcontractor	Address	
Phone	Nevada Contractor License #	Limit of License
Description & Value of Work:		
Name of Subcontractor	Address	
Phone	Nevada Contractor License #	Limit of License
Description & Value of Work:		
Name of Subcontractor	Address	
Phone	Nevada Contractor License #	Limit of License
Description & Value of Work:		

Bidder Name: _____ **Authorized Signature:** _____

CITY OF SPARKS ACKNOWLEDGMENT AND EXECUTION:

STATE OF _____)
) SS
County of _____)

_____ (Name of Principal) being first duly sworn, deposes and says: That he/she is the Bidder, or authorized agent of the Bidder for whom the aforesaid described work is to be performed by; that he/she has read the Plans, Specifications, and related documents including but not limited to, any addenda issued and understands the terms, conditions, and requirements thereof; that if his/her bid is accepted that he/she agrees to furnish and deliver all materials except those specified to be furnished by the City of Sparks (Owner) and to do and perform all work for the **NORTH TRUCKEE DRAIN REALIGNMENT PHASE 1,** Bid # **13/14-007,** together with incidental items necessary to complete the work to be constructed and/or services to be provided in accordance with the Specifications, Plans, and Contract Documents annexed hereto.

TO THE CONTRACTS AND RISK MANAGER OF THE CITY OF SPARKS:
The undersigned, as Bidder, declares that the only persons or parties interested in this proposal, as principals, are those named herein, the Bidder is fully informed respecting the preparation and contents of the attached Bid and of all pertinent circumstances respecting such Bid: that this proposal is made without collusion with any other person, firm or corporation; that he/she has carefully examined the location of the proposed work; the proposed form of Contract, the Contract Provisions, Plans, Specifications and Contract Documents incorporated therein referred to and made part thereof; that he/she proposes and agrees if this proposal is accepted, that he/she will contract with the City of Sparks in the form of the Contract prescribed, to provide all necessary machinery, tools, apparatus and other means of construction, and to do all the work and furnish all the materials specified in the Contract and annexed Contract Provisions, Plans and Specifications, in the manner and time prescribed and according to the requirements of the Project Representative as therein set forth, it being understood and agreed that the quantities shown herein are approximate only and are subject to increase or decrease, and that he/she will accept, in full, payment therefore the indicated prices.

	Contractor/Bidder:
(Printed Name of Contractor/Bidder)	BY:
	Firm:
	Address:
	City:
	State / Zip Code:
	Telephone Number:
	Fax Number:
	E-mail Address:
(Signature of Principal)	Signature:
	DATED this day of , 2013.

State of Nevada)
) SS.
County of _____)

On this day of , in the year 2013, before me,

/Notary Public, personally appeared Personally known to me (or proved

to me on the basis of satisfactory evidence) to be the person whose name is subscribed to this instrument, and acknowledged that he (she) executed it. WITNESS my hand and official seal.

Notary's Signature: My commission Expires:

CERTIFICATION REGARDING DEBARMENT, SUSPENSION, AND OTHER RESPONSIBIILTY MATTERS
(This form to be signed and returned at the time of bid)

The prospective bidder, _____ certifies to the best of its knowledge and belief that it and its principals:

(a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

(b) Have not within a three year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(c) Are not presently indicted for or otherwise criminally or civilly charged by a government entity (Federal, State, or local) with commission of any of the offenses enumerated in paragraph (b) of this certification; and

(d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State, or local) terminated for cause or default.

I understand that a false statement on this certification may be grounds for rejection of this proposal or termination of the award. Any exceptions provided will not necessarily result in denial of award, but will be considered in determining bidder responsibility and whether or not the City will enter into contract with the party. For any exception noted, indicate on an attached sheet to whom it applies, initiating agency, and dates of action. Providing false information may result in criminal prosecution or administrative sanctions.

_____

Typed Name & Title of Authorized Representative

_____

Signature of Authorized Representative Date

I am unable to certify to the above statement. My explanation is attached.

Signature_____Date_____

Local Preference Affidavit

***NEW Instructions*:** This form is required to receive a preference in bidding on projects exceeding $250,000. This form must be submitted no later than two (2) hours following the opening of bids, only if the bidder wishes for their preferential status(established by their current Certificate of Eligibility) to be considered in the evaluation of bids. A copy of the bidder's Certificate of Eligibility must be submitted at the time the contractor submits their bid.

I, _____, on behalf of the Contractor, _____, swear and affirm that in order to be in compliance with NRS 338.0117 and be eligible to receive a preference in bidding **NORTH TRUCKEE DRAIN REALIGNMENT PHASE 1** (**Bid #13/14-007**) certify that the following requirement will be adhered to, documented and attained on completion of the contract. Upon submission of this affidavit on behalf of _____, I recognize and accept that failure to comply with any requirements is a material breach of the contract and entitles the City to damages. In addition, the Contractor may lose their preference designation and/or lose their ability to bid on public works for a period of time, pursuant to NRS 338:

1. The Contractor shall ensure at least 50 percent of workers employed on the public work possess a Nevada driver's license or identification card;

2. The Contractor shall ensure all vehicles used primarily for the public work will be registered and (where applicable) partially apportioned to Nevada;

3. The Contractor shall ensure payroll records related to this project are maintained and available within the State of Nevada.

These requirements are not applicable to Contractors who do not use the "Bidder's Preference" eligibility certificate in their bid or do not receive an advantage in ranking of bids due to their preference status.

By:_____ Title:_____

Signature:_____ Date:_____

Signed and sworn to (or affirmed) before me on this _____ day of _____, 20_____, by_____ (name of person making statement).

State of _____)
)ss.
County of _____)

_____ STAMP AND SEAL
Notary Signature

CITY OF SPARKS, NEVADA – 5% Bid Bond

KNOW ALL MEN BY THESE PRESENTS: That we the undersigned _____, as "Principal," and _____, as "Surety," are hereby held and firmly bound unto the City of Sparks, Nevada, as "Obligee," in the penal sum of _____dollars ($_____) for the payment of which, well and truly to be made, the Principal and Surety bind themselves, their heirs, executors, and administrators, successors and assigns, jointly and severally, by this instrument. The condition of the obligation of this bid bond is as follows:

WHEREAS, NRS 332.105 authorizes local governments to require bid bonds to insure execution and proper performance of the Contract and the Bonding Company has an "A" or better rating with Moody's or A.M. Best and T-Listed with the U.S. Treasury Department;

AND, WHEREAS, the Principal has submitted a bid for Bid # **13/14-007**, PWP # **WA-2014-011**, for the **NORTH TRUCKEE DRAIN REALIGNMENT PHASE 1**.

NOW, THEREFORE,

(a) If said Bid shall be rejected; or

(b) If said Bid shall be accepted and the Principal shall execute and deliver the contract in the bid documents ("Contract") to Obligee in accordance with the terms of the bid documents, and give such bond or bonds as may be specified in the bid or contract documents with good and sufficient surety for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof; or

(c) If the Principal shall pay to the Obligee the full amount of the bid bond as a penalty irrespective of the Obligee's actual damages in the event of the failure of the Principal to enter into such Contract and give such bond or bonds,

then, this obligation shall be null and void. Otherwise it shall remain in full force and effect, it being expressly understood and agreed that the liability of the Surety (but not of the Principal) for any and all claims hereunder shall, in no event, exceed the penal amount of the obligation as herein stated.

The Surety, for the consideration for which this bond was executed, hereby stipulates and agrees that the obligations of said Surety and its bond shall be in no way impaired or affected by any extension of the time within which the Obligee may accept such bid, and hereby waives notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and the Surety has caused their seal to be hereto affixed and these present to be signed by their proper officers.

Signed, Sealed and dated: _____

_____
Principal
By: _____

_____
Surety
By: _____

GENERAL CONDITIONS

GENERAL CONDITIONS

Please Read Carefully
These Provisions Are a Part of Your Bid and any Contract Awarded

Scope of Bid/Proposal: Bids/Proposals are hereby requested for **NORTH TRUCKEE DRAIN REALIGNMENT PHASE 1**, as per specifications herein.

The bidder agrees that:

A. Bidder has carefully examined the specifications, and all provisions relating to the item(s) to be furnished or the work to be done; understands the meaning, intent, and requirements; and

B. Bidder will enter into a written contract and furnish the item(s) or complete the work in the time specified, and in strict conformity with the City of Sparks specifications for the prices quoted.

Note: Bidder is defined as any individual, partnership, or corporation submitting a bid, proposal, or quotation in response to a request for bid (RFB), request for proposal (RFP), request for information (RFI) or request for quotation (RFQ). A bidder may also be referred to as a bidder, contractor, supplier or vendor.

The use of the title "Bidder:, "Vendor", "Contractor" or "Consultant" within this solicitation document and any resulting contract shall be deemed interchangeable and shall refer to the person or entity with whom the City of Sparks is soliciting and/or contracting for the service or product referenced within the bid document.

1. Prices:

All prices and notations must be in ink or typewritten. Mistakes may be crossed out and corrections typed or written with ink adjacent to the error. Bids shall indicate the unit price extended to indicate the total price for each item bid. Any difference between the unit price correctly extended and the total price shown for all items bid shall be resolved in favor of the unit prices. Bidders are encouraged to review all prices prior to bid submittal, as withdrawal or correction may not be permitted after the bid has been opened.

2. Firm Prices:

Prices on bid shall be firm prices not subject to escalation unless otherwise provided for in the specifications. In the event the specifications provide for escalation, the maximum limit shall be shown, or the bid shall not be considered. In the event of a decline in market price below a price bid, the City of Sparks shall receive the benefit of such decline.

3. Items Offered:

If the item offered by the bidder has a trade name, brand and/or catalog number, such shall be stated in the bid. If the bidder proposes to furnish an item of a manufacturer or vendor other than that mentioned on the face hereof, bidder must specify maker, brand, quality, catalog number, or other trade designation. Unless such is noted on the bid form, it will be deemed that the item offered is that designated even though the bid may state "or equal".

4. Brand Names:

Whenever reference to a specific brand name is made by the City, it is intended to describe a component that has been determined to best meet operational, performance, or reliability standards of the City, thereby incorporating these standards by reference within the specifications. These specifications are not meant to limit the vendor; they are guidelines to minimum qualifications. The bidder shall indicate their compliance or non-compliance for each line of the specification. Any deviations from the specifications or where submitted literature does not fully support the meaning of the specifications must be clearly cited in writing by the bidder.

An equivalent ("or equal") may be offered by the bidder, subject to evaluation and acceptance by the City. It is the bidder's responsibility to provide, at bidder's expense, samples, test data, or other documentation the City may require to fully evaluate and determine acceptability of an offered substitute. The City reserves the sole right to reject a substituted component that will not meet or exceed City standards.

5. Samples:
Samples may be required for bid evaluation and testing purposes. Bidders shall agree to provide samples upon request and at no additional cost to the City.

6. Withdrawal of Bids:
Bids may be withdrawn by written or facsimile notice received prior to the exact hour and date specified for receipt of bid. A bid may also be withdrawn in person by a bidder, or bidder's authorized representative, prior to the exact hour and date set for receipt of bids. Telephone withdrawals are not permitted.

7. Late Bids, Modifications, or Withdrawals:
Bids, modifications of bids, or bid withdrawals received after the exact time and date specified for receipt will not be considered.

8. Mistake in Bid:
(a) If the bidder discovers a mistake in bid prior to the hour and date specified for receipt of bid, bidder may correct the mistake by withdrawing the bid in accordance with Item 7 above and resubmit prior to the stated bid deadline.

(b) If within seventy-two hours of the bid closing and prior to the issuance of a purchase order or a contract, the apparent low bidder discovers a mistake in bid of a serious and significant nature, bidder may request consideration be given to withdrawing the bid. The mistake must be evident and provable. The right is reserved by the City to reject any and all requests for withdrawal of bids. The decision of the Purchasing Manager is final as regards acceptance or rejection of requests for withdrawal after closing of bids.

(c) A mistake in bid cannot be considered once a purchase order or contract is issued.

9. Signature:
All bids shall be signed and the title and firm name indicated. A bid by a corporation shall be signed by an authorized officer, employee or agent with his or her title.

10. Exceptions:
A bidder deviating from specifications must specify any and all deviation(s). Failure to note said exceptions shall be interpreted to convey that the bidder shall propose to perform in the manner described and/or specified in this bid solicitation. If exception(s) are taken or alternatives offered, complete descriptions must be shown separately.

11. Confidential Information:
Any information deemed confidential or proprietary should be clearly identified by the bidder as such. It may then be protected and treated with confidentiality only to the extent permitted by state law. Otherwise the information shall be considered a public record. Information or data submitted with a bid will not be returned.

12. Quality:
Unless otherwise required in the specifications, all goods furnished shall be new and unused.

13. Litigation Warranty:

The bidder, by bidding, warrants that bidder is not currently involved in litigation or arbitration concerning the materials or bidder's performance concerning the same or similar material or service to be supplied pursuant to this contract of specification, and that no judgments or awards have been made against bidder on the basis of bidder's performance in supplying or installing the same or similar material or service, unless such fact is disclosed to the City in the bid. Disclosure may not disqualify the bidder. The City reserves the right to evaluate bids on the basis of the facts surrounding such litigation or arbitration and to require bidder to furnish the City with a surety bond executed by a surety company authorized to do business in the State of Nevada and approved by The City of Sparks in a sum equal to one hundred percent (100%) of the contract price conditional on the faithful performance by bidder of the contract in the event the bid is awarded to bidder, notwithstanding the litigation or arbitration.

14. Royalties, Licenses and Patents:

Unless otherwise specified, the bidder shall pay all royalties, license and patent fees. The bidder warrants that the materials to be supplied do not infringe any patent, trademark or copyright and further agrees to defend any and all suits, actions and claims for infringement that are brought against the City, and to defend, indemnify and hold harmless the City from all loss or damages, whether general, exemplary or punitive, as a result of any actual or claimed infringement asserted against the City, the bidder or those furnishing material to bidder pursuant to this contract.

15. Performance Standards:

Performance of work and acceptability of equipment or materials supplied pursuant to any contract or award shall be to the satisfaction and full discretion of the City.

16. Americans with Disabilities Act (ADA) Standards:

Bidders shall be required to comply with current ADA Standards in preparing their bids and executing work required under any contract resulting from this bid. Completed work must comply with current ADA Standards.

17. Warranties:

(a) Unless otherwise specified, all workmanship, material, labor or equipment provided under the contract shall be warranted by bidder and/or manufacturer for a minimum of twelve (12) months after acceptance by City. Greater warranty protection will be accepted. Lesser warranty protection must be indicated by bidder on the bid proposal as an exception.

(b) Bidder shall be considered primarily responsible to the City for all warranty service, parts and labor applicable to the goods or equipment provided by bidder under this bid or award, irrespective of whether bidder is an agent, broker, fabricator or manufacturer's dealer. Bidder shall be responsible for ensuring that warranty work is performed at a local agency or facility convenient to City and that services, parts and labor are available and provided to meet City's schedules and deadlines. If required and defined within the Scope of Work, the Bidder will post a performance bond after contract award to guarantee performance of these obligations. Bidder may establish a service contract with a local agency satisfactory to City to meet this obligation if bidder does not ordinarily provide warranty service.

18. Addenda:

The effect of all addenda to the bid documents shall be considered in the bid, and said addenda shall be made part of the bid documents and shall be returned with them. Before submitting a bid, each bidder shall ascertain

whether or not any addenda have been issued, and failure to acknowledge any such addenda may render the bid invalid and result in its rejection.

All potential bidders are responsible for monitoring the City website regarding the availability of new bid documents or addenda (where applicable). The City of Sparks will not be responsible for the results of any potential failures in automatic notification systems to potential bidders or plan holders with respect to these documents and will not adjust bid schedules or requirements due to any potential failures of those systems. It is the responsibility of all potential bidders/responders to monitor the Purchasing Division's website for any changing information prior to submitting their bid/proposal. The City of Sparks will not be responsible for the timeliness or completeness of information provided by any 3rd party bid listing or re-selling service.

19. Specifications to Prevail:

The detailed requirements of the Specifications, Scope of Work or Special Conditions shall supersede any conflicting reference in these General Conditions or the stated language on the City of Sparks Standard Purchase Order that are in conflict therewith.

20. Taxes:

The City is exempt from State, City and County Sales Taxes per NRS 372.325. The City will furnish Exemption Certificates for Federal Excise Tax when applicable.

21. Prevailing Wages:

Bidder is responsible for complying with all applicable local, State and Federal wage laws, whether or not specifically cited in this bid document.

Per NRS Sections 338.020 through 338.090, certain projects defined as "public works" require the payment of the prevailing wage as determined by the Labor Commissioner. Generally speaking, projects/contracts for construction of a public work valued at less than $100,000 are exempt from the prevailing wage requirement (NRS 338.080). Bidder shall be fully aware of the prevailing wage requirements of the State of Nevada as detailed in NRS Chapter 338 and price their bid response accordingly. Further information concerning Prevailing Wage rates can be found at:
http://www.laborcommissioner.com/pwpw.html

Federal "Davis Bacon" wages may be applicable if the funding for the project includes Federal funds. These requirements are detailed in the "Special Conditions – Federal Requirements" section that will be included in this bid document when such conditions apply.

22. Conflict of Interest:

No City employee or elected or appointed member of City government, or member of the employee's immediate family, may participate directly or indirectly in the procurement process pertaining to this bid if they:

(a) Have a financial interest or other personal interest that is incompatible with the proper discharge of their official duties in the public interest or would tend to impair their independence, judgment or action in the performance of their official duties.

(b) Are negotiating for or have an arrangement concerning prospective employment with bidder. The bidder warrants to the best of his knowledge that the submission of the bid will not create such conflict of interest. In the event such a conflict occurs, the bidder is to report it immediately to the Purchasing Manager. For breach or violation of this warranty, the City shall have the right to annul this contract without liability at its discretion, and bidder may be subject to damages and/or debarment or suspension.

23. Disqualification of Bidder:

Any one or more of the following may be considered as sufficient for the disqualification of a prospective Bidder and the rejection of the Bid:

(a) The Bidder is not responsive or responsible.
(b) The quality of services, materials, equipment or labor offered does not conform to the approved plans and specifications.
(c) There is evidence of collusion among prospective Bidders (Participants in such collusion will receive no recognition as Bidders).
(d) The Bidder lacks the correct contractor's license classification required for the defined scope of work.
(e) Lack of competency, understanding of the scope of work, adequate machinery, plant and/or equipment as revealed in routine due diligence associated with bid evaluation.
(f) Unsatisfactory performance record as shown by past work for the City of Sparks, judged from the standpoint of workmanship, progress, and quality of services/goods provided.
(g) Uncompleted work which, in the judgment of the City of Sparks, might hinder or prevent the prompt completion of additional work, if awarded.
(h) Failure to pay or satisfactorily settle all bills due for labor and/or material on any contract(s).
(i) Failure to comply with any requirements of the City of Sparks.
(j) Failure to list, as required, all subcontractors who will be employed by the Bidder.
(k) Any other reason determined, in good faith, to be in the best interest of the City of Sparks.

24. Gratuities:

The City may rescind the right of the bidder to proceed under this agreement if it is found that gratuities in the form of entertainment, gifts, cash or otherwise are offered or given by the bidder, or any agent or representative of the bidder, to any officer or employee of the City with the intent of influencing award of this agreement or securing favorable treatment with respect to performance of this agreement.

25. Bidder's Security (This Section ☒ IS ☐ IS NOT Applicable to this bid):

A bid deposit in an amount equal to at least 5% of the bid may be required as a bid security by the City. The bid security may only be in cash, a cashier's or certified check made payable to the City of Sparks, or a bid bond. If the bid security is a bond, it shall be executed by a surety insurer authorized to issue surety bonds in the State of Nevada. All Bonding Companies must have an "A" rating or better with Moody's or A.M. Best Company, and be included on the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bond and as Acceptable Reinsuring Companies" as published in circular 570 (as amended) by the audit staff, Bureau of Accounts, U.S. Treasury Department. (In other words, the company is T-listed.) The bid security must be executed by the bidder and enclosed with the bid proposal in the sealed bid envelope.

26. Performance and Payment Bonds:

Per NRS 339.025, before any contract, except one subject to the provisions of chapter 408 of NRS, exceeding $100,000 for any project for the new construction, repair or reconstruction of any public building or other public work or public improvement of any contracting body is awarded to any contractor, he shall furnish to the contracting body the following bonds which become binding upon the award of the contract to the contractor (All Bonding Companies must have an "A" rating or better with Moody's or A.M. Best Company, and be included on the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bond and as Acceptable Reinsuring Companies" as published in circular 570 (as amended) by the audit staff, Bureau of Accounts, U.S. Treasury Department. (In other words, the company is T-listed.)):

Performance Bond (This Section ☒ IS ☐ IS NOT Applicable to this bid):
The Contractor awarded this bid will be required to furnish the City with a surety bond conditioned upon the faithful performance of the contract. This may take the form of a bond executed by a surety company authorized to do business in the State of Nevada and approved by the City of Sparks. The bond shall be in a sum equal to one hundred percent (100%) of the amount of the contract price. Such bond shall be forfeited to the City in the event that bidder receiving the contract shall fail or refuse to fulfill the requirements and all terms and conditions of the contract.

Payment Bond (This Section ☒ IS ☐ IS NOT Applicable to this bid):
The Contractor awarded this bid will be required to furnish the City with a payment bond**.** This may take the form of a bond executed by a surety company authorized to do business in the State of Nevada and approved by the City of Sparks. The bond shall be in a sum equal to one hundred percent (100%) of the amount of the contract price The bond must be solely for the protection of claimants supplying labor or materials to the contractor to whom the contract was awarded, or to any of his subcontractors, in the prosecution of the work provided for in such contract.

27. Indemnification:
Upon award, Contractor agrees to hold harmless, indemnify, and defend City, its officers, agents, employees, and volunteers from any loss or liability, financial or otherwise resulting from any and all claims, demands, suits, actions, or causes of action, caused by any action, either direct or passive, the omission, failure to act, or negligence on the part of Contractor, its employees, agents, representatives, or Subcontractors arising out of the performance of work under this Agreement by Contractor, or by others under the direction or supervision of Contractor.

If City's personnel are involved in defending such actions, Contractor shall reimburse City for the time and costs spent by such personnel at the rate charged City for such services by private professionals.

In determining the nature of the claim against City, the incident underlying the claim shall determine the nature of the claim, notwithstanding the form of the allegations against City.

Nothing in this contract shall be interpreted to waive nor does the City, by entering into this contract, waive any of the provisions found in Chapter 41 of the Nevada Revised Statutes.

28. Insurance:
BIDDERS' ATTENTION IS DIRECTED TO THE INSURANCE REQUIREMENTS BELOW. IT IS HIGHLY RECOMMENDED THAT BIDDERS CONFER WITH THEIR RESPECTIVE INSURANCE CARRIERS OR BROKERS TO DETERMINE IN ADVANCE OF BID SUBMISSION THE AVAILABILITY OF INSURANCE CERTIFICATES AND ENDORSEMENTS AS PRESCRIBED AND PROVIDED HEREIN. IF THE APPARENT LOW BIDDER FAILS TO COMPLY STRICTLY WITH THE INSURANCE REQUIREMENTS, THAT BIDDER MAY BE DISQUALIFIED FROM AWARD OF THE CONTRACT.

Should work be required on City premises or within the public right-of-way, upon award of the contract, the bidder shall provide proof of Commercial General Liability Insurance and Automobile Liability, Professional Liability and Workers' Compensation if applicable, prior to initiation of any services under City, Bid, Proposal or Contract. Coverage shall be from a company authorized to transact business in the State of Nevada and the City of Sparks and shall meet the following minimum specifications:

INDUSTRIAL INSURANCE

It is understood and agreed that there shall be no Industrial Insurance coverage provided for Contractor or any Sub-Contractor of the Contractor by the City. Contractor agrees, as a precondition to the performance of any work under this Agreement and as a precondition to any obligation of the City to make any payment under this Agreement to provide City with a certificate issued by an insurer in accordance with NRS 616B.627 and with a certificate of an insurer showing coverage pursuant to NRS 617.210.

It is further understood and agreed by and between City and Contractor that Contractor shall procure, pay for, and maintain the above mentioned industrial insurance coverage at Contractor's sole cost and expense.

Should Contractor be self-funded for Industrial Insurance, Contractor shall so notify City in writing prior to the signing of this Contract. City reserves the right to approve said retentions, and may request additional documentation, financial or otherwise, for review prior to the signing of this Contract.

MINIMUM LIMITS OF INSURANCE

CONTRACTOR shall maintain coverages and limits no less than:

1. General Liability: $1,000,000 (or amount customarily carried by Contractor, whichever is greater) combined single limit per occurrence for bodily injury, personal injury and property damage. If Commercial General Liability Insurance or other form with a general aggregate limit is used, the general aggregate limit shall be increased to equal twice the required occurrence limit or revised to apply separately to this project or location.

2. Automobile Liability: $1,000,000 combined single limit per accident for bodily injury and property damage. No aggregate limit may apply.

3. Contractor Errors and Omissions Liability: $1,000,000 per claim and as an annual aggregate. Premium costs incurred to increase Contractor's insurance levels to meet minimum contract limits shall be borne by the Contractor at no cost to the City.

4. Workers' Compensation: Contractor shall provide proof of worker's compensation insurance as required by NRS 616B.627 or proof that compliance with the provisions of Nevada Revised Statutes, Chapters 616A-D and all other related chapters is not required.

Contractor will maintain Contractor liability insurance during the term of this Agreement and for a period of three (3) years from the date of substantial completion of the project. In the event that Contractor goes out of business during the term of this Agreement or the three (3) year period described above, Contractor shall purchase Extended Reporting Coverage for claims arising out of Contractor's negligent acts, errors and omissions committed during the term of the Contractor Liability Policy.

Should City and Contractor agree that higher Contractor Coverage limits are needed warranting a project policy, project coverage shall be purchased and the premium for limits exceeding the above amount shall be borne by City. City retains the option to purchase project insurance through Contractor's insurer or its own source.

OTHER INSURANCE PROVISIONS

The policies are to contain, or be endorsed to contain, the following provisions:

1. General Liability and Automobile Liability Coverages

a. City, its officers, agents, employees, and volunteers are to be included as insureds as respects damages and defense arising from: activities performed by or on behalf of Contractor, including the insured's general supervision of Contractor; products and completed operations of Contractor; premises owned, occupied, or used by Contractor; or automobiles owned, leased, hired, or borrowed by the Contractor. The coverage shall contain no special limitations on the scope of protection afforded to City, its officers, employees, or volunteers.

b. Contractor's insurance coverage shall be Primary insurance with respect to the City, its officers, agents, employees, and volunteers. Any insurance or self-insurance maintained by City, its officers, employees, or volunteers shall be excess of Contractor's insurance and shall not contribute with it in any way.

c. Any failure to comply with reporting provisions of the policies shall not affect coverage provided to City, its officers, agents, employees, or volunteers.

d. Contractor's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.

2. Property Coverages (If Applicable)

Contractor shall provide builders risk insurance on an "All Risk" basis on a policy form satisfactory to City. The limit of coverage will be the amount necessary to cover the bid value of any structures in the Contract or other value determined by City. City reserves the right to require Contractor to provide boiler and machinery insurance coverage or other forms of property insurance. If the project is in a flood plain, City reserves the right to require flood coverage at Contractor's expense. Losses paid under the property insurance policy or policies shall be paid directly to City by the insurer(s).

3. All Coverages

Each insurance policy required by this clause shall be endorsed to state that coverage shall not be suspended, voided, canceled, or non-renewed by either Contractor or by the insurer, reduced in coverage or in limits except after thirty (30) days' prior written notice by certified mail, return receipt requested, has been given to City except for nonpayment of premium.

ACCEPTABILITY OF INSURERS

Insurance is to be placed with insurers with a Best's rating of no less than A-: VII. City, with the approval of the Risk Manager, may accept coverage with carriers having lower Best's ratings upon review of financial information concerning Contractor and insurance carrier. City reserves the right to require that Contractor's insurer be a licensed and admitted insurer in the State of Nevada, or on the Insurance Commissioner's approved but not admitted list.

VERIFICATION OF COVERAGE

Contractor shall furnish City with certificates of insurance and with original endorsements affecting coverage required by this contract. The certificates and endorsements for each insurance policy are to be signed by a person authorized by that insurer to bind coverage on its behalf.

Prior to the start of any Work, Contractor must provide the following documents to City of Sparks, Attention: Purchasing Division, P.O. Box 857, Sparks, NV 89432-0857:

A. Certificate of Insurance. Contractor must provide a Certificate of Insurance form to the City of Sparks to evidence the insurance policies and coverage required of Contractor.

B. Additional Insured Endorsements. An original Additional Insured Endorsement, signed by an authorized insurance company representative, must be submitted to the City of Sparks, by attachment to the Certificate of Insurance, to evidence the endorsement of the City of Sparks as additional insured.

C. Policy Cancellation Endorsement. Except for ten days notice for non-payment of premium, each insurance policy shall be endorsed to specify that without thirty (30) days prior written notice to the City of Sparks, the policy shall not be cancelled, non-renewal or coverage and/or limits reduced or materially altered, and shall provide that notices required by this paragraph shall be sent by certified mailed to the address specified above. A copy of this signed endorsement must be attached to the Certificate of Insurance.

D. Bonds (as Applicable). Bonds as required and/or defined in the original bid documents.

All certificates and endorsements are to be addressed to the City of Sparks, Purchasing Division and be received and approved by City before work commences. The City reserves the right to require complete certified copies of all required insurance policies at any time.

SUBCONTRACTORS

Contractor shall include all Subcontractors as insureds under its policies or shall furnish separate certificates and endorsements for each Subcontractor. All coverages for Subcontractors shall be subject to all of the requirements stated herein.

MISCELLANEOUS CONDITIONS

1. Contractor shall be responsible for and remedy all damage or loss to any property, including property of City, caused in whole or in part by Contractor, any Subcontractor, or anyone employed, directed, or supervised by Contractor.
2. Nothing herein contained shall be construed as limiting in any way the extent to which Contractor may be held responsible for payment of damages to persons or property resulting from its operations or the operations of any Subcontractors under it.
3. In addition to any other remedies City may have if Contractor fails to provide or maintain any insurance policies or policy endorsements to the extent and within the time herein required, City may, at its sole option:
    a. Purchase such insurance to cover any risk for which City may be liable through the operations of Contractor under this Agreement and deduct or retain the amount of the premiums for such insurance from any sums due under the Agreement;
    b. Order Contractor to stop work under this Agreement and/or withhold any payments which become due Contractor here under until Contractor demonstrates compliance with the requirements hereof; or,
    c. Terminate the Agreement.

29. Safety Program:

Upon award, the Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the work. The Contractor shall take all necessary precautions for the safety of, and shall provide all necessary protection to prevent damage, injury, or loss to:

1. All employees on the work site and all other persons who may be affected thereby.
2. All the work, materials, and equipment to be incorporated therein, whether in storage on or off the site.
3. 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 construction.

Contractor shall comply with all applicable laws, ordinances, rules, regulations, and others of any public authority having jurisdiction for the safety of persons or property or to protect them from damage, injury, or loss. He shall erect and maintain, as required by existing conditions and progress on the work, all necessary safeguards for safety and protection, including posting danger signs, other warnings against hazards, promulgating safety regulations, and notifying owners and users of adjacent utilities. Contractor shall comply with OSHA'S Hazard Communication Standards.

Contractor shall designate a responsible member of its organization at the site whose duty shall be the prevention of accidents. This person shall be Contractor's superintendent unless otherwise designated in writing by Contractor to the Owner and the Engineer.

30. Award of Contract:

(a) Bids/Proposals will be analyzed and award will be made to the lowest, responsive and responsible bidder whose bid conforms to the solicitation and whose bid is considered to be most advantageous to the City, price and other factors considered. Factors to be considered may include, but are not limited to: bidder's past performance, total unit cost, economic cost analysis, life cycle costs, warranty and quality, maintenance cost, durability, the operational requirements of the City and any other factors which will result in the optimum economic benefit to the City.

(b) The City reserves the right to reject any item or items, to waive informalities, technical defects and minor irregularities in bids/proposals received; and to select the bid(s) or proposal(s) deemed most advantageous to the City. Should the City elect to waive a right it will not constitute an automatic waiver of that right in the future nor will it impact any other right or remedy. The City may consider bids/proposals submitted on an "all or nothing" basis if the bid/proposal is clearly designated as such.

(c) The City reserves the right to award one or more contracts on the bids/proposals submitted, either by award of all items to one bidder or by award of separate items or groups of items to various bidders as the interests of the City may require, unless the bidder clearly specifies otherwise in his bid.

(d) Upon acceptance by the City of Sparks, the solicitation, bid, proposal, or price quotation and issuance of a purchase order issued to the successful bidder shall be deemed to result in a binding contract incorporating those terms and these General Conditions without further action required by either party. Items are to be furnished as described in the bid and in strict conformity with all instructions, conditions, specifications, and provisions in the complete contract, as defined by this clause or any related integrated agreement.

31. Request for Proposal (RFP) Submittals:

In the case of Request for Proposals (RFP's), it should be noted that the documents submitted by prospective bidders are competitive sealed proposals and not competitive sealed bids. When proposals are opened, prices and other information will not be made public until the proposal is awarded. There shall be no disclosure of any bidder's information to competing bidders prior to the award of the proposal.

By their nature, proposals will include a number of variables that will vary based on the complexity of the product or service addressed within the proposal. Therefore, the evaluation of RFP's and the recommendation

for award will not be based on price alone. Selection criteria will be better defined for each scope of work in the Special Conditions section of this bid.

Upon award of the contract, the executed contract and proposals will become public information. Accordingly, each proposal should be submitted on the vendor's most favorable terms from a price and technical standpoint.

32. Bidder Preference Law (This Section ☒ IS ☐ IS NOT Applicable to this bid):

This project will be bid and awarded under the Provisions(s) of NRS 338.147, which restricts preference given to certain contractors on Public Works Projects. The NRS cited in this section is meant to be a reference only. Each bidder shall acquaint himself with the latest provisions of NRS 338.147.

If the Contract for any Public Works Construction Project is expected to cost $250,000 or more, then all Contractors must be able to submit upon request, a copy of their Certificate of Bidder Preference issued by the State Contractor's Board to be eligible for bidder preference (Call 775-688-1141 or 775-486-1100 to obtain certification information from the State Contractors Board).

To the extent Contractor has sought, qualified and receives a bidding preference on this project, pursuant to Nevada Revised Statutes Chapter 338, Contractor acknowledges and agrees that the following requirements will be adhered to, documented and attained for the duration of the Project:

1. At least 50 percent of the workers employed on the Project (including subcontractors) hold a valid driver's license or identification card issued by the Nevada Department of Motor Vehicles;

2. All vehicles used primarily for the public work will be (a) registered and (where applicable) partially apportioned to Nevada; or (b) registered in Nevada; and

3. The Contractor shall maintain and make available for inspection within Nevada all payroll records related to the Project.

Contractor recognizes and accepts that failure to comply with any requirements herein shall be a material breach of the contract and entitle the City of Sparks to liquidated damages in the amount set by statute. In addition, the Contractor recognizes and accepts that failure to comply with any requirements herein may lose its certification for a preference in bidding and/or its ability to bid on any contracts for public works pursuant to NRS Chapter 338.

To the extent Contractor has sought, qualified and receives a bidding preference, and this project has a value of over $250,000 pursuant to Nevada Revised Statutes Chapter 338, each contract between the contractor, applicant or design-build team and a subcontractor must provide for the apportionment of liquidated damages assessed pursuant to this section if a person other than the Contractor was responsible for the breach of a contract for a public work caused by a failure to comply with a requirement of Items 1-3 within this section. The apportionment of liquidated damages must be in proportion to the responsibility of each party for the breach.

This section shall not be applicable for projects in which some or all of the funding comes from Federal sources.

33. Tie Bids:

Should identical low, responsive and responsible bids be received from two or more bidders, the City of Sparks Purchasing Manager shall notify all parties involved in the tie and may at his option, exercise the following tie breaking method unless another alternative is apparent and prudent:

Should there be two or more low, responsive and responsible tie bids where representatives of the bidders wish to participate in the tie breaking process, the City of Sparks Purchasing/Contracts Manager shall set a mutually agreed upon time where, in his office, he shall shuffle a new deck of playing cards and have each bidder's representative cut the cards. The tie bidder who cuts the highest card (with Ace high) shall be recommended for bid award.

34. Appeals/Protests – Bids Only (Not Applicable to Request for Proposals):

A person who submits a bid on a contract may, after the bids are opened and within 5 business days after the date the "Recommendation to Award" is issued by the City, unless otherwise stated in the Special Conditions, file a notice of protest regarding the awarding of the contract. The City's "Recommendation to Award" will be dated and posted on the City's public website within the area where bid notices and bid re-caps are posted (Currently: http://www.cityofsparks.us/departments/financial-services/purchasing/bids-rfps).

(a) A notice of protest must include a written statement setting forth with specificity the reasons the person filing the notice believes the applicable provisions of law were violated.

(b) A person filing a notice of protest may be required by the governing body or its authorized representative, at the time the notice of protest is filed, to post a bond with a good and solvent surety authorized to do business in this State or submit other security, in a form approved by the governing body or its authorized representative, to the governing body or its authorized representative who shall hold the bond or other security until a determination is made on the protest. A bond posted or other security submitted with a notice of protest must be in an amount equal to the lesser of:

(1) Twenty-five percent of the total value of the bid submitted by the person filing the notice of protest; or

(2) Two hundred fifty thousand dollars ($250,000).

(c) A notice of protest filed in accordance with the provisions of this section operates as a stay of action in relation to the awarding of any contract until a determination is made by the governing body or its authorized representative on the protest.

(d) A person who submits an unsuccessful bid may not seek any type of judicial intervention until the governing body or its authorized representative has made a determination on the protest and awarded the contract.

(e) A governing body or its authorized representative is not liable for any costs, expenses, attorney's fees, loss of income or other damages sustained by a person who submits a bid, whether or not the person files a notice of protest pursuant to this section.

(f) If the protest is upheld, the bond posted or other security submitted with the notice of protest must be returned to the person who posted the bond or submitted the security. If the protest is rejected, a claim may be made against the bond or other security by the governing body or its authorized representative in an amount equal to the expenses incurred by the governing body or its authorized representative because of the unsuccessful protest. Any money remaining after the claim has been satisfied must be returned to the person who posted the bond or submitted the security.

35. Documentation:

Due to the time constraints that affect contract performance, all required documents, certificates of insurance and bonds shall be provided to the City within ten (10) calendar days following award or date of request by

City, whichever is later. Any failure to comply may result in bid being declared non-responsive and rejected, and at City's option, the bid bond may be attached for damages suffered.

36. Discounts:

(a) Prompt payment discounts will not be considered in evaluating bids for award. However, offered discounts will be taken if payment is made within the discount period, even though not considered in the evaluation of bids.

(b) In connection with any discount offered, time will be computed from date of delivery and acceptance, or invoice receipt, whichever is later. Payment is deemed to be made for the purpose of earning the discount on the date of mailing of the City check.

(c) Any discount offered other than for prompt payment should be included in the net price quoted and not included in separate terms. In the event this is not done, the City reserves the right to accept the discount offered and adjust prices accordingly on the Purchase Order.

37. Seller's Invoice:

Invoices shall be prepared and submitted in duplicate to the address shown on the Purchase Order. Separate invoices are required for each Purchase Order. Invoices shall contain the following information: Purchase Order number, item number, description of supplies or services, sizes, unit of measure, quantity, unit price and extended totals.

38. Inspection and Acceptance:

Inspection and acceptance will be at destination unless specified otherwise, and will be made by the City department shown in the shipping address or other duly authorized representative of the City. Until delivery and acceptance, and after any rejection, risk of loss will be on the bidder unless loss results from negligence of the City.

39. Lost and Damaged Shipments:

Risk of loss or damage to items prior to the time of their receipt and acceptance by the City is upon the bidder. The City has no obligation to accept damaged shipments and reserves the right to return at the bidder's expense damaged merchandise even though the damage was not apparent or discovered until after receipt of the items.

40. Late Shipments:

Bidder is responsible to notify the City department receiving the items and the Purchasing Manager of any late or delayed shipments. The City reserves the right to cancel all or any part of an order if the shipment is not made as promised.

41. Document Ownership:

All technical documents and records originated or prepared pursuant to this contract, including papers, reports, charts, and computer programs, shall be delivered to and become the exclusive property of the City and may be copyrighted by the City. Bidder assigns all copyrights to City by undertaking this agreement.

42. Advertisements, Product Endorsements:

City employees and agencies or organizations funded by the City of Sparks are prohibited from making endorsements, either implied or direct, of commercial products or services without written approval of the City Manager. No bidder may represent that the City of Sparks has endorsed their product or service without prior written approval.

43. Optional Cooperative Purchase Agreement

It is intended that any other public agency (i.e., city, county, district, public agency, municipality or state agency) shall have the option to participate (A.K.A. "join" or "piggyback") in any award made as a result of this solicitation. The City of Sparks shall incur no financial responsibility in connection with purchase orders or contracts made by the bidder with another public agency resulting from this solicitation. The public agency utilizing the original contract shall accept sole responsibility for placing orders and making applicable payments to the vendor. Should the Bidder not wish for a contract resulting from this bid to be used by other public agencies, they have the option to decline that option at the time of request.

44. Vendor Workplace Policies

No Vendor providing a service, program or activity to the public on behalf of the City shall discriminate against any person because of sex, race, color, creed, national origin or disability. Vendor, if providing a service, program or activity to the public on behalf of the City, shall comply with the Americans with Disability Act and City's policies pursuant thereto when providing said service, program or activity.

The City of Sparks is an Affirmative Action/Equal Opportunity Employer. Bidders shall be cognizant of the requirements for compliance with Executive Order 11246, entitled "Equal Employment Opportunity" as amended by Executive Order 11375 and as supplemented in regulations of the U.S. Department of Labor (41 CFR part 60).

45. Business License Requirement:

All companies doing business with, or within, the City of Sparks are required to obtain and maintain a current business license from the City of Sparks prior to the commencement of work per Sparks Municipal Code Section 5.08.020A. Bidder(s) awarded a contract resulting from this bid shall be required to obtain a current business license if they do not already possess one.

46. City Provisions to Prevail:

Except as indicated in the specifications, the City's standard General Conditions shall govern any contract award. Any standard terms and conditions of bidder submitted by bidder shall not be acceptable to City unless expressly agreed to by the City. The City reserves the right to reject bidder's bid as non-responsive, to consider the bid without bidder's standard terms and conditions, or to require bidder to delete reference to such, as a condition of evaluation or award of the bid. If, after award of contract, bidder (contract vendor) provides materials or services accompanied by new or additional standard terms or conditions, they too shall be considered void and City may require deletion as a further condition of performance by vendor.

47. Invalid Provisions:

In the event that any one or more of the provisions of this agreement shall be found to be invalid, illegal or unenforceable, the remaining provisions shall remain in effect and be enforceable.

48. Amendments and Modifications:

The Purchasing Manager may at any time, by written order, and without notice to the sureties, make a modification to the contract or an amendment to the Purchase Order, within the general scope of this contract, in (1) quantity of materials or service, whether more or less; (2) drawings, designs, or specifications, where the supplies to be furnished are to be specially manufactured for the City; (3) method of shipment or packing; and (4) place of delivery. If any such change causes an increase or decrease in the cost or the time required for the performance of this contract, an equitable adjustment shall be made by written modification of the contract or

amendment to the Purchase Order. Any claim by the bidder for adjustment under this clause must be asserted within 30 calendar days from the notification date.

49. Assignment:
Vendor shall not assign or delegate duties or responsibilities under this agreement, in whole or in part, without prior written approval of the City.

50. Disputes After Award:
Except as otherwise provided in these provisions, any dispute concerning a question of fact arising under this contract which is not disposed of by agreement shall be decided by the Purchasing Manager, who shall reduce this decision to writing and mail a copy to the bidder. The decision of the Purchasing Manager shall be final and conclusive, unless bidder requests arbitration within ten (10) calendar days. Pending final decision of a dispute, the bidder shall proceed diligently with the performance of the contract and in accordance with the Purchasing Manager's decision.

51. Arbitration after Award:
Any and all disputes, controversies or claims arising under or in connection with the contract resulting from this bid, including without limitation, fraud in the inducement of this Contract, or the general validity or enforceability of this Contract, shall be governed by the laws of the State of Nevada without giving effect to conflicts of law principles, may be submitted to binding arbitration before one arbitrator, and shall be conducted in accordance with the Commercial Arbitration Rules of the American Arbitration Association in a private manner in Washoe County, Nevada. This award shall be final and judgment may be entered upon it in any court having jurisdiction thereof. In reaching this final award, the arbitrator shall have no authority to change or modify any provision of this Contract. All other expenses of arbitration shall be borne equally by the parties. All fees, including legal fees, shall be borne by the party who incurred them. All costs of enforcement shall be borne by the losing party. Each party shall have the right to discovery in accordance with the Nevada Rules of Civil Procedure.

52. Lawful Performance:
Vendor shall abide by all Federal, State and Local Laws, Ordinances, Regulations, and Statutes as may be related to the performance of duties under this agreement. In addition, all applicable permits and licenses required shall be obtained by the vendor, at vendor's sole expense.

53. Annual Appropriation of Funds:
Multi-year term supply and service contracts and leases are subject to annual appropriation of funds by the City Council. The City plans and makes appropriations to the City Budget with respect to a fiscal year that starts July 1st and ends June 30th of each year. Payments made under term contracts and leases are considered items of current expense. Purchase Orders are funded when issued; therefore, they are current expense items and are not subject to any subsequent appropriation of funds.

Continuance of a multi-year contract beyond the limits of funds available shall be contingent upon appropriation of the requisite funds in the ensuing fiscal year and the termination of this contract due to lack of appropriation shall be without penalty.

54. Extension:
When in the City's best interest, this agreement may be extended on a daily, month-to-month, or annual basis by mutual agreement of both parties. Services and/or materials received under an extension shall be in accordance with pricing, terms, and conditions, as described herein.

55. Termination:

The City may terminate this agreement and be relieved of any consideration to the vendor should vendor fail to perform in the manner required. Furthermore, the City may terminate this agreement for any reason without penalty upon giving thirty (30) days written notice to the vendor. In the event of termination, the full extent of City liability shall be limited to an equitable adjustment and payment for materials and/or services authorized by and received to the satisfaction of the City prior to termination.

56. Venue:

This agreement shall be governed by and interpreted according to the laws of the State of Nevada, and venue for any proceeding shall be in Washoe County.

Special Conditions and Specifications
(Specific to Project)

In instances where the Special Conditions conflict with the General Conditions, the Special Conditions will prevail with respect to that instance or item(s).

SPECIAL PROVISIONS
NORTH TRUCKEE DRAIN REALIGNMENT – PHASE 1
Bid Number 13/14-007, PWP# WA-2014-011

These Special Provisions supplement and modify the "Standard Specifications for Public Works Construction" Latest Edition, the Truckee Meadows Water Authority Engineering & Construction Standards, and are adopted by the City of Sparks, Nevada (hereafter "CITY", "Representative", "Project Manager", "Engineer"). All of the requirements and provisions of said Standard Specifications shall apply except where modified by the plans and these Special Provisions (all contained within this bid document). Where discrepancies exist between these Special Provisions and aforementioned standard specifications, the Special Provisions shall govern.

PART 1 – GENERAL PROVISIONS

SECTION 1: SCOPE OF WORK
Workscope: The work performed under this contract consists of, but is not limited to: clearing and grubbing the work area, excavation and fill of specified areas, construction of new reinforced concrete boxes, construction of new roadways with asphalt and concrete, traffic control, relocation of utilities, dewatering, disposal of material excavated, as well as all appurtenant work necessary to complete the project as stated in the bid specifications. The locations of the work are generally bounded on the North side by Interstate 80, on the South and East sides by the Truckee River and on the West side by Sparks Blvd. The project limits are within the City limits of the City of Sparks, Washoe County, Nevada, and is more specifically designated in the plans for this project.

SECTION 2: TECHNICAL SPECIFICATIONS / SPECIAL PROVISIONS
The requirements set forth in these "Technical Specifications" (Special Provisions) shall be used in addition to those set forth in "Standard Specifications for Public Works Construction", latest edition.

SECTION 3: STANDARD SPECIFICATIONS AND DETAILS
All materials furnished and work performed shall be done in accordance with the latest edition of the Standard Specifications for Public Works Construction (hereinafter designated "Standard Specifications" or "Orange Book"), and any revisions thereto if not covered or amended by the Special Technical Provisions; and the Standard Details for Public Works Construction (hereinafter designated "Standard Details"), except as modified by the drawings.

SECTION 4: NOTICE TO PROCEED
Contract time will begin on the date specified in the "Notice to Proceed", unless operations begin at an earlier date, in which case the date that such operations begin will apply. The CONTRACTOR shall immediately begin and diligently prosecute the work to completion. The CONTRACTOR shall obligate himself to complete the work within the stated working days.

SECTION 5: WORKING DAYS
The work to be performed under this contract shall be commenced after all executed Contract Documents have been submitted, within five (5) calendar days of the commencement date set forth in the Notice to Proceed.

SECTION 5a: WORKING DAYS for GREG STREET
The work between Station 55+44 and 57+50 (crossing of Greg St), including any and all alternates and options, shall be completed within one hundred and twenty (120) **CALENDAR** days after commencement of work within these stations.

SECTION 5b: WORKING DAYS for ENTIRE PROJECT
The work, including any and all alternatives and options, shall be completed within three hundred sixty five (365) CALENDAR days after the commencement date set forth in the Notice to Proceed.

SECTION 6: LIQUIDATED DAMAGES
In case all work called for under the contract is not completed before or upon the expiration of the time limits set forth above, it is agreed by the parties to the contract that damage will be sustained by the CITY and that it will be impracticable to determine accurately the actual damage the CITY will sustain in the event of any such delay. Therefore, the CONTRACTOR shall pay to the CITY, the amounts specified below for each and every working day's delay in finishing the work in excess of the number of working days prescribed and the CITY shall further have the right to charge to the CONTRACTOR, his heirs, assigns or sureties and to deduct from the final payment for the work, all or any part as it may deem proper of the actual cost of which are directly chargeable to the contract and which accrue during the period of such extensions, except that the cost of the final surveys and preparation of final estimate shall not be included in such charges. The CITY may deduct this amount from any money due or that may become due the CONTRACTOR under the contract. This payment shall not be considered as a penalty, but as liquidated damages suffered by the CITY on account of the failure of the CONTRACTOR to complete the work within the time limit of the contract.

SECTION 6a: LIQUIDATED DAMAGES for GREG STREET
The CONTRACTOR shall pay to the CITY, TWO THOUSAND FIVE HUNDRED DOLLARS ($2,500.00) for each and every **CALENDAR** day's delay.

SECTION 6b: LIQUIDATED DAMAGES for ENTIRE PROJECT
The CONTRACTOR shall pay to the CITY, FIVE HUNDRED DOLLARS ($500.00) for each and every **WORKING** day's delay.

SECTION 7: EXCUSABLE DELAYS
The CONTRACTOR shall not be assessed with liquidated damage nor the cost of engineering inspection during any delay in the completion of the work caused by acts of God, the public enemy, fire, floods, epidemics, quarantine restrictions, strikes, freight embargoes, unusually severe weather, or due to such causes, provided that the CONTRACTOR shall within ten (10) days from the beginning of such delay notify the CITY in writing of the causes of delay. The CITY's findings of the facts thereon shall be final and conclusive.

SECTION 8: INTENT OF THE PLANS AND SPECIFICATIONS
The intent of the plans and specifications is to prescribe a complete outline of work, which the CONTRACTOR undertakes to do in full compliance with the contract.

The CONTRACTOR shall furnish all required materials, equipment, tools, labor and incidentals, unless otherwise provided in the contract and shall include the cost of these items in the contract unit prices for the several units of work. All items of work called for on the plans or in the specifications and not included as a separate item in the proposal shall be considered as incidental to the other items listed in the proposal and the payment for such incidental items shall be considered as included in the contract unit prices bid.

SECTION 9: AUTHORITY OF THE PROJECT MANAGER AND INSPECTOR
All work shall be done under the supervision of the Project Manager acting on behalf of the CITY. He shall decide all questions that arise as to the quality and acceptability of materials furnished, work performed, manner of performance, rates of progress, interpretation of the plans and specifications,

acceptable fulfillment of the contract and compensation under the specifications. He shall determine the amount of work performed and materials furnished and his decision and estimate shall be final. His estimate shall be "condition precedent" to the right of the CONTRACTOR to receive money due him under the contract. The Project Manager does not have authority to authorize changes in plans and specifications without prior written approval of the CITY.

The CITY shall provide an inspector who will represent the CITY and the Engineer and shall make inspections of all work, sample and test materials and do such other work relative to supervision of the project as he may be assigned by the CITY. All instructions given by the inspector are subject to approval by the CITY.

SECTION 10: CHANGE ORDERS

The CITY reserves the right to make alterations or supplements to the Contract. Change Order Forms are required for all changes in decreases and/or increases of quantities and/or dollar amount changes in accordance with the "Standard Specifications".

SECTION 11: COOPERATION WITH OTHER CONTRACTORS

The CONTRACTOR shall cooperate with other CONTRACTORS who may be employed by the CITY, or other agencies, on construction of other work adjacent to or in the proximity of the location of the project.

SECTION 12: HAZARDOUS MATERIAL DEMOLITION

If the handling, demolition and removal of hazardous materials, including but not limited to Asbestos Cement Pipe, is required by contract plans and/or documents, an **Asbestos Removal Permit** shall be obtained from Washoe County Health District – Air Quality Management Division. All activities associated with asbestos shall adhere to local, state, federal, and OSHA laws, regulations, and guidelines, including 40 CFR Part 61, Subpart M including requirements regarding having a properly trained person to supervise removal and utilization of EPA approved worker protection practices.

SECTION 13: DISPOSAL OF EXCESS AND WASTE MATERIALS

Trash, construction debris, cleared vegetation, excavated material unsuitable to be incorporated in the construction shall become the property of the CONTRACTOR and shall be removed by the CONTRACTOR and shall be legally disposed of offsite in accordance with all federal, state and local regulations. The CONTRACTOR is referred to the Soil and Groundwater Management Plan (HDR, February 2013) for summary of contaminants and constituent levels likely to be encountered in the soils.

SECTION 14: LIMITS OF CONTRACTOR'S OPERATIONS

The CONTRACTOR will confine his operations within the limitations of construction easements or limits as shown on the drawings. If the CONTRACTOR's operations result in damage to any publicly or privately owned facilities outside the limitations of the construction easement, the CONTRACTOR shall, at his expense, repair such damage or indemnify the owner of the damaged property.

The CONTRACTOR shall be required to place chain link fence panels on top of temporary reinforced concrete barricades ("Jersey walls") – or comparable water filled barricades - along all easement lines within the project area when the CONTRACTOR is working in those areas. Any areas that contain a permanent fence along the easement line are not required to have the chain link fence. This fence shall be surveyed in and placed correctly before any work may begin. Orange construction fence will not be acceptable. This temporary fencing shall remain in good working condition for the duration that the CONTRACTOR is working in a specific area. The Construction Manager or CITY shall make timing for

fence installation and subsequent removal. Fence panels/barricades must be repaired or replaced within 24 hours should damage occur. There will be no direct payment for the temporary fence panels. Cost shall be included as part of mobilization / demobilization. CONTRACTOR shall coordinate with individual landowners regarding schedule and when the fence panels are to be placed so landowners can remove any and all items in the easement area.

If the CONTRACTOR negotiates with property owners for the use of land for construction operations outside the limits of the construction easements, he shall do so at his own risk and the CITY will assume no liability for such use of private property. All agreements between the CONTRACTOR and private property owners shall be in writing and the CITY will be furnished copies of such agreements.

SECTION 14b: LIMITS OF CONTRACTOR'S OPERATIONS WITHIN APN 034-171-24

Within the bounds of APN 034-171-24, regarding utility demolition and reconstruction construction efforts, CONTRACTOR shall have access to the allocated easement only during the hours specified under Section 19b of these provisions. At all times outside of active construction efforts, CONTRACTOR shall not store materials or equipment within the easement and shall allow tenants full and unimpeded access (to the front face of curb) for delivery and export activities.

For areas including and west of the Larkin Circle bulb where the RCB will be constructed, CONTRACTOR shall have full usage of the easement for the duration of the project, and shall delineate and protect said easement per the stipulations set forth in these provisions.

SECTION 15: PROTECTION OF EXISTING UTILITIES

The location of existing utilities and drain lines shown on the plans are not guaranteed, but indicates generally their location according to the best knowledge of the Project Manager. The CONTRACTOR shall notify Underground Services Alert (USA Dig) at 1-800-227-2600, and NV Energy, Truckee Meadows Water Authority (TMWA), SBC, Verizon/MCI and other fiber optic companies, Charter Communications and other cable companies not less than five (5) working days prior to the start of construction to verify the location and depths of utilities.

The CONTRACTOR shall take inventory of the exact location of all vaults, boxes, conduits, sanitary sewer laterals, cables, pipe systems, etc. and shall protect said utilities. The CONTRACTOR at his own expense shall repair any damage caused by operation of the CONTRACTOR. It shall be the CONTRACTOR's responsibility to contact the impacted utility for any replacement hardware.

The CONTRACTOR shall submit the utility inventory to the CITY and the utility companies upon the completion of utility lowering activities. The CONTRACTOR shall also keep a copy of the utility location inventory list on the project work site at all times for emergency shutoff purposes.

It shall be the CONTRACTOR‘s responsibility to adjust all surface mounted utility appurtenances, such as manholes, survey monument covers and valve boxes to grade consistent with the grade of the restored street surface.

SECTION 16: CONTRACT AMOUNT

The total amount payable under this contract shall be determined by the sum of the amounts earned and the various quantities of repairs actually made and determined from unit prices as furnished by the CONTRACTOR in the schedule of prices contained in his proposal. The various quantities of repairs in the bid proposal are estimates and the CITY reserves the right to vary quantities as may be necessary.

SECTION 17: PRECONSTRUCTION CONFERENCE

After the execution of the contract, but prior to the commencement of any work, a preconstruction conference between the CONTRACTOR and the CITY will be held at a mutually acceptable time and place. As described in Section 21, the CONTRACTOR shall submit the name and qualifications of the proposed traffic control superintendent prior to the preconstruction meeting.

SECTION 18: MEASUREMENT FOR PAYMENT

Whenever possible, the actual quantities installed or work performed on any project shall be measured on the site of the work by a crew composed of both the CONTRACTOR and the CITY or Inspector. This combined crew shall record all measured quantities in field notebooks, in legible and understandable entries. The CONTRACTOR and the CITY shall each have a set of field notes which are to be in agreement on all quantities and items measured and shall include all work accomplished on the project under contract. Each set of field measurements shall be initialed and dated by responsible representatives of the CONTRACTOR and the CITY or Inspector participating on the combined crew. In the event that it is not possible to form a combined crew for the measurements, the area repaired shall be measured by the CITY or Inspector.

SECTION 19: PRE/POST-CONSTRUCTION WALK-THRU

The CONTRACTOR, Inspector, and/or CITY shall conduct a pre and post construction walk-thru. The video shall clearly show the pre-construction condition of all roadways, concrete gutters, traffic signs, landscaping, staging areas and commercial business areas that will, or have the potential to, be disturbed by the CONTRACTOR'S operations.

The video shall clearly display the date and time the video was taken and shall be organized by street with verbal notes of location of video, such as address. This tape will be in a DVD format or commonly recognized digital media format (*.WMF, *.MPEG, *.AVI, etc.) and a digital hard copy of the recording will be provided to the CITY. Areas near the property lines, back of sidewalk and driveways, landscaping, mow strips, fences and edging should be specifically filmed so to avoid any disputes or damage claims with property owners. The CONTRACTOR will be required to replace and or repair all areas that damaged by construction activities. Areas that are in question or concern should be noted on the video and the CONTRACTOR should notify the CITY or inspector.

The CONTRACTOR shall not mobilize or start any construction activities until the CONTRACTOR receives a written approval of the contents of the DVD from the CITY.

SECTION 20: WORKING DAY, WORK HOURS, SATURDAY, SUNDAY, HOLIDAY AND OVERTIME WORK

The CONTRACTOR shall not perform any contract work on Sunday, legal Holidays and outside of the twelve (12) hours available (beginning at 7:00 A.M. Pacific Time) during a regular working day except as directed and/or approved by the CITY and as specified herein.

If the CONTRACTOR plans to perform work outside of the twelve (12) hours available during a regular working day, the CONTRACTOR shall first obtain approval from the CITY at least twenty-four (24) hours prior to commencing such overtime work. If the CONTRACTOR plans to perform work on Sunday, they shall obtain approval by the Thursday prior to work on the Sunday for which work is planned. If the CONTRACTOR plans to perform work on a legal Holiday, they shall first obtain approval from the CITY at least 48 hours in advance.

The CONTRACTOR shall anticipate night and weekend work for utility relocations and outages. Each utility shall be coordinated with in this regard.

Whenever night work approval is granted, work shall commence no earlier than 7:00 P.M. and must stop by 7:00 A.M unless written permission is granted otherwise by the CITY.

The CONTRACTOR shall be charged for all of City of Sparks' employee(s) time spent for overtime, Saturday, Sunday or Holiday work, based on the employee's hourly rate, plus benefits. The

CONTRACTOR will be notified of the costs incurred and if the payment is not made, such costs will be deducted from any payment due to the CONTRACTOR.

The CONTRACTOR's normal working hours shall be from 7:00 A.M. until 7:00 P.M., Monday through Saturday unless otherwise required by these specifications or approved in writing by the CITY when requested in writing by the CONTRACTOR, excluding but not limited to, the following legal Holidays, recognized by the City of Sparks:

January 1	New Year's Day
3rd Monday in January	Martin Luther King, Jr. Birthday
3rd Monday in February	President's Day
Last Monday in May	Memorial Day
July 4	Independence Day
1st Monday in September	Labor Day
Last Friday in October	Nevada Day
November 11	Veteran's Day
4th Thursday in November	Thanksgiving Day
4th Friday in November	Family Day (day after Thanksgiving)
December 25	Christmas Day

SECTION 20b: WORK HOURS FOR UTILITIES CONTAINED WITHIN APN 34-171-24

The CONTRACTOR'S normal working hours for all utility efforts within APN 34-171-24 between "NTD" Station 62+55 and Station 66+00 shall deviate from those specified for the rest of the project. For this area, work shall be conducted during (a) continuous 60-hour period(s) from 7:00 P.M. on a Friday night until 7:00 A.M. on a Monday morning. During this time, all demolition work, excavation, installation, backfill and patching efforts shall be conducted for the following items:

- 12" storm drain pipe and associated drop inlets / tie-ins between station ~64+22 and ~65+90
- 12" TMWA water line installation
- 6" and 8" TMWA water line demolition, and associated appurtenances including meter, to stand pipe
- 1.25" and 2" private water laterals, and associated appurtenances including meter and corp stop
- 2" gas pipe

No work of any kind shall be allowed outside of specified working hours within this area.

If work is performed during a time/season when temperatures do not meet specifications for a permanent AC patch, trench shall be covered with a temporary AC trench patch (per Standard Details) until such a time when a permanent patch may be constructed. When weather permits (per Orange Book 315.03), construct a permanent bituminous pavement patch. This effort shall be conducted during the same weekend work hours as specified previously.

The specific weekend(s) chosen shall be coordinated with other work so that storm runoff will properly drain and flow from the site and into the adjacent subterranean storm drain network. Water shall not be allowed to pond in parking lots as a result of this work.

Times chosen shall additionally be coordinated with tenants and the property manager (Mark Meiser at GB EGC LLC, 315 Freeport Blvd. Sparks, NV 89431, 775-359-0303, mmeiser@compuserve.com) and deliveries in the adjacent building on the same parcel. Construction efforts shall not disrupt deliveries to and from said tenants.

SECTION 20c: WORK HOURS FOR CROSSING OF GREG STREET

Earthwork and installation efforts for the crossing of Greg Street (regardless of method chosen) is not subject to the previously mentioned working hours, and may, at the CONTRACTOR'S discretion, proceed uninterrupted until the crossing is complete. This allowance applies to ~"NTD" Station 55+40 until ~"NTD" Station 57+97.

The erection/installation, modification, and removal of all traffic control on Greg Street (~"NTD" Station 56+00 to ~"NTD" Station 57+00) shall occur between the hours of 10:00 pm and 6:00 am the following day. Changes or modifications to traffic control outside of these hours shall not be permitted.

SECTION 21: REINFORCED CONCRETE BOX MATERIAL

For this project, CONTRACTOR shall have the option to choose either Cast-In-Place Reinforced Concrete Box Culvert or Precast Reinforced Concrete Box Culvert (in tongue and groove sections). Installation may entail all of either material, or (a) combination(s) thereof, provided that proper transition structures or materials adequately connect the different materials.

Regardless of the material chosen, the material and the installation shall adhere to the applicable sections found in the Standard Specifications for Public Works Construction.

SECTION 22: GENERAL AND MATERIAL SUBMITTALS

Refer to Specification Section 01340 for requirements for the mechanics and administration of the submittal process.

Submittals shall be provided in a timely manner as items not approved shall not be installed. Items 1-13 shall be submitted at the preconstruction conference.

The following items, (including but not limited to) are required submittals.

General

1. Construction Schedule
    a. Overall Project
    b. Dates for Greg Street Crossing
    c. Dates for Storm Drain construction within parcel 34-171-24
    d. Dates for RCB construction within parcel 34-171-24
    e. Dates for RCB construction in Larkin Circle, west of Madison Ave.
    f. Dates for RCB construction in Larkin Circle, east of Madison Ave.
    g. Dates for SS lift station and bypass piping
2. Schedule of Values
3. Permits
4. Safety Program
5. Traffic Control Plan
6. Haul Routes
7. Hazardous Material Management Report
8. Dewatering Plan

9. Reinforced Concrete Box Construction / Installation Plan
10. Project Surveyor
11. Utility Inventory (per Section 14)
12. Greg Street Crossing Plan
    a. Bore and Jacking Operation for Greg St. (if applicable) – multiple submittals (305.18)
    b. Temporary Bridge with Open Cut for Greg St. (if applicable) – multiple submittals
    c. Other (if applicable)
13. Soil Management Plan
14. Potable Pipeline Flushing and Disinfecting Plan
15. Sanitary Sewer Bypass System
16. Notices to Businesses
    a. Traffic ingress and egress
    b. Utility outages
17. Concrete Patching Methods
18. Record Drawings
19. Certified Payroll Reports

Materials

1. Aggregate Base Material
2. Asphalt Mix Designs
3. Concrete Mix Designs
4. Granular Backfill and Bedding Materials
5. Concrete Repair Materials
6. Concrete Curing Compound
7. Slurry and Mortar Mix Designs
8. Fencing
9. Frames and Covers
10. Manholes and Appurtenances
11. Mastic Material
12. Non-shrink Grout for Manholes
13. Geotextile Fabrics
14. Pipe Materials
15. Pipe Fittings and Pipe Restraints
16. Polyethylene Encasement for Ductile Iron Pipe Systems
17. Reinforced Concrete Box Design / Mix Designs for Boxes
18. Pipe Fittings and Appurtenances
19. Prime Coat
20. Rebar
21. Valve Boxes, Covers, Risers
22. Valves and Appurtenances
23. Warning Tape
24. Permanent Signs
25. Pavement Marking Film
26. Product Data Sheets (PDS)
27. Paint System Data Sheet (PSDS)
28. Tapping Sleeves
29. CTS HDPE Tubing and Connections for service lines
30. Service Saddles and Corp Stops
31. Water Meter Boxes per TMWA Standards

32. Water Meters
33. Flange and Mechanical Joint T-Head Bolts and Nuts
34. Reinforcing Steel Bending and Cutting Diagrams
35. Miscellaneous Brass Fittings
36. Packaged Sanitary Sewer Lift Station (including:)
    a. Scaled drawings showing wetwell plan and sections, complete with dimensions
    b. Pump cut sheets and complete specifications
    c. Pump performance curves including efficiency, $NPSH_{req}$, horsepower, etc.
    d. All piping and valves specifications and cut-sheets
    e. Engineer's stamped calculations
    f. Electrical and controls specifications, cutsheets, and control diagrams

SECTION 23: ACCOMMODATION FOR PUBLIC TRAFFIC

All traffic control shall conform to the latest editions of the NDOT Work Zone Traffic Control Handbook and the Manual on Uniform Traffic Control Devices (MUTCD) and as directed by the City of Sparks Community Services Department.

Per section **100.33.01 MAINTENANCE OF TRAFFIC** of the "Standard Specifications for Public Works Construction" Latest Edition, the CONTRACTOR shall maintain access to each business and or property owners on Kleppe Lane, Larkin Circle and Madison Avenue throughout the project duration, including access to loading docks and adequate ingress and egress of trucks and equipment so that shipments and deliveries can be conducted without interruption or interference. In order to accomplish these requirements, CONTRACTOR shall anticipate the following: phasing of the work, building new or modifying existing driveways, flaggers to direct one way traffic, night and weekend work and any other means to accomplish this directive. CONTRACTOR shall coordinate specific access requirements with individual businesses so that size, type and timing of deliveries / exports can be properly accounted for. See Section 19 for Working Hour requirements.

Regarding Parcel 34-171-24, CONTRACTOR shall coordinate with property owner and individual tenants regarding potential removal and replacement in-kind of two (2) concrete masonry unit trash enclosures if such is necessary to provide sufficient ingress and egress.

The CONTRACTOR shall designate a Traffic Control Supervisor (TCS), certified by the American Traffic Safety Services Association (ATSSA), who shall be responsible for planning, initiating, installing and maintaining all traffic control devices, as shown on the traffic control plan, as specified in the MUTCD and these specifications. The designated construction TCS shall be available to be contacted twenty-four (24) hours a day, seven (7) days a week, for the life of this Contract.

The traffic control plan shall scaled such that all proposed signage and traffic control for all streets in the entire unit can be seen on one full size (24"x 36") plan sheet. The CONTRACTOR shall submit two (2) copies of proposed traffic control plan to the CITY for review and comments five (5) working days prior to the pre-construction meeting. The proposed traffic control plan shall be prepared and signed by a certified TCS, retained by the CONTRACTOR.

The CONTRACTOR's traffic control plans shall include, but not be limited to, the following:

- Proposed construction zone and existing speed limits
- All construction signing
- Message board locations
- Location of flaggers
- Types and locations of traffic control devices

- Temporary lane striping
- Construction phasing
- Lane crossovers between construction phases
- Method for maintaining traffic signal functions
- Detours
- Accommodations for pedestrian, bicycle, and transit facilities
- Special events accommodations (namely but not limited to):
    - Hot August Nights (August)
    - Rib Cook Off (September)
    - Street Vibrations (September)

If, during construction, revisions to the accepted plan is necessary or safety or accommodation to traffic, these changes must also be prepared by the ATSSA certified, Traffic Control Supervisor.

The CITY may authorize a suspension of work during unfavorable weather or other conditions beyond the control of the CONTRACTOR. During such a suspension, the CONTRACTOR shall make passable and shall open to traffic such portions of the project under improvement and such temporary roadways or portions thereof as may be agreed upon between the CONTRACTOR and the CITY for the accommodation of necessary traffic during the period of suspension. The maintenance of the temporary route, replacement or renewal of any work or materials lost or damaged, removal of any work or materials and temporary maintenance shall be at the expense of the CONTRACTOR.

During non-working hours, any hazardous section of the work shall be outlined with markers and flares. If deemed necessary by the CITY, barricades shall be erected to protect public traffic or he may direct the CONTRACTOR to furnish flagger(s) and pilot cars. Such markers, flares, barricades, flagging or piloting shall be at the expense of the CONTRACTOR.

When the CONTRACTOR's hauling equipment is required to merge with a cross, traffic and at such other points which may be necessary to maintain safe traffic conditions, flaggers shall be provided to each side of the impairment to stop and direct traffic.

In case of damage to detours due to storms or other causes, the CONTRACTOR shall at once repair the damage, provide other detours or provide for carrying traffic through construction operations. Water shall be applied at points and in amounts as directed by the CITY, to keep the roadbed firm, smooth, stable and to reduce the dust hazard to a minimum.

Construction Zone Signs shall be placed on all cross streets where traffic is to be maintained. They shall be placed a sufficient distance from the construction to give motorist's adequate warning of the construction. None of the provisions herein shall be construed to restrict or prohibit, at any time, the prosecution of items of work, which will not interfere with the use of existing streets.

All flagging, piloting, signs, barricades, maintenance of work, streets, structures, detours, temporary approaches, replacement or renewal of work, water applied for these items or for dust control, shall not be paid for directly, but shall be included in various pay items of the proposal and the CONTRACTOR shall not be paid an additional amount for such work. When so ordered by the CITY, detours shall be surfaced and the materials needed shall be paid for by the cubic yard or ton as set forth in the pay items of the proposal.

Initial deployment of construction signs and traffic control devices on shoulders may not occur more than 24 hours in advance of work activities.

The CONTRACTOR shall verify with the CITY that necessary labor, equipment and materials for the planned work activities are on site prior to placing traffic control devices. Do not begin placing traffic control devices until necessary labor, equipment and materials are on-site to perform planned work activities.

Upon completion of a specific work activity or item as identified in the project schedule, remove traffic control devices from the project roadway and stockpile at an approved staging area if subsequent work is not scheduled in the same project phase, stage, or location within 5 working days (or 7 calendar days for calendar day or completion date projects). In addition, prior to holidays or special events, remove all traffic control devices which no longer apply to existing conditions, as directed. Traffic control devices must be removed from the roadway and stockpiled a minimum of 30 ft. from the pavement edge at an approved staging area.

A single traffic lane in each direction on Greg Street shall be preserved at 11 ft. minimum at all times, and at no time will traffic be allowed to be completely stopped in either direction.

Traffic lane(s) on Larkin Circle shall be preserved at **11 ft. minimum at all times**, and may be permitted to be stopped for up to 10 minutes, and may be permitted to be reduced to 1-way travel provided that sufficient access to driveways and to the travel ways is preserved for all vehicles.

After presumptive completion of all pay items and at such time as contract time is suspended for final clean up, remove all traffic control devices daily from the roadway and stockpile a minimum of 30 ft. from the pavement edge at an approved staging area. All traffic control devices necessary for final clean up work shall be placed and removed from the project right-of-way on a daily basis.

The traffic control supervisor shall make at least three (3) inspections of all traffic control devices each day, with no longer than 12 hrs. elapsing between inspections, as follows:

1. Before beginning work.

2. At mid-shift.

3. After the end of the shift.

Flaggers shall have completed an approved instructional course in flagger procedures and shall possess a valid flagger card attesting that they have satisfactorily completed said instructional course. Flaggers shall wear vests meeting Performance Class 3 requirements set forth in ANSI/ISEA 107-2004 “American National Standard for High-Visibility Safety Apparel and Headwear”.

Equip the flaggers at each end of work zones with two-way communication radios to allow them to be in contact with each other to control public traffic through the work zone, as conditions require.

Failure to comply with any of the requirements specified herein will be considered a traffic control deficiency and subject to the liquidated damages.

If two violations of the traffic control requirements specified herein are observed by the CITY, work may be suspended. If work is suspended, submit a written revised plan, which addresses the deficiencies. Upon written approval of the plan, the construction operations may resume. Working days, or calendar days, will continue to be assessed during the suspension period.

Should the CONTRACTOR appear to be negligent in furnishing or maintaining warning and protective measures, as described herein, the CITY may direct attention to the existence of the hazard, and the necessary measures shall be immediately furnished and installed by the CONTRACTOR. Failure to do so will be cause to suspend the work until the deficiency is corrected. If the deficiency is not corrected by the end of the work day and the CITY determines that public safety is endangered, then the CITY may in an emergency situation, with or without notice, or prior legal process to the CONTRACTOR, provide suitable protection. In a case where the CITY is forced to provide protection to the general public, a Change Order shall be issued unilaterally deducting from the payments due the CONTRACTOR, the costs of correcting such deficiencies. This cost may include but is not limited to Design Consultants fee, CITY staff time and wages, rental equipment costs, or possibly the use of an outside CONTRACTOR.

SECTION 24: CLEANUP AND DUST CONTROL

It shall be the CONTRACTOR's responsibility to provide cleanup and dust control throughout all phases of construction, including suspension of work, and until final acceptance of the project. The CONTRACTOR shall keep the work site and other adjacent areas clean and free from rubbish and debris. The CONTRACTOR shall also abate dust nuisance by cleaning, sweeping, and sprinkling with water, or other means as necessary. A power broom will not be an acceptable means of cleaning the site unless used in conjunction with water to prevent dust from the power broom operation. The use of water resulting in mud on public streets will not be permitted as a substitute for sweeping or other methods. All water used for dust control must be from a potable water source.

All construction procedures shall conform to Washoe County Health Department – Air Quality Management Division standards, and a **Dust Control Permit** shall be obtained from said agency.

Excess excavated material from trenches, manholes, catch basins or similar structures in public streets shall be removed from the site immediately. At no time will the CONTRACTOR be allowed to store debris or materials on the street overnight. All asphalt, concrete, soil and aggregate base will be hauled off at the conclusion of each working day. Materials for installation of Drop Inlets (Pipe, boxes frame and cover) will be allowed to be stored onsite with the approval of the CITY or inspector. Sufficient material may remain for use as backfill, but shall not remain during non-working hours. Forms and form lumber shall be removed from the site as soon as practical after stripping. No screening of excavated material will be allowed in the street. The CONTRACTOR shall remove all trash from the site in a timely manner. At no time shall the CONTRACTOR permit disposal of trash in any excavation.

Materials and equipment shall be removed from the site as soon as they are no longer necessary; and, upon completion of the work and before final inspection, the entire worksite shall be cleared of equipment, waste and unused materials, construction debris and rubbish so as to present a satisfactory clean and neat appearance.

Care shall be taken to prevent spillage on haul routes. Any such spillage shall be removed immediately and the area cleaned.

Failure of the CONTRACTOR to comply with the Agency's cleanup orders may result in an order to suspend work until the condition is corrected. Working days will continue to be counted during the suspension. No additional compensation will be allowed as a result of such suspension. No extension of contract time will be allowed as a result of such suspension.

If the contract time expires before final cleanup has been completed, liquidated damages, as specified in the contract, may be imposed.

SECTION 25: FORCE ACCOUNTS

THIS ITEM SHALL BE IDENTIFIED AS A CONTINGENT ITEM. The use of this contingent item will be as directed by the CITY. The quantity of the above contingent item of work, as set forth on the bid schedule represent no actual estimate, is nominal only and may be greatly increased or decreased or reduced to zero. The increase or reduction of this quantity as compared with that set forth on the bid schedule shall not constitute a basis for claim by the CONTRACTOR for extra payment or damages.

Force Account items as defined by the CITY will be additions to the contract arising within the course and scope of the contract for incidental costs due to unforeseen circumstances. Unforeseen circumstances include but are not limited to the following:

Emergency repairs, complications arising with interfacing new improvements to existing improvements, emergency pumping, emergency light/power plants, premium time or overtime to accelerate portions of work, unexpected utility modifications or conflicts, correcting existing substandard work, requested traffic control measures or signage, over-excavation of unsuitable materials, unknown field conditions, underground storage tanks, asbestos encountered, or any other miscellaneous or incidental items related to unforeseen circumstances.

Any force account items shall be adjusted daily upon report sheets, furnished to the CITY by the CONTRACTOR and signed by both parties. These daily reports shall thereafter be considered the true record of force account items for unforeseen circumstances. No additional incidental work shall be performed or made except upon a written order from the CITY.

SECTION 26: RECORD DOCUMENTS

The CONTRACTOR shall maintain, in a safe place at the job site, one record copy of the construction Drawings in good order and annotated to show all changes made during construction and all existing facilities exposed during construction. These record drawings shall be kept current and made available to the CITY and inspector for reference upon request. CONTRACTOR shall, at the completion of the project, return one completed copy of the Record Drawings to the CITY and TMWA. The CITY will not release CONTRACTOR's retention until the Record Drawings have been received and reviewed by the CITY.

Additionally, the CONTRACTOR is required to obtain the services of a Nevada licensed surveyor to complete an as-built survey of the project. This survey shall be completed during and at the end of the project (depending on features surveyed) and the CONTRACTOR is required to submit an AutoCAD drawing with a complete and useable surface that can be input into the CITY's files to record an exact as-built condition of the project.

Survey shall include, but is not limited to:

- Street centerlines
- Manhole rims and inverts
- Pipe diameters
- Rims and tops of nuts on valves
- Drop inlet flowlines
- Curb returns at driveways
- Inverts of RCB beginning and termination
- Locations of plantings
- Underground electric
- Centerline Monuments

Additionally, the CONTRACTOR is required to obtain the services of a Certified Environmental Manager to implement the Soil and Groundwater Management Plan (HDR February 2013), and to prepare a Contaminant Management Report upon completion of the project. This report shall be submitted to the CITY.

SECTION 27: PROJECT SUPERVISION

The CONTRACTOR will provide a superintendent for this project that is available during working hours. The CONTRACTOR will also provide a foreman for supervision of crews that are currently working on site. A "Working foreman" will not be permitted to supervise daily activities subcontractors will be subject to this rule as well. Supervision of several crews by one foreman will be permitted; the superintendent can also act as the supervision of the crews however, the superintendent must remain on the job at all times during working hours.

SECTION 28: SURVEYING AND TESTING

The CITY will provide construction surveying for the project. Reference points with grades will be provided as well as cut sheets. The CONTRACTOR should exercise extreme care around stakes, PK nails and any reference points. Any re-staking that is needed due to damage by the CONTRACTOR will be the responsibility of the CONTRACTOR.

Compaction testing, asphalt and concrete testing will be provided by the CITY. 24-hour notice must be given by the CONTRACTOR to the CITY or inspector prior to any testing. Three copies of aggregate base, concrete and asphalt submittals will be required for approval prior to any installation.

SECTION 29: DEWATERING / NUISANCE WATER

The CONTRACTOR shall provide the CITY with a dewatering plan at the preconstruction meeting. This dewatering plan shall address the methods which the CONTRACTOR plans on dealing with any water during construction of the box. The CONTRACTOR is referred to the Soil and Groundwater Management Plan (HDR, February 2013) for summary of contaminants and constituent levels likely to be encountered in the groundwater. This report is available as a separate document available from the website where potential bidders downloaded this bid document. The dewatering plan shall be approved by the CITY prior to work beginning. Contractor shall obtain De Minimus permits from NDEP.

SECTION 30: CONSTRUCTION SCHEDULE

The CONTRACTOR shall provide the CITY with a construction schedule at the preconstruction meeting. The schedule shall take into account all restrictions as set forth in the required permits as well as meet the requirements set forth in this section. Several specific items to note are described as follows:

- Dates of crossing Greg Street
- Dates for Storm Drain construction within parcel 34-171-24
- Dates for RCB construction within parcel 34-171-24
- Dates for RCB construction in Larkin Circle west of Madison Ave
- Dates for RCB construction in Larkin Circle east of Madison Ave
- Dates for SS lift station and bypass piping

SECTION 31: COORDINATION WITH CITY

The CONTRACTOR shall coordinate at least WEEKLY either in writing or in person with the CITY. Information communicated shall be (but is not limited to and may be added upon at the discretion of the CITY) as follows: 3 week work projection, work accomplished since previous meeting, dewatering and treatment efforts, excavation and handling/treatment of contaminated soils, etc.

SECTION 32: GREG STREET CROSSING CONSTRUCTION

All work on Greg Street shall be performed in the presence of the CITY.

The CONTRACTOR shall give the CITY a minimum of 72 hours advance notice of the start of an excavation or boring operation through Greg St.

It shall be the CONTRACTOR'S responsibility to ensure that all work, regardless of which method of crossing is chosen, is done in conformance with all applicable federal, state and local safety requirements.

Under no conditions or circumstances shall equipment or material be stockpiled or stored within 15 feet horizontal of an excavation.

All reinforced boxes shall be designed to bear HS-20 loading and soil dead and live loading per grades shown on the plans.

The following methods and specifications, while not a comprehensive list, are potential methods to cross Greg St:

Bore and Jack with Potential Soil Stabilization

All jacking and boring operations and/or associated soil stabilization efforts shall be performed by a qualified CONTRACTOR(s) with at least five years experience involving work of a similar nature i.e. length, diameter, depth, soil conditions, etc.

The CONTRACTOR shall be responsible for maintaining the specified line and grade and for preventing settlement of overlying pavement or other damage due to the jacking and boring operations.

Grout shall consist of one part Portland Cement, three parts sand and the minimum amount of water necessary to obtain the desired consistency; and, all grout mixtures shall contain two percent of bentonite by weight of the cement. Portland cement, water and sand shall conform to the applicable requirements of the Standard Specifications for Public Works Construction except that sand to be used shall be of such fineness that 100 percent will pass a Standard No. 8 sieve and at least 45 percent by weight, will pass a Standard No. 40 sieve. Bentonite shall be a commercial-processed powdered bentonite, Wyoming type, such as Imacco-gel, Black Hills, Sika, or equal.

Jacking Head:

A. A steel jacking head/shield shall be fitted to the lead section of the RCB in such a manner that it extends around the entire outer surface of the RCB and projects at least 18 inches beyond the driving end of the RCB.
B. The jacking head shall not protrude more than 1/2 inches outside of the RCB outer dimensions.
C. The head shall be securely anchored to prevent any wobble or alignment variation during the jacking or boring operations.
D. To minimize voids outside the casing, excavation shall be carried out entirely within the jacking head and not in advance of the head.
E. Dimensions of bore shall not exceed the dimensions of the RCB by more than 2 inches.
F. Excavated materials shall be removed from the RCB and from the boring/receiving pit as the jacking or boring operation progresses.

Jacking Pit:

A. The excavations for the jacking or boring operations shall be adequately shored to safeguard existing substructures and surface improvements and to ensure against ground movement in the vicinity of the jack supports.
B. Heavy guide timber, structural steel, or concrete cradles of sufficient length shall be provided to assure accurate control of jacking or boring alignment.
C. Provide adequate space within the excavation to permit the insertion of the lengths of RCB to be jacked or bored.
D. Timbers and structural steel sections shall be anchored to ensure action of the jacks in line with the axis of the RCB.
E. A bearing block, consisting of a timber or structural steel framework, shall be constructed between the jacks and the end of the RCB to provide uniform end bearing over the perimeter of the RCB and distribute the jacking pressure evenly.

Control of Alignment and Grade:

A. The CONTRACTOR shall control the application of the jacking pressure and excavation of materials ahead of the RCB as it advances to prevent the RCB from becoming earthbound or deviating from the required line and grade.
B. The CONTRACTOR shall restrict the excavation of the materials to the least clearance necessary to prevent binding in order to avoid loss of ground and consequent settlement or possible damage to overlying structures/roadways.
C. Allowable grade deviations in horizontal and vertical alignments shall be no greater than 0.2 feet per 100 feet in any direction over the length of the jacking or boring to a maximum deviation of 0.5 feet.
D. Paragraph 15 of Section 311.18 Precast Concrete Box Culverts in the Standard Specifications for Public Works Construction shall be deleted and replaced with the following: For multiple box installations utilizing the method of boring and jacking, a space greater than 3 feet but not greater than 5 feet measured from outside face to outside face shall separate each line of boxes.

Grouting:

A. Immediately after completion of the jacking or boring operations, the CONTRACTOR shall inject grout through the grout connections in such a manner as to completely fill all voids outside the RCB resulting from the jacking or boring operations.
B. Grout pressure shall be controlled so as to avoid movement of the surrounding ground.

Application of Mortar Lining and Coating to Joints:

A. Application of mortar to the interior joints shall be performed in accordance with the Standard Specifications for Public Works Construction.

Closing of Pits:

A. After jacking equipment and excavated materials from the jacking or boring operations have been removed from the jacking pit, the CONTRACTOR shall prepare the bottom of the jacking pit as a RCB foundation. The CONTRACTOR shall remove all loose and disturbed materials below pipe grade to undisturbed earth and scarify & recompact the material in accordance with the Plans and Specifications.

Prior to beginning any work in the Greg St fill (between "NTD" Station 53+40 to Station 57+50), the CONTRACTOR shall submit to, and be in receipt of the CITY's written acceptance of, a Nevada PE stamped package which includes the following:

- Detailed schedule and description of work
- Detailed locations and dimensions of boring/receiving pits
- Limits of excavation(s)
- Structural design for reinforced concrete backstop
    - Rebar sizing and configuration
    - Concrete mix design
- Structural design for RCB (note that the table on Sheet DT-4 only applies to depths <20' and is not necessarily designed to resist bore and jacking forces)
    - Rebar sizing and configuration
    - Concrete mix design
    - Grout mix design
    - Dimensions of individual RCB sections
- Supporting calculations
- Detailed drawings of the jacking head, box skid guides, excavation shield and required bracing
- Method and means to inject lubricant around box during, and grout subsequent to, jacking operations. Include number and configuration of ports in the RCB or tubes parallel to box
- Method and means to ensure roadway stability and traffic safety during jacking operations (including, but not limited to, injection of cementious material thorough vertical borings, etc.)
    - Soil stabilization chemicals (if applicable) including Material Safety Data Sheets
- Traffic control plan
- All associated and applicable permits
- Letter stating that all specified conditions have been met

<u>Open Cut with Usage of Temporary Bridges</u>

Prior to beginning any work in the Greg St fill (between "NTD" Station 53+40 to Station 57+50), the CONTRACTOR shall submit to, and be in receipt of the CITY's written acceptance of, a Nevada PE stamped package which includes the following:

- Detailed schedule and description of work
- Location and design of temporary bridge abutments
    - Depth and dimensions
    - Concrete mix design
    - Rebar sizing and configuration
- Limits of excavation(s)
- Material submittal for temporary bridge(s)
- Method for launching / erecting and disassembling the bridge(s)
- Structural design for RCB (note that the table on Sheet DT-4 only applies to depths <20')
- Supporting calculations
- Method and means to ensure traffic safety and stability of embankments and roadway during open cut efforts
- Traffic control plan
- All associated and applicable permits
- Letter stating that all specified conditions have been met

Temporary Bridges shall meet the following minimum requirements:

- Single span
- No-Sag HS-20 load rated

- Minimum shoulder width of 2' each
- Bridge deck does not have to be paved, but shall exhibit openings less than ½ inch square
- Bridge deck shall exhibit serrations or some comparable means or product so to provide adequate friction for tires under all weather conditions for the entire duration the bridge is utilized.

Temporary bridge(s) shall be obtained from a company who specializes in providing comparable structures, with at least five years of operation history.

Regularly, but at least once per week while bridge is in service, bridge, bearings and expansion joints shall be inspected and cleared of any trash or debris.

Temporary bridge shall exhibit < ½" vertical difference between the roadway drive surface and the bridge deck at all times.

Prior to opening to live traffic, bridge(s) shall be inspected by a licensed Nevada PE with at least 5 years of structural/bridge inspection experience. A written and stamped letter attesting to fact that each bridge was erected properly and is safe to carry live vehicle loads shall be provided to the CITY.

Open Cut with Phasing and Soil Tie Backs

Prior to beginning any work in the Greg St fill (between "NTD" Station 53+40 to Station 57+50), the CONTRACTOR shall submit to, and be in receipt of the CITY's written acceptance of, a Nevada PE stamped package which includes the following:

- Detailed schedule and description of work
- Manufacturer cut sheet(s) for Soil Tie Back devices
- Structural design for RCB (note that the table on Sheet DT-4 only applies to depths <20')
- Supporting calculations
- Method and means to ensure traffic safety and stability of embankments and roadway during open cut efforts
- Traffic control plan
- All associated and applicable permits
- Letter stating that all specified conditions have been met

Other Method

Prior to beginning any work in the Greg St fill (between "NTD" Station 55+44 to Station 57+50), the CONTRACTOR shall submit to, and be in receipt of the CITY's written acceptance of, a Nevada PE stamped package which includes the following:

- Detailed schedule and description of work
- Structural design for RCB (note that the table on Sheet DT-4 only applies to depths <20')
- Supporting calculations
- Method and means to ensure traffic safety and stability of embankments
- Traffic control plan
- All associated and applicable permits
- Letter stating that all specified conditions have been met

SECTION 33: APPLICABLE PUBLICATIONS

The publications listed form a part of these specifications to the extent referenced. The publications are referred to in the text by the basic designation only.

1. American Association of State Highway and Transportation Officials (AASHTO) Publications

2. The Standard Specifications for Public Works Construction (Orange Book), Latest Edition
3. Nevada Department of Transportation (NDOT) Standard Specifications for Road and Bridge Construction, Latest Edition
4. The International Building Code, Latest Edition
5. Truckee Meadows Water Authority (TMWA) Engineering & Construction Standards
6. NV Energy (Sierra Pacific Power Co. – SPPCo) Gas Engineering and Construction Standards Volume 15
7. American Concrete Pipe Association Concrete Design Manual, Latest Edition
8. American Water Works Association

This section references the appropriate American Water Works Association standards relating to gate valves; manufacturing, linings, coatings, pipe joints, and fittings for Ductile Iron and PVC water pressure pipe and miscellaneous pipe and fittings. The standards are a part of this section as specified and modified, and shall reflect the standard's latest edition.

A. Ductile-Iron pipe and fittings:

C104/A21.4 Cement-Mortar lining for Ductile-Iron Pipe and Fittings for Water.

C105/A21.5 Polyethylene Encasement for Ductile-Iron Pipe Systems.

C110/A21.10 Gray Iron and Ductile-Iron fittings, 3-48 inches for Water.

C111/A21.11 Rubber Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

C115/A21.15 Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges.

C150/A21.50 Thickness Design of Ductile-Iron Pipe.

C151/21.51 Ductile-Iron Pipe, Centrifugally Cast for Water or Other Liquids.

C153/A21.53 Ductile-Iron Compact Fittings for Water Service

C600-05 Installation of Ductile-Iron Water Mains and Appurtenances.

B. PVC pipe and fittings:

C605 Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water

C900 Polyvinyl Chloride (PVC) Pressure Pipe, 4-12 inches for Water Distribution.

C901 Polyethylene (PE) Pressure Pipe and Tubing, ½-inch through 3-inch.

C. Valves:

C500 Gate Valves, including the appendix.
C504 Rubber-Seated Butterfly Valves
C509 Resilient-Seated Gate Valves
C515 Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service

D. Disinfection of water mains:

C651 Disinfecting water mains.

BID ITEM CLARIFICATIONS
NORTH TRUCKEE DRAIN REALIGNMENT – PHASE 1
Bid Number 13/14-007, PWP# WA-2014-011

GENERAL INFORMATION

Unless indicated otherwise within the specific bid item as described in this section, the Engineer's estimated quantity as contained in the bid schedule shall be the final pay quantity. For bid items measured in lineal feet, the quantities are estimated by taking the horizontal projected lengths. For bid items measured in square feet, the quantities are estimated by taking the horizontal projected areas.

The Engineer's estimated quantity, as contained in the bid schedule, is based on the details and dimensions shown on the plans, and no guarantee is made that the quantity, which can be determined by field measurements and computations, will equal the estimated quantity.

In case of discrepancy between the quantity contained in the bid schedule and the quantity or summation for quantities for the same item shown on the plans, payment will be based on the quantity contained in the bid schedule

If City of Sparks, Nevada (CITY – herein also referred to as Engineer, Representative or Engineer Representative) intentionally increases or decreases the quantity of a particular item of work during construction, the final pay quantity of that item will be adjusted to reflect the change.

There shall be no additional payment for changes in the traffic control plan required as a result of changes in the Contractor's work method or schedule.

Bid Item 1. – Mobilization / Demobilization / Insurance / Bonds

This item shall include providing all labor, materials, supplies, equipment, services and other incidentals necessary for mobilization, demobilization, temporary facilities, transport fees, obtaining all required insurance, bonds, permits (except for those required for Dewatering – which are accounted for under other Bid Items), site dust control through out the project duration, and project signs to perform the work as shown on the plans and in accordance with local, state and national requirements.

This item shall also include compilation and review of Soil Management Plan – wherein handling and treatment of contaminated soils will be detailed, among other activities. Work under this item shall also include any preparatory work and operations necessary for the movement of personnel, equipment, supplies and incidentals to the project site before beginning construction, and include any other item of work for which other bid items have not been established in this bid schedule.

This item also includes all materials, labor, supplies, equipment (including job trailer(s), electricity, communication, sanitary services, potable services, etc.), and other incidentals for complete demobilization from the work site. All cleanup work and punch list items shall be completed before final payment of this item shall be paid.

Payment for mobilization will be lump sum with an initial amount of 20% when all preconstruction submittals have been submitted and approved by the CITY. Payment will then be completed using the following schedule based on completed linear centerline feet of box installed:

10% Project Completion – 20% Payment

30% Project Completion – 20% Payment

50% Project Completion – 20% Payment

70% Project Completion – 10% Payment

100% Project Completion -10% Payment (Final Mobilization/Demobilization Payment will be made at the end of the project schedule following submittal of Record Survey and Contaminant Management Report and all areas have been cleaned and restored to working condition, and punch list is complete).

Bid Item 2. – Clear and Grubbing

This item shall include providing all labor, materials, supplies, equipment, services and other incidentals necessary for clearing and grubbing.

Clear and Grubbing shall be paid for per lump sum.

Depending on how the contractor plans to stage the work, Clearing and Grubbing may be prorated and paid as a percentage of the clearing and grubbing completed. The prorated percentage shall be discussed and agreed upon by the Engineer and the Contractor.

Bid Item 3. – Traffic Control

This item shall include providing all labor, materials, supplies, equipment, services, and other incidentals necessary to provide any notifications, coordination with City and Nevada DOT staff, signage, detours using existing streets and roads to permit traffic to pass through construction, and using flaggers, uniformed traffic control officers, traffic control supervisor, and pilot cars, or a combination of these methods, in addition to furnishing, maintaining, relocating, and removing temporary traffic control devices and services as necessary for the control and protection of public traffic through the project, in accordance with the plans and specifications.

This work also consists of renting necessary traffic control devices, designing traffic control plans, and furnishing and placing traffic control as required in the contract documents.

This work also consists of any driveway modification or other related activities or accommodations to provide and preserve access to all businesses and loading docks and to restore said modifications and to their pre-construction configuration as directed in the plans.

If applicable, this item would also include traffic control related to soil stabilization efforts (for Bore and Jacking) or for Temporary Bridge(s).

Traffic Control shall be paid for per lump sum.

This bid item shall be paid at the contract lump sum price and will be prorated as a percentage of work completed. The prorated percentage shall be discussed and agreed upon by the Engineer and the Contractor. The total payment will constitute full compensation for all labor, equipment, tools, and all other items necessary and incidental to the completion of the work.

Bid Item 4. – Dewatering

Work under this bid item shall consist of obtaining NDEP De Minimus permits and design of and treatment of site groundwater as well as design of and implementation of a site storm water pollution prevention plan (SWPPP). Contractor will have access to an $8,000.00 (eight thousand and no/100 dollars) credit available at NDEP for this project. As each De Minimus permit has a filing fee of $200.00, sufficient funds are available to permit 40 (forty) wells. Contractor shall be responsible for the charges beyond that amount/number.

Work shall also include, but is not limited to, complying with and obtaining all necessary permits, furnishing, installing, operating, and maintaining the necessary trenches, coffer dams, drains, sumps, pumps, well points, generators, piping, treatment facilities and/or equipment, and for all labor, equipment, tools, and all other items necessary and incidental to the completion of the work. Damage to installed temporary works from rainfall runoff or from the contractor's operations shall be repaired before proceeding with other work unless otherwise approved by the Engineer. A written plan for dewatering must be submitted to the Engineer before work shall commence. Work under this bid item shall conform to the requirements of Section 305 of the Standard Specifications except as modified in the Special Provisions.

This dewatering item shall include all dewatering and full treatment as necessary for any construction and permit compliance required on this project. All dewatering necessary for removals and demolition shall be considered incidental to the cost of those items.

Dewatering shall be paid for per lump sum and will be prorated as a percentage of work completed, minus the existing NDEP credit. The prorated percentage shall be discussed and agreed upon by the Engineer and the Contractor. Such payment will constitute full compensation for all labor, equipment, tools, and all other items necessary and incidental to the completion of the dewatering work.

Bid Item 5. – Removal of Plantmix Bituminous Surface

The unit price bid for this item shall include all labor, materials, supplies, equipment, disposal, tipping fees, repair and protection of adjacent areas not indicated for removal, services, and other incidentals necessary to remove plantmix bituminous surface. Removal of bituminous surface shall also include any saw cutting as directed by the plans.

This item shall be measured once, regardless of the number of passes necessary to obtain the depth specified on the plans and as approved. Removal of bituminous surface shall include

removal of base material and any subgrade required; therefore, removal shall constitute the entire required section. The area of removal shall coincide with the area of replacement as shown on the plan set.

The Contractor should be aware that the actual existing pavement and base thickness may vary, that steep crowns, flat crowns, off-set crowns, quarter crowns, excessive existing pavement thicknesses, or other variations in the existing section may necessitate removal of existing materials to depths greater than shown on the plans.

Removal of plantmix bituminous surface will be measured and paid for by the square yard.

The accepted quantities, measured as provided above, will be paid for at the contract price per unit of measurement for the items that are shown in the proposal. Payment will be full compensation for the work prescribed in this Section.

Bid Item 6. – Removal of Portland Cement Concrete (PCC) Items

The unit price bid for this item shall include all labor, materials, supplies, equipment, disposal, tipping fees, repair and protection of adjacent areas not indicated for removal, services, and other incidentals necessary to remove PCC in the following configurations: concrete driveway aprons, type 1, 3, & A curb and gutter and the utility pad at "NTD" Station 61+30. Removal of concrete pavement surface shall include removal of base material and any subgrade required; therefore, removal shall constitute the entire required section. Removal of PCC surface shall also include any jackhammering or cutting of concrete or rebar as directed by the plans or as required.

Removal of PCC Surface will be measured and paid for by lump sum.

The accepted quantities, measured as provided above, will be paid for at the contract price per unit of measurement for the items that are shown in the proposal. Payment will be full compensation for the work prescribed in this Section.

Bid Item 7. – Removal of Small Diameter Pipe (All Materials and Sizes <13" Diameter)

This item shall include the removal of Small Diameter Sanitary Sewer and Storm Drain Pipe (6", 8", 12") inside diameter solid wall Polyvinyl Chloride (PVC), Corrugated Metal Pipe (CMP) or Reinforced Concrete Pipe (RCP) as shown on the plans. This item shall also include all labor, materials, equipment, tools, excavation, shoring, trenching, cutting, removing, hauling and disposing of materials, clean-up, and all incidentals necessary for a complete removal at the locations shown on the plans.

Removal of Storm Drain Pipes shall be paid per lineal foot as shown on the plan set. Vertical offsets, angle points or any other appurtenances shall be included as part of the lineal foot price.

The removal of Asbestos Concrete Pipe (Transite) shall not be included with this item; it is accounted for elsewhere.

The accepted quantities, measured as provided above, will be paid for at the contract price per unit of measurement for the items that are shown in the proposal. Payment will be full compensation for the work prescribed in this Section.

Bid Item 8. – Removal of Large Diameter Pipe (All Materials and Sizes > 13" Diameter)

This item shall include the removal of Large Diameter Storm Drain Pipe (15" and 24") inside diameter solid wall Polyvinyl Chloride (PVC) or Reinforced Concrete Pipe (RCP) as shown on the plans. This item shall also include all labor, materials, equipment, tools, excavation, shoring, trenching, cutting, removing, hauling and disposing of materials, clean-up, and all incidentals necessary for a complete removal at the locations shown on the plans.

Removal of Storm Drain Pipes shall be paid per lineal foot as shown on the plan set. Vertical offsets, angle points or any other appurtenances shall be included as part of the lineal foot price.

The removal of Asbestos Concrete Pipe (Transite) shall not be included with this item; it is accounted for elsewhere.

The accepted quantities, measured as provided above, will be paid for at the contract price per unit of measurement for the items that are shown in the proposal. Payment will be full compensation for the work prescribed in this Section.

Bid Item 9. – Removal of Small Concrete Structures (Manholes and Drop Inlets – All Sizes)

The unit price bid for this item shall include all labor, materials, supplies, equipment, services and other incidentals necessary to remove the storm drain manholes and drop inlets and sanitary sewer manholes as indicated on the plan set. Removal shall include maintenance of flows during temporary conditions, pumping, temporary piping, disposing of necessary materials and any tipping fees.

Removal of Small Concrete Structures shall be measured by each.

The accepted quantities, measured as provided above, will be paid for at the contract price per unit of measurement for the items that are shown in the proposal. Payment will be full compensation for the work prescribed in this Section.

Bid Item 10. – Removal of Private Asbestos Concrete (Transite) Water Main (6" Diameter)

The unit price bid for this item shall include all labor, materials, excavation, cutting, equipment, hauling, tipping fees, hazardous material handling and disposing requirements, and incidentals necessary to remove asbestos concrete (transite) water mains as indicated on the plan set and per local, federal, and OSHA requirements.

Removal of Asbestos Concrete (Transite) water main shall be measured by linear foot.

The accepted quantities, measured as provided above, will be paid for at the contract price per unit of measurement for the items that are shown in the proposal. Payment will be full compensation for the work prescribed in this Section.

The accepted quantities, measured as provided above, will be paid for at the contract price per unit of measurement for the items that are shown in the proposal. Payment will be full compensation for the work prescribed in this Section.

Bid Item 11. and 12. and 13. Remove Small Diameter Water Lines (1.25" & 2" PVC), Remove Water Lines (6" PVC & 8" PVC), Remove and Salvage Fire Hydrant

The unit price bid for these items shall include all labor, materials, supplies, equipment, services and other incidentals necessary to completely demolish and remove the sizes and types of utilities noted in the title of this section and shown on the utility sheets of the design drawings. Components to be salvaged, as determined by the CITY, shall be delivered to the City of Sparks Corporation Yard. All other materials shall be hauled off and disposed of per state and local codes.

All underground piping shall be measured by linear foot.
All fire hydrants shall be measured by each.

The accepted quantities, measured as provided above, will be paid for at the contract price per unit of measurement for the items that are shown in the proposal. Payment will be full compensation for the work prescribed in this Section.

Bid Item 14. – Construct Sanitary Sewer Lift Station

The unit price bid for this item shall include all labor, materials, supplies, equipment, services and other incidentals necessary to furnish and construct a sanitary sewer lift station in accordance with the plans and specifications.

The following items shall be included in the price for this item: structure excavation and backfill (including structural bedding/backfill), ancillary piping, ancillary cables/wiring, pumps, pump controls, electronic/electricity controls, telemetry equipment, vault(s) and wet wells, enclosures, manhole lids, testing, and any other labor or equipment relevant and necessary to provide a complete and properly functioning lift station.

Payment for Sanitary Sewer Lift Station will be lump sum and will be paid for on the following schedule:

All components arrive on site – 33.3% Payment

Hole is excavated and piping into and out of wet well is installed – 33.3% Payment

Lift Station is complete and in place, tested, and fully operational -33.4% Payment

Such payment will constitute full compensation for all labor, equipment, tools, and any other items necessary and incidental to the completion of the work.

Bid Item 15. and 16. and 17. and 18. Construct Precast 48" Type 1-A Manhole, Cast in Place or Precast Reinforced Concrete Manhole and Riser for RCB (2x48"), Lockable Hinged 24" Manhole Covers, Construct Type 3R Drop Inlet

The unit price bid for these items shall include all labor, materials, supplies, excavation, equipment, shipping/hauling, services and other incidentals necessary to construct or install the sizes and types of facilities noted in the title of this section and shown on the plans, complete and in place. The amounts bid for this item shall include all associated excavation, bedding, backfill, pressure testing (for SS force main), connections to associated systems, frames, water tight sealant materials or device and concrete collars, but shall not include the permanent granular roadway base material or permanent AC paving.

All Manholes, RCB Manholes, Manhole Covers and Drop Inlets will be measured by each with one (1) RCB manhole comprising of 2x24" diameter manholes as per the plans.

Cast in place forms, Portland Cement Concrete, and reinforcing steel or structural steel or any other item necessary as per the details in the plans and used while constructing will not be measured separately and will be paid as part of the overall item as each.

The accepted quantities, measured as provided above, will be paid for at the contract price per unit of measurement for the items that are shown in the proposal. Payment will be full compensation for the work prescribed in this Section.

Bid Item 19. and 20. and 21. Construct Small Diameter (<13") Gravity & Force Mains for Sanitary Sewer & Storm Drains, Construct Large Diameter (>13") Gravity Mains for Storm Drains, Construct 18" RCP Storm Drains with Concrete Pipe Anchors

The unit price bid for these items shall include all excavation, backfill, bedding, compaction, labor, materials, fittings, supplies, casing pipe, casing spacers, end seals, equipment, services, and other incidentals necessary to construct, transport and install circular shaped reinforced concrete pipe (RCP) or polyvinyl chloride (PVC) pipe including end sections and concrete anchors, complete and in place in accordance with the plans and specifications.

The unit price bid shall not include dewatering, finish paving or traffic control, as those items are accounted for elsewhere in these BICs.

Small Diameter (<13") Gravity and Force Mains, comprising of 8" PVC Sanitary Sewer, 8" PVC Storm Drain, 12" PVC Storm Drain, 12" RCP Storm Drain and 4" PVC force main, shall be paid for by the linear foot, as measured along the centerline of the pipe per the different sizes described in the plans. The casing pipe shall be considered incidental to the installation of the carrier pipe.

Large Diameter (>13") Gravity Mains, comprising of 15" RCP Storm Drain, 18" RCP Storm Drain (all classes) and 30" RCP Storm Drain, shall be paid for by the linear foot, as measured along the centerline of the pipe per the different sizes described in the plans.

The accepted quantities, measured as specified here-in, will be paid for at the contract price per unit of measurement for the pay items that are shown in the proposal. Payment will be full compensation for the work prescribed in this Section.

GENERAL EXCAVATION for Storm Drain Pipes:

General excavation is defined as the excavation required for the installation of all parallel storm drains, all RCB's and the shown concrete structures along the alignment. Plan limits of excavation are based upon the use of shoring.

No additional compensation shall be made to the CONTRACTOR for trucking, tipping fees, associated fees with protective systems required by OSHA regulations, off-hauling and disposing of materials that cannot be recycled, removal and disposal of material which may come into an excavation from outside the designated limits or from ground movements, or any other cost incidental to the excavation and removal of excavated material.

When changes are made during construction, they will be dealt with as described in the following:

(a) Overbreak. All sideslope overbreak, will not be paid for.

(b) Widening Cuts. If the Construction Inspection, Engineer, CITY or the Contractor deems it necessary to excavate beyond the limits of the typical cross section for safety reasons, easier constructability or any other reason, no additional payment shall be made. The Contractor shall proceed with work in a safe manner, of his choosing, but be responsible for additional work and additional quantities caused in such situations.

(c) Selected Material. If material is encountered during excavation that can be recycled, the selected material can be stockpiled and if deemed suitable for use by the Engineer, the material may be used and paid for as described in the sections regarding fill materials.

(d) Slides and Slipouts. In the event of slides and slipouts, the Contractor is responsible for the integrity of the trench and shall be responsible for any cleanup.

The cost of pioneering work necessary to make slide or slipout areas accessible to normal excavation equipment and the cost of related clearing and grubbing shall be considered as incidental to pipe installation.

Pipes cut to fit a structure or slope, will be measured by the linear foot of pipe to the inside face of the structure. The estimated quantities shown on the plans will be the quantity used for payment.

PVC and RCP bends, wyes, tees, reducers, end sections and other fittings, and concrete pipe anchors with associated excavation and backfill, will be considered incidental to the cost of this bid item.

Full compensation for furnishing pipe with end finish, including distortion if required, will be considered as included in the price paid per linear foot for the pipe involved.

The accepted quantities, measured as provided above, will be paid for at the contract price per unit of measurement for the pay items that are shown in the proposal. Payment will be full compensation for the work prescribed in this Section.

REINFORCED CONCRETE AND POLYVINYL CHLORIDE PIPE (for storm drain pipes)

The unit price for parallel storm drain pipes shall include the following items:

(a) Effort and materials required to connect proposed culverts to existing headwalls, manholes, culverts, and drop inlets; including, but not limited to, preparation of surfaces and concrete patching work.

(b) All other items not specifically listed which are pertinent to and necessary for installation of parallel storm drain pipes.

BACKFILL MATERIAL: CLASS A / CLASS C, CLASS E AND STRUCTURAL FILL (for storm drain pipes)

The Contractor shall be responsible to import material as necessary should native material not meet requirements set forth in the plans and specifications.

Bid Item 22. and 23. Construct Small Diameter Water Lines (1.25" & 2" HDPE), Construct 8" DIP Water Line

The unit price bid for these items shall include all labor, materials, supplies, equipment, services and other incidentals necessary construct the sizes and types of utilities noted in the title of this section and shown on the utility sheets of the design drawings completely and in place. The amounts bid for these items shall include all associated excavation, pipe bedding, backfill, sleeving, valves, valve boxes, testing, disinfecting and flushing but shall not include the permanent granular roadway base material or permanent AC paving. The amount bid for these items shall include all associated thrust blocks and any joint restraints for piping.

All underground piping shall be measured by linear foot.

The accepted quantities, measured as provided above, will be paid for at the contract price per unit of measurement for the items that are shown in the proposal. Payment will be full compensation for the work prescribed in this Section.

Bid Item 24.– Construct Small Backflow Preventer (1.25")

The unit price bid for this item shall include all labor, materials, supplies, excavation, equipment, shipping/hauling, disinfecting, testing, services and other incidentals necessary to construct or install the backflow preventer for a 1.25" diameter pipe as shown on the plans, complete and in place. The amounts bid for this item shall include all associated bedding, backfill, small concrete slab and metal mesh cage as required.

Small backflow preventer shall be measured by each.

Finish landscaping around the backflow preventer will not be paid for as part of this item.

The accepted quantities, measured as provided above, will be paid for at the contract price per unit of measurement for the items that are shown in the proposal. Payment will be full compensation for the work prescribed in this Section.

Bid Item 25.– Construct Large Backflow Preventer (8")

The unit price bid for this item shall include all labor, materials, supplies, excavation, vault with lid, equipment, shipping/hauling, services, disinfecting, testing and other incidentals necessary to construct or install the backflow preventer for an 8" diameter pipe as shown on the plans, complete and in place. The amounts bid for this item shall include all associated bedding and backfill as required as well as small concrete slab and/or hot box.

Large backflow preventer shall be measured by each.

Finish landscaping around the backflow preventer will not be paid for as part of this item.

The accepted quantities, measured as provided above, will be paid for at the contract price per unit of measurement for the items that are shown in the proposal. Payment will be full compensation for the work prescribed in this Section.

Bid Item 26.– Install Fire Hydrant

The unit price bid for this item shall include all labor, materials, supplies, excavation, equipment, shipping/hauling, services and other incidentals necessary to construct or install fire hydrant(s) as shown on the plans. The amounts bid for this item shall include all associated bedding, backfill, tees, elbows, piping, tapping, flushing, testing and disinfecting as required to convey flow from the water main to the hydrant complete and operational in place.

Fire Hydrants shall be measured by each.

Finish landscaping will not be paid for as part of this item.

The accepted quantities, measured as provided above, will be paid for at the contract price per unit of measurement for the items that are shown in the proposal. Payment will be full compensation for the work prescribed in this Section.

Bid Item 27.– Remove and Replace Permanent Concrete Barrier Rail

The unit price bid for this item shall include all labor, materials, supplies, equipment, services, and other incidentals necessary to remove and replace the concrete barrier rail as indicated on the plan set. Removal shall include disposing of necessary materials and any associated tipping fees. Barrier Rail shall be cast in place reinforced concrete and meet the conditions set forth in the Standard Specifications and any modifications in the Technical Specifications

Removal and Replacement of Concrete Barrier Rail shall be paid per linear foot as measured and agreed by the Contractor and CITY.

The accepted quantities, measured as provided above, will be paid for at the contract price per unit of measurement for the items that are shown in the proposal. Payment will be full compensation for the work prescribed in this Section.

Bid Item 28.– Remove and Replace Chain Link Fence

The unit price bid for this item shall include all labor, materials, supplies, equipment, services, and other incidentals necessary to remove and replace all fence items as shown on the plan set. Chain link can be salvaged and reused if materials are still in good working condition. Engineer shall determine whether it needs to be replaced with new materials or if old materials are acceptable to use. Fence will be measured along the fence alignment. Gates are considered incidental to the fence construction and will be paid as part of the fence, per linear foot.

Removal and Replacement of Fences shall be measured and paid per linear foot.

The accepted quantities, measured as provided above, will be paid for at the contract price per unit of measurement for the items that are shown in the proposal. Payment will be full compensation for the work prescribed in this Section.

Bid Item 29.– Not Used

Bid Item 30. and 31. – Construct and Install Reinforced Concrete Box: 2-14'x10', Construct and Install Reinforced Concrete Box: 2-14'x10' – Station 55+44 to 57+50 (Greg Street)

The unit price bid for these items shall include all labor, excavation, backfill, bore and jacking efforts (if applicable), temporary bridge (if applicable), materials, supplies, equipment, services, and other incidentals necessary to construct, transport and place reinforced concrete box, complete and in place in accordance with the plans and specifications.

The unit prices bid for these items shall not include dewatering, finish paving or traffic control, as those items are accounted for elsewhere in these Bid Item Clarifications.

Installation of Reinforced Concrete Box: 2-14'x10' will be measured and paid for by the alignment centerline linear foot of RCB; segment lengths as shown on the profile views.

The accepted quantities, measured as provided above, will be paid for at the contract price per unit of measurement for the pay items that are shown in the proposal. Payment will be considered full compensation for the work prescribed in this Section.

The following are components of the above bid item (installation of RCB) and are broken out for convenience:

GENERAL EXCAVATION for RCBs:
General excavation is defined as the excavation required for the installation of the RCBs along the alignment.

Plan limits of excavation are based upon the use of shoring.

No additional compensation shall be made to the Contractor for trucking, tipping fees, associated fees with protective systems required by OSHA regulations, off-hauling and disposing of materials that cannot be recycled, removal and disposal of material which may come into an excavation from outside the designated limits or from ground movements, or any other miscellaneous material or labor costs.

When changes are made during construction, they will be dealt with as described in the following:

(a) Overbreak. All sideslope overbreak, will not be paid for.

(b) Widening Cuts. If the Construction Inspection, Engineer, CITY or the Contractor deems it necessary to excavate beyond the limits of the typical cross section for safety reasons, easier constructability or any other reason, no additional payment shall be made. The Contractor shall proceed with work in a safe manner, of his choosing, but be responsible for additional work and additional quantities caused in such situations.

(c) Slides and Slipouts. In the event of slides and slipouts, the Contractor is responsible for the integrity of the trench and shall be responsible for any cleanup.

The cost of pioneering work necessary to make slide or slipout areas accessible to normal excavation equipment and the cost of related clearing and grubbing shall be considered as incidental to RCB installation.

REINFORCED CONCRETE BULKHEADS, REINFORCED CONCRETE BOX: 2-14'X10' and REINFORCED CONCRETE BOX 2-14'X10' FOR DEEP FILL/BORE AND JACKING
This component shall include all labor, materials, fittings, joint materials, supplies, equipment, services, and other incidentals necessary to construct, transport and install reinforced concrete box (RCB), including construction of bulkheads at both upstream and downstream terminus, complete and in place in accordance with the plans and specifications. Any labor or material costs associated with repair of pipe sections shall be at the contractor's expense.

RCB's may be cast-in-place or precast, or a combination there of so far as the plans allow. Precast and cast-in-place RCB's shall be paid for by the same unit price regardless of method used.

The unit price bid shall not include dewatering, finish paving, traffic control or penetrations from other stormwater facilities, as those items are accounted for elsewhere in these BICs.

RCB shall be paid for by the linear foot, as measured along the centerline of the alignment, segment lengths as shown on the profile views, where-in 1 lf of alignment actually includes 2 lf of RCB, as both barrels are included, segment lengths shown on profile views.

The unit price for cast-in-place RCB shall include the following items:

(a) The use of temporary or stay-in-place metal forms

(b) The use of temporary wooden or metal forms

(c) Effort and materials required to connect proposed culverts to existing headwalls; including, but not limited to, preparation of headwall surfaces and drilling and epoxy of rebar dowels

(d) All other items not specifically listed which are pertinent to and necessary for construction of cast-in-place concrete.

The unit price for precast RCB shall include the following items:
(a) Tremie seal concrete

(b) Compression joint seal, sealing bands and any other items used and necessary to maintain water tightness within the boxes

(c) Storage, transportation, handling and crane costs along with associated temporary haul roads.

(d) All other items not specifically listed which are pertinent to and necessary for construction of precast concrete.

The unit price for Deep Fill or Boring and Jacking RCBs shall include any engineering costs, submittal costs, special considerations or design modifications to the box to ensure strength and stability during installation efforts and post construction deep fill (fill >20'D) application.

Pressure testing effort and equipment for connections to maintenance access vaults and connections to /from precast to cast-in-place segments shall be considered incidental and included in the cost of this item.

BACKFILL MATERIAL: CLASS A / CLASS C, CLASS E AND STRUCTURAL FILL
This component shall include all labor, materials, handling, compacting, hauling services and incidentals necessary to prepare, bed and backfill the RCBs per the plans and specifications.

This item also includes storing and processing (or blending) efforts and equipment should some quantity of native material be utilized as backfill.

BORE and JACKING REINFORCED CONCRETE BOX
If this installation method is chosen, the following shall apply:

This component shall include all labor, materials, supplies, equipment, services, and other incidentals necessary to bore and jack reinforced concrete box culvert, in accordance with the plans and specifications. This optional item shall be in affect only after written approval from the City consenting to this method of construction.

This item includes only the personnel, material and equipment germane to boring and jacking and soil stabilization efforts such as excavation, backfill and shoring of bore and receiving pits, design, construction and removal of backstops, removal of materials during boring efforts, and costs related to the installation of grout, slurry, or similar material in the annular spaces outside of the box. The price for this item also includes development of a work plan, engineering costs, any costs associated with installation of guide pipes or rails, and changes to equipment in response to changed soil conditions.

TEMPORARY BRIDGE

If this installation method is chosen, the following shall apply:

This component shall include items and costs associated with preservation of two-way traffic over / through the construction site during box installation efforts including but not limited to: engineering design, work plan submittal and response to comments, rental, shipping, assembly/disassembly and launching fees associated with temporary bridges, construction and demolition of temporary bridge abutments. This item also includes excavation, handling, trucking, backfill and compaction of soil associated with temporary bridge abutments.

This optional item shall be in affect only after written approval from the City consenting to this method of construction.

Bid Item 32. – Cast in Place Access Vaults for 2-14'x10' RCB

The unit price bid for this item shall include all labor, materials, supplies, equipment, services, and other incidentals necessary to construct Maintenance Access Vaults in accordance with the plans and specifications, complete and in place.

Cast in place maintenance access vaults shall be measured as each.

With the exception of excavation and backfill, which are included with that required for RCB installation, Portland Cement Concrete, reinforcing steel, structural steel, grade rings, reinforced concrete collars, cleanouts, lockable lids or any other item necessary as per the details in the plans and used while constructing or reconstructing items will not be measured separately and will be paid as part of the overall item as an Each.

Considering measurement and payment, access vaults shall be considered to begin and end, and RCB's shall be considered to end and begin, at the outside face of concrete for the access vaults as shown on the profile view in the Plans.

The accepted quantities, measured as provided above, will be paid for at the contract price per unit of measurement for the pay items that are shown in the proposal. Payment will be full compensation for the work prescribed in this Section.

Bid Item 33. and 34. and 35. and 36.– Type A PCC Curb, 24" Type 1 PCC Curb and Gutter, Type 3 PCC Curb and Gutter, 3' & 6' Reinforced Valley Gutter and Driveway

The unit price bid for these items shall include all labor, materials, supplies, equipment, services, and other incidentals necessary to construct Portland Cement Concrete (PCC) curbs, gutters and valley gutters in accordance with the plans and specifications.

Curb, gutter, and combination curb and gutter will be measured and paid for by the linear foot along the base of the curb face. Such measurement will be continuous along such line extended across driveway and ramp openings.

All excavation, subgrade preparation and aggregate base course material and work required for the described items shall be considered incidental to installation and no additional payment shall be made.

The accepted quantities, measured as provided above, will be paid for at the contract price per unit of measurement for the pay items that are shown in the proposal. Payment will be full compensation for the work prescribed in this Section.

Bid Item 37. and 38. – Plantmix Bituminous Pavement (5" AC on 8" Aggregate Base) and Plantmix Bituminous Pavement (3" AC on 6" Aggregate Base)

The unit price bid for these items shall include all labor, materials, supplies, equipment, services, and other incidentals necessary to construct one or more courses of Asphalt Concrete Pavement (AC) including plantmix bituminous aggregate, bituminous material, mineral filler, and sand blotter on a prepared aggregate base; to place plantmix bituminous open-graded surface including plantmix bituminous open-graded surface aggregate, asphalt cement, and mineral filler; to apply an emulsified asphalt tack coat; to apply a bituminous material prime coat and sand blotter as required; and to apply a bituminous material seal coat and sand blotter as required, in accordance with the plans and specifications.

Plantmix bituminous surface will be per measured and paid for by square yard.

Plantmix Bituminous Pavement shall include all base aggregates to be placed and compacted under Plantmix Bituminous Pavement. Aggregates shall meet standards set forth herein and within the Standard Specifications.

The accepted quantities, measured as provided above, will be paid for at the contract price per unit of measurement for the items that are shown in the proposal. Payment will be full compensation for the work prescribed in this Section.

All base materials and preparation shall be considered incidental to the cost of the Plantmix Bituminous Pavement. Properties of aggregates shall be per Section 200.02.03, and per Section 200.01.03 for the base material. Both shall be placed and compacted as specified in the plan set and constructed as per the Standard Specifications.

Bid Item 39. – Portland Cement Concrete Pavement (10.5" PCC on 6" Aggregate Base)

The unit price bid for this item shall include all labor, materials, supplies, equipment, services, and other incidentals necessary to construct Portland Cement Concrete (PCC) pavement, on a prepared surface, in accordance with the plans and specifications.

Portland Cement Concrete Pavement and base at the specified thicknesses will be measured per square yard.

PCC pavement shall include all materials and labor associated with the base aggregates to be placed and compacted under PCC pavement. Aggregates shall meet standards set forth herein and within the Standard Specifications.

PCC pavement shall include all labor and materials for pavement joint construction per the plans.

All reinforcement required for the Portland Cement Concrete Pavement shall be considered incidental to the cost of the pavement and therefore no additional payment will be made for any reinforcement including tie bars and dowel bars. All reinforcement shall be included in the square yard cost as described herein. All granular base materials and preparation for the structural pavement section shall be considered incidental to the cost of the Portland Cement Concrete Pavement. Materials, compaction and preparation of either general backfill or backfill for overexcavated areas shall be accounted for as described elsewhere in this document. Properties of aggregates for PCC shall be per Section 200.06.01, and per Section 200.01.03 for the base material. Both shall be placed and / or compacted as specified in the plans and specifications.

The accepted quantities, measured and adjusted as provided above, will be paid for at the contract price per unit of measurement for the pay items that are shown in the proposal. Payment will be full compensation for the work prescribed in this Section.

Bid Item 40. and 41. and 42. and 43. and 44. and 45. and 46. and 47.– Place Permanent Pavement Markings: 4" Dashed White (Type II), 4" Solid White (Type II), 4" Double Solid Yellow (Type II), 8" Solid White Type II), Red Curb (Type II), 24" Solid White Stop Bar Stripe (preformed Thermoplastic), Fire Hydrant Marker (Blue Reflector), 8' Directional Arrow (Preformed Thermoplastic)

The unit price bid for these items shall include all labor, materials, supplies, equipment, services, and other incidentals necessary to apply permanent pavement markings on the completed pavement in accordance with the plans and specifications.

Epoxy pavement striping will be measured and paid for by the linear foot for the type specified.

Waterborne pavement striping will be measured and paid for by the linear foot for the type specified.

The double solid yellow line shall be considered as a single line when measured for payment. Gaps in the broken or dotted lines shall be included in the linear measurement.

Preformed Thermoplastic items (including Left and Right Directional Turn Arrows) and fire hydrant markers shall be paid per each.

The accepted quantities, measured as specified above, will be paid for at the contract price per unit of measurement for the pay items that are shown in the proposal. Payment will be full compensation for the work prescribed in this Section.

Bid Item 48. – Landscape and Irrigation Repair/Restoration

This item shall include all labor, materials, supplies, equipment, shipping, services, arborist services, hydroseeding and other incidentals necessary for complete and in-place installation and restoration of landscaping areas and irrigation systems. All irrigation systems shall be restored in-kind to pre-construction configuration and functionality; all types of vegetation and shrubbery shall be restored or replaced to the pre-construction configuration, size and species.

Any concrete, pavement or any other existing item related to the landscaping of a private or public property that is altered during construction shall be repaired or replaced.

Landscape and Irrigation Repair/Restoration will be measured per lump sum

Landscape and Irrigation will be prorated and paid as a percentage of the work completed. The prorated percentage shall be discussed and agreed upon by the Engineer and the Contractor.

The accepted quantities, measured as specified above, will be paid for at the contract price per unit of measurement for the pay items that are shown in the proposal. Payment will be full compensation for the work prescribed in this Section.

Bid Item 49.– Remove & Replace Concrete Masonry Unit (CMU) Trash Enclosures - *contingent item*

The unit price bid for this item shall include all labor, materials, supplies, equipment, services, and other incidentals necessary to remove and replace unreinforced CMU trash enclosures as shown on the plan set on Parcel 34-171-24. Blocks can be salvaged and reused if materials are still in good working condition. Engineer shall determine whether it needs to be replaced with new materials or if old materials are acceptable to use. Wall will be measured along the centerline alignment.

Removal and Replacement of the CMU Trash Enclosure(s) shall be measured and paid per each.

This item shall be considered a contingent item. The quantity indicated in the bid schedule represents no actual estimate, is nominal only, and may be greatly increased or decreased or reduced to zero. The increase or reduction of this quantity, as compared with that contained in the bid schedule, shall not constitute a basis for claim by the Contractor for extra payment or changed conditions.

Payment will be made only for work authorized by the CITY.

The accepted quantities, measured as provided above, will be paid for at the contract price per unit of measurement for the items that are shown in the proposal. Payment will be full compensation for the work prescribed in this Section.

Bid Item 50. and 51.– Overexcavate Unsuitable Material and Backfill with Class C Fill, Overexcavate Unsuitable Material and Backfill with Structural Fill - *contingent items*

The unit price bid for these items shall include all labor, equipment, materials and all incidentals necessary to remove, at the direction of the Engineer and in accordance with Standard Specifications unsuitable subgrade materials that may be encountered. Work shall include, but not be limited to removal and offsite disposal of unsuitable material, preparation and compaction of material below the removal, furnishing and placing woven geotextile fabric over the subgrade, backfill on top of the geotextile to subgrade and incidentals to complete all Engineer directed overexcavation. Backfill for these items shall be Class C (200.03.04) where the overexcavation occurs in a trench for RCP or Structural Fill (200.01.09) where the overexcavation occurs in a trench for RCB respectively, unless otherwise directed by the Engineer.

These items shall be considered contingent. The quantity indicated in the bid schedule represents no actual estimate, is nominal only, and may be greatly increased or decreased or reduced to zero. The increase or reduction of this quantity, as compared with that contained in the bid schedule, shall not constitute a basis for claim by the Contractor for extra payment or changed conditions.

Overexcavated unsuitable material and backfill shall be measured and paid for per cubic yard to the nearest yard, under the assumption that one cubic yard of overexcavation is replaced with one cubic yard of import.

The final pay quantity shall be by field measurement. The CITY and the Contractor shall agree upon the quantity daily at which time it shall be recorded and initialed by both the Contractor and the CITY in the daily field report.

Bid Item 52. – Force Account – General - *contingent item*

A force account of $1,000,000 has been established for this project

The lump sum unit price bid amount set forth in the bid schedule shall be the same for all bidders. This bid amount shall cover furnishing of materials, equipment, and labor and all incidentals for any work not included in the plans and specifications that may be directed by the CITY. Provisions of sections 100.24 CHANGE ORDERS and 100.25 EXTRA WORK of the Standard Specifications for Public Works Construction (SSPWC) apply to work covered by this specification. This bid item has been established to compensate for any costs allowed as a result of unforeseen interferences, changes to the work, or other items in connection with constructing the improvements, which require work or material by the Contractor in addition to those items included in the Contract. The amount to be included in the Contract for such work shall be as set forth in the bid schedule must be included by the Bidder.

There is no direct payment for this item. Payment will be made only for additional authorized work performed. Depending upon the amount of additional work authorized and completed at the close of the Contract, the amount bid may be used entirely, partially, or not at all.

Bid Item 53. – Force Account – Hazardous Materials (Soils) - *contingent item*
A force account of $50,000.00 has been established for this item.

The lump sum unit price bid amount set forth in the bid schedule shall be the same for all bidders. This bid amount shall cover all labor, equipment, materials and all incidentals necessary to control and/or treat, at the direction of the Engineer and in accordance with Standard Specifications (Provisions of sections 100.24 CHANGE ORDERS and 100.25 EXTRA WORK of the Standard Specifications for Public Works Construction (SSPWC)) contaminated water or soil which may be encountered. Work shall include, but not be limited to, removal and offsite disposal of contaminated material, pumping and piping equipment, material handling and hauling, all environmental permits, and conforming with any and all rules, regulations as determined by the Nevada Department of Environmental Protection, the City of Sparks or any other governing agency regarding contaminated or polluted ground or surface water.

There is no direct payment for this item. Payment will be made only for additional authorized work performed. Depending upon the amount of additional work authorized and completed at the close of the Contract, the amount bid may be used entirely, partially, or not at all. The CITY and the Contractor shall agree upon the quantities (if any) on a daily basis for each day when hazardous materials are encountered at which time it shall be recorded and initialed by both the Contractor and the CITY in the daily field report.

The following bid items shall be considered Alternate A bid items, which, as a whole, may be removed from the contract subsequent to bid award.

Bid Item 54. and 55. and 56. and 57. Construct TMWA Water Main (12" DIP), Construct TMWA Water Main (16" DIP), Relocate Existing Meters and Construct Small TMWA Water Lines (1.25" & 2" HDPE), Construct TMWA Sleeves and Couplings (12" DIP)
The unit price bid for these items shall include all labor, materials, equipment, shut down coordination, services and other incidentals necessary to install the sizes and types of utilities noted in the title of this section and shown on the TMWA sheets of the design drawings completely and in place.

The amount bid for these items shall include all associated pipe, excavation, pipe bedding, pipe wrapping, backfill, flushing, testing, disinfecting, permanent and or temporary flush valve assemblies, piping, fittings and elbows, thrust blocks, joint restraints, relocation of water meters, meter pits, lids and insulation, air/vacuum valves, tapping devices, tapping saddles, corp stops, valves and valve boxes or valve can riser with ductile iron lid, and ductile iron sleeve coupling.

The amounts bid for these items shall not include the permanent granular roadway base material or permanent AC paving.

All underground piping shall be measured by linear foot.

The accepted quantities, measured as provided above, will be paid for at the contract price per unit of measurement for the items that are shown in the proposal. Payment will be full compensation for the work prescribed in this Section.

Bid Item 58. – Install TMWA 4" Flush Valve Assembly on 12" Transite Water Main

The unit price bid for this item shall include all labor, materials, supplies, equipment, shut down coordination, services and other incidentals necessary to completely cut and install a 4" flush valve assembly as indicated on the plan set securely and in accordance with the specifications.

Removal of pipe and tipping fees shall not be included in this pay item as they are accounted for elsewhere.

Install flush valve assembly shall be measured by each.

The accepted quantities, measured as provided above, will be paid for at the contract price per unit of measurement for the items that are shown in the proposal. Payment will be full compensation for the work prescribed in this Section.

Bid Item 59. – Remove TMWA Asbestos Concrete (Transite) Water Main (8"-16" Diameter)

The unit price bid for this item shall include all labor, materials, excavation, cutting, equipment, hauling, tipping fees, hazardous material handling and disposing requirements, and incidentals necessary to remove asbestos concrete (transite) water mains as indicated on the plan set and per local, federal, and OSHA requirements.

Removal of Asbestos Concrete (Transite) water main shall be measured by linear foot.

The accepted quantities, measured as provided above, will be paid for at the contract price per unit of measurement for the items that are shown in the proposal. Payment will be full compensation for the work prescribed in this Section.

The following bid items shall be considered Alternate B bid items, which, as a whole, may be removed from the contract subsequent to bid award.

Bid Item 60. and 61. and 62. – NVE Electrical Mobilization, Bonds and Insurance, NVE Electrical Demobilization and Cleanup, and NVE Electrical Traffic Control

The unit price for these items shall include providing all labor, materials, supplies, equipment, services and other incidentals necessary for mobilization, transport fees, temporary facilities, obtaining all required insurance, bonds, permits to perform the work, and to cleanup and demobilize after performing the work, and any required traffic control to safely perform the work, as shown on the plans and in accordance with local, state and national requirements.

Mobilization, Bonds and Insurance, Demobilization and Cleanup, and Traffic Control shall be measured by lump sum.

The accepted quantities, measured as provided above, will be paid for at the contract price per unit of measurement for the items that are shown in the proposal. Payment will be full compensation for the work prescribed in this Section.

Bid Item 63. and 64.– NVE Electrical Excavate and Backfill Electrical Trench for 1-4" Conduit, Excavate and Backfill Electrical Trench for 1-3" Conduit

The unit price bid for these items shall include all labor, materials, saw cutting, excavation, equipment, hauling, tipping fees, hazardous material handling and disposing requirements, backfill material, compaction equipment and effort and other incidentals necessary to excavate trenches for the installation of the specified conduits per the plans and specifications.

Labor and materials for the actual installation of the conduit, and asphalt patching after backfilling is completed, will be paid for under other items.

Excavate and Backfill Electrical Trench for 1-4" Conduit and Excavate and Backfill Electrical Trench for 1-3" Conduit shall be measured by linear foot.

The accepted quantities, measured as provided above, will be paid for at the contract price per unit of measurement for the items that are shown in the proposal. Payment will be full compensation for the work prescribed in this Section.

Bid Item 65. – NVE Electrical Remove and Replace AC

The unit price bid for this item shall include all labor, materials, supplies, equipment, services, and other incidentals necessary to sawcut and remove asphalt concrete (AC) and to also construct temporary patches including plantmix bituminous aggregate, bituminous material, mineral filler, and sand blotter on a prepared aggregate base in accordance with the plans and specifications.

This item shall be measured once, regardless of the number of passes necessary to obtain the depth specified on the plans and as approved. This item shall include removal of base material and any subgrade required; therefore, removal shall constitute the entire required section. The area of removal shall coincide with the area of replacement as shown on the plan set.

Remove and Replace AC shall be measured and paid for by square foot.

This item shall include all base aggregates to be placed and compacted under the patches. Aggregates shall meet standards set forth herein and within the Standard Specifications.

The accepted quantities, measured as provided above, will be paid for at the contract price per unit of measurement for the items that are shown in the proposal. Payment will be full compensation for the work prescribed in this Section.

All base materials and preparation shall be considered incidental to the cost of the Temporary AC Patch. Properties of aggregates shall be per Section 200.02.03, and per Section 200.01.03 for the base material. Both shall be placed and compacted as specified in the plan set and constructed as per the Standard Specifications.

Bid Item 66. and 67.– NVE Electrical Install 1-4" Conduit, NVE Electrical Install 1-3" Conduit

The unit price bid for these items shall include all labor, materials, supplies, equipment, services, and other incidentals necessary to install electrical conduits in accordance with the plans and specifications.

Sawcutting, excavation and backfill shall not be included with this item; they are accounted for elsewhere.

Install 1-4" Conduit and Install 1-3" Conduit shall be measured by linear foot.

The accepted quantities, measured as provided above, will be paid for at the contract price per unit of measurement for the items that are shown in the proposal. Payment will be full compensation for the work prescribed in this Section.

Bid Item 68. – NVE Electrical Install Concrete Vault with Lid

The unit price bid for this item shall include all labor, materials, supplies, transport, base aggregate, compaction, dewatering, equipment, services and other incidentals necessary to install a concrete vault in accordance with the plans and specifications.

This item shall also include all excavation, backfill, off-haul and import of soil and aggregates and compaction efforts.

Install Concrete Vault with Lid shall be measured by each.

The accepted quantities, measured as provided above, will be paid for at the contract price per unit of measurement for the items that are shown in the proposal. Payment will be full compensation for the work prescribed in this Section.

Bid Item 69. and 70.– NVE Electrical Dig Pole Hole 7' Deep and Backfill, NVE Electrical Dig Anchor Hole 6' Deep and Backfill

The unit price for this item shall include all labor, materials, supplies, equipment, services and other incidentals necessary to dig and backfill pole holes and anchor holes in accordance with the plans and specifications.

This item shall also include all excavation, backfill, off-haul and import of soil and aggregates, concrete, and compaction efforts.

This item shall not include removal of the existing or installation of the new poles or anchor(s) as that work will be performed by NV Energy crews.

Dig Pole Hole 7’ Deep and Backfill and Dig Anchor Hole and Backfill shall be measured by each.

The accepted quantities, measured as provided above, will be paid for at the contract price per unit of measurement for the items that are shown in the proposal. Payment will be full compensation for the work prescribed in this Section.

Bid Item 71. and 72.– NVE Electrical Install Riser with 1-4” Conduit, NVE Electrical Install Riser with 1-3” Conduit

The unit price bid for this item shall include all labor, materials, supplies, equipment, services and other incidentals necessary to install risers with conduit in accordance with the plans and specifications.

Install Riser with 1-4” Conduit and Install Riser with 1-3” Conduit shall be measured by each.

The accepted quantities, measured as provided above, will be paid for at the contract price per unit of measurement for the items that are shown in the proposal. Payment will be full compensation for the work prescribed in this Section.

The following bid items shall be considered Alternate C bid items, which, as a whole, may be removed from the contract subsequent to bid award.

Bid Item 73. – NVE Gas Support Relocation of Gas Main (8” Steel)

The unit price bid for this item shall include all labor, materials, equipment, services and other incidentals necessary to provide excavation support for the temporary retirement, removal, and relocation of the existing 8” steel gas main during the construction calendar window approved by NV Energy. Refer to the NV Energy sheets of the design drawings.

NV Energy to provide all piping materials listed on the NV Energy design drawings.

NV Energy to perform all piping work, hot work, and tie-ins of the 8” steel gas main

The amount bid for these items shall include all associated sawcutting, excavation, trenching, proper disposal of excavated piping and material, NV Energy approved bedding sand, backfill, shoring, dewatering, and protecting existing and installed natural gas facilities.

The amounts bid for these items shall not include the permanent granular roadway base material or permanent AC paving.

All underground piping shall be measured by linear foot.

The accepted quantities, measured as provided above, will be paid for at the contract price per unit of measurement for the items that are shown in the proposal. Payment will be full compensation for the work prescribed in this Section.

Bid Item 74. and 75. – NVE Gas Construct and Install Gas Main (4" PE) and NVE Gas Construct and Install Gas Service (2" PE)

The unit price bid for this item shall include all labor, materials, equipment, services and other incidentals necessary to construct and install the sizes and types of gas facilities noted in the title of this section and shown on the NV Energy sheets of the design drawings completely and in place. Unit price bid for this item also includes support to allow NV Energy crews to safely perform system tie-ins. Refer to the NV Energy sheets of the design drawings.

NV Energy to provide all piping materials listed on the NV Energy design drawings.

Contractor to perform all piping work except for hot work, and tie-ins of the gas facilities.

The amount bid for these items shall include all associated sawcutting, excavation, trenching, proper disposal of excavated piping and material, NV Energy approved bedding sand, backfill, shoring, dewatering, and protecting existing and installed natural gas facilities.

The amounts bid for these items shall not include the permanent granular roadway base material or permanent AC paving.

All underground piping shall be measured by linear foot.

The accepted quantities, measured as provided above, will be paid for at the contract price per unit of measurement for the items that are shown in the proposal. Payment will be full compensation for the work prescribed in this Section.

Bid Item 76. – NVE Gas Additional Excavation Support

The unit price bid for this item shall include all labor, materials, equipment, services and other incidentals necessary to provide excavation support for the retirements required outside the limits or vicinity of the work described in NVE GAS Bid Items #73-75. Refer to the NV Energy sheets of the design drawings.

NV Energy to provide all piping materials listed on the NV Energy design drawings.

NV Energy to perform all piping work, hot work, and retirements of the existing gas mains and services

The amount bid for these items shall include all associated sawcutting, excavation, trenching, proper disposal of excavated piping and material, NV Energy approved bedding sand, backfill, shoring, dewatering, and protecting existing and installed natural gas facilities.

The amounts bid for these items shall not include the permanent granular roadway base material or permanent AC paving.

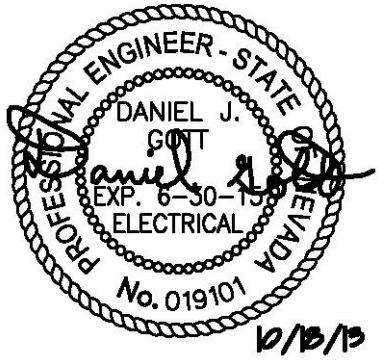
Each additional excavation hole or pit shall be assumed and estimated to be 5'x5'x5'.

The accepted quantities, measured as provided above, will be paid for at the contract price per unit of measurement for the items that are shown in the proposal. Payment will be full compensation for the work prescribed in this Section.

CONTRIBUTING AUTHORS FOR SPECIFICATIONS

Noel C. Laughlin, P.E., Project Manager =NCL

Dan J. Gott, P.E., Electrical Engineer =DJG



Noel Laughlin, PE is responsible for the following portions of the Specifications:

- Technical Washoe County “Orange Book” Format Specifications
    - Part 2 - Construction Materials (all)
    - Part 3 – Construction Methods (all)

Dan Gott, PE is responsible for the following portions of the Specifications:

- Lift Station CSI Format Specifications
    - Division 01300 (all)
    - Division 01600 (all)
    - Division 11000 (all)
    - Division 13000 (all)
    - Division 16000 (all)

PART 2 – CONSTRUCTION MATERIALS

200.01 AGGREGATES FOR BASE COURSES

Add the following section:
200.01.09 – Structural Fill – Add the following: Base aggregates shall conform to the following additional requirements:

The 1 inch sieve size shall replace the 4 inch sieve size in Table 200.01.02-I. The material shall have 100% passing the 1 inch Sieve Size and the rest of the gradation shall remain the same.

200.03 AGGREGATES FOR BEDDING AND BACKFILL

Add the following section: Before placing backfill material (imported, blended or native) sieve, plasticity index and proctor compaction dry density analysis must be completed to ensure conformance to specifications. At a minimum, one (1) bulk sample per soil type shall be obtained for testing.

Add the following section:
200.03.04.01 – Class C Material used for Base Course, Leveling Courses and Gravel Surfacing – Add the following: Base aggregates shall conform to the following additional requirements:

Project Control Tests	Test Method	Requirements
Abrasion	AASHTO T96	35 percent maximum wear.
CBR Value	ASTM D1883	100 percent, minimum
Soundness	ASTM C88	12 percent, maximum
Flat and Elongated Particles	ASTM D4791	8 percent, maximum.

Add the following section:
200.03.04.02 – Class C Material used for Base Course, Leveling Courses and Gravel Surfacing – Add the following: Bedding material as shown in the Standard Details within the plan set is required should the CONTRACTOR choose to use either Pre-Cast or Cast-In-Place Reinforced Concrete Boxes.

201.01 BITUMINOUS MATERIALS

Bituminous Plantmix shall conform to the requirements of Section 320 - "Plantmix Bituminous Pavement" of the Standard Specifications, except as modified herein.

The CONTRACTOR shall submit in writing for approval a job mix formula conforming to the requirements of Subsection 320.02.01 – "Composition of Mixtures" of the Standard Specifications. Type 2 aggregate conforming to the requirements of Subsection 200.02. – "Aggregates for Bituminous Courses" shall be used unless otherwise specified.

Unless otherwise approved by the CITY, Asphalt Cement shall be PG64-28NV. Asphalt binders shall conform to the requirements of Section 201 - "Bituminous Material" of the Standard Specifications with the following exceptions:

Test	Test Method	Requirements	Limit with Tolerance	Rejection Limit
Tests on Original Asphalt Cement				
Average Mass Change (percent)	AASHTO T240	1.00 Maximum	1.00 Maximum	1.01 Maximum

COMPOSITION OF MIXTURES

Subsection 320.02.01 - "Job Control Grading Band" of the Standard Specifications, is herewith amended as follows:

1. Amend the gradation and asphalt cement content table as follows:

	Maximum Tolerance
Aggregate passing No. 4 and larger sieves	±7 percent
Aggregate passing No. 8 to 100 sieves	±4 percent
Aggregate passing No. 200 sieve	±2 percent
Asphalt content	-0.2% to +0.7% of total weight of mix

2. Delete the third paragraph of Subsection 337.04.01 – "Composition of Mixtures" of the Standard Specifications and replace as follows:

   The optimum asphalt cement content shall be determined to 0.1 percent, by total weight of mix and dry weight of aggregate, in accordance with the Asphalt Institute's Manual Series No. 2 (MS-2) with a target value of 3% Air Voids for light traffic conditions (design Equivalent Single Axle Load (ESAL) < 10^4) and 4% Air Voids for medium and heavy traffic conditions (design ESAL > 10^4). The CONTRACTOR shall use a 75-blow Marshall Mix design for all streets on this project. The mix design and project control samples shall conform to MS-2 Table 5.2 - Marshall Mix Design Criteria.

   Modified MS-2 Table 5.2 - Marshall Mix Design Criteria

	Light Traffic[2] Surface & Base		**Medium Traffic[2] Surface & Base**		**Heavy Traffic[2] Surface & Base**	
Marshall Method Mix Criteria[1]						
Compaction, Number of Blows, Each End of Specimen	50*		50		75	
Stability (pounds)	1,200 Min.*		1,200 Min.		1,800 Min.	
Flow (0.01 inches)	8 Min.	16 Max.*	8 Min.	16 Max.(8)	8 Min.	14 Max.(8)
Air Voids (percent)	2 Min.*	4 Max.*	3 Min.	5 Max.	3 Min.	5 Max.
Voids in Mineral Aggregate (percent)	See STS Table 1.14A-2 : MS-2 Table 5.3					
Voids Filled With Asphalt (percent)	70	80	65	78	65	75

Notes:

1. All criteria, not just stability value alone, must be considered in designing an asphalt paving mix. Hot mix asphalt bases that do not meet these criteria when tested at 140 ^{o}F are satisfactory if they meet the criteria when tested at 100 ^{o}F and are placed 4 inches or more below the surface.
2. Traffic classifications
   Light Traffic conditions resulting in a Design ESAL < 10^4
   Medium Traffic conditions resulting in a Design ESAL between 10^4 and 10^6
   Heavy Traffic conditions resulting in a Design ESAL > 10^6
3. Laboratory compaction efforts should closely approach the maximum density obtained in the pavement under traffic.
4. The Flow value refers to the point where the load begins to decrease.
5. The portion of asphalt cement lost by absorption into the aggregate particles must be allowed for when calculating percent air voids.
6. Percent air voids are calculated at the target value.
7. Percent voids in the mineral aggregate are to be calculated on the basis of the ASTM bulk specific gravity for the aggregate.
8. Upon approval of CITY, flow may exceed the maximum value when polymer modified binders are used.

* Indicates modified value from MS-2 Table 5.2.

Minimum Percent Voids in Mineral Aggregate (VMA)

	Voids Filled in Mineral Aggregate (percent), Min.		
Nominal Maximum Particle Size (inches)[1, 2]	Design Air Voids (percent)[3]		
	3.0	4.0	5.0
No. 16	21.5	22.5	23.5
No. 8	19.0	20.0	21.0
No. 4	16.0	17.0	18.0
3/8	14.0	15.0	16.0
1/2	13.0	14.0	15.0
3/4	12.0	13.0	14.0
1	11.0	12.0	13.0
1-1/2	10.0	11.0	12.0
2	9.5	10.5	11.5
2-1/2	9.0	10.0	11.0

Notes:

1. Standard Specifications for Wire Cloth Sieves for Testing Purposes.
2. The nominal maximum particle size is one size larger than the first sieve to retain more than 10 percent.
3. Interpolate minimum voids in the mineral aggregate (VMA) for design air void values between those listed.

PRIME COATS

Table 315.03.04-I shall be replaced with the following table: Allow prime coats to cure for a minimum of 48 hours prior to paving, unless otherwise approved.

Grade of Asphalt Emulsion	**Distributor Spraying Temperature °F**		**Pugmill Mixing Temperature °F of Emulsion and Aggregates**	
	Minimum	**Maximum**	**Minimum**	**Maximum**
RS-1	70	140	(Not used for Mixing)	
RS-2, CRS-2, CRS-2nv	125	185	(Not used for Mixing)	
CRS-1, CRS-1nv	125	185	(Not used for Mixing)	
CQS-1nv	70	160	(Not used for Mixing)	
SS-1, CSS-1	70	160	50	160
SS-1h, CSS-1h	70	160	50	160
CMS-2, CMS-2h, CMS-2s	70	160	50	160
LMRS-2, LMRS-2h	125	185	(Not used for Mixing)	
LMCRS-2, LMCRS-2h	125	185	(Not used for Mixing)	
PMPS, PMPS-h, PMPS QB	110	185	(Not used for Mixing)	
PMPS Recycle	110	185	60	140

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

TACK COAT
Emulsified Asphalt, Type CQS-1nv (Diluted) may be substituted for the tack coat.

Emulsified asphalt for the seal coat shall be Emulsified Asphalt, Type SS-1h (Diluted); however, Emulsified Asphalt, Type SS-1 (Diluted), Emulsified Asphalt, Type CSS-1 (Diluted) or Emulsified Asphalt, Type CSS-1h (Diluted) may be substituted. Prepare the surface and apply the emulsified asphalt according to the Standard Specifications in the area where it is to be used as a seal coat.

202.01 PORTLAND CEMENT CONCRETE AND SLURRY BACKFILL

Add the following to the end of Section 202.01.01

Portland Cement Concrete shall conform to the requirements of Subsection 337.10 – "General Structural Use Concrete" of the Standard Specifications. The CONTRACTOR shall submit in writing for approval a mix design conforming to the requirements of Subsection 337.10 - "General" of Section 337 – "Composition of Mixtures" of the Standard Specifications. All Portland Cement Concrete, unless otherwise indicated, shall have a coarse aggregate gradation conforming to Size No. 67 in Subsection 200.05.03 - "Coarse Aggregates" of the Standard Specifications. Cement shall be Type II.

If the CONTRACTOR submits a written request to use Size No. 57 in lieu of Size No. 67, and if the CITY approves this request, then air entrainment shall be adjusted to conform to ACI requirements for severe conditions.

Concrete used for curbs, gutters, sidewalks, pedestrian ramps, and driveway aprons shall conform to the requirements of Subsection 337.10.01.01 – "Portland Cement Concrete Exposed to Freeze-Thaw Cycles" of the Standard Specifications and shall be reinforced with collated, fibrillated polypropylene fibers conforming to the requirements of Subsection 202.02.02.04 – "Polypropylene Fibers" of the Standard Specifications, at 1.5 pounds per cubic yard of concrete.

Subsection are herewith amended as follows:

Class AA concrete shall be required where the option of Class A or Class AA concrete is indicated in the plans or the Standard Specifications. Class DA may be substituted for Class AA concrete.

Type of Use	Minimum Cement Content	Minimum Compressive Strength , psi	Slump Inches	Maximum Water Cement Ratio (By Weight)	Air Content
Sidewalks, curbs, gutters, valve and manhole collars, valley gutters, pedestrian ramps and driveway approaches	6 sacks per cubic yard	4,000	1 to 4	0.45	6% ±1.5%
Thrust and Anchor Blocks	564 lbs./cubic-yard	3,000	3 to 4	0.50	No Requirement
Excavatable Slurry Bedding and Backfill	Submit Mix Design	300	6 to 9	Submit Mix Design	5%-min.
* Mix designs shall have a target air content of 6 percent, unless stipulated otherwise. Field air content shall be 6 percent ± 1½ percent.					

202 CEMENT AND RELATED MATERIALS
Add the following sections:

202.01.08 Pozzolan. Use Type V cement with a minimum of 20% Type F pozzolan by mass in all concrete. In lieu of this requirement, Type II cement with a minimum of 20% Type F pozzolan by mass or Type IP (MS) cement may be substituted therefore. The combined mass of cement and pozzolan will be considered as the mass of the cement when determining compliance with the cement range and maximum water requirements as specified in the Standard Specifications.

202.01.09 Concrete Mixing and Placement. Concrete shall be delivered to the site by transit mixers. The rate of delivery, haul time, mixing time and hopper capacity shall be such that all mixed concrete delivered shall be placed in the forms within one hour from the time of introduction of cement and water to the mixer. All concrete shall be kept continuously agitated until discharged in the hopper at the job site.

202.01.10 Ready-Mixed Concrete. Ready-mixed concrete shall be batched, mixed, and transported in accordance with ASTM C94 and Chapter 7 of ACI 301. Plant equipment and facilities shall conform to the "Check List for Certification of Ready Mixed Concrete Production Facilities" of the National Ready Mixed Concrete Association.

Add the following to the beginning of Section 202.02.02 Base Materials
202.02.02 Base Materials. Provide necessary means to obtain an aggregate sample from the batch plant conveyor belt. Construct the sampling device so representative samples may be taken as required. Deliver the samples by mechanical means to a point on the ground or other satisfactory safe and accessible location.

If two consecutive sieve analysis results are out of specification, reprocess failing stockpile or stockpiles. If three consecutive sieve analysis results are out of specification, stockpile or stockpiles will be rejected. Once rejected material has been replaced, provide informational results indicating the new material is within specification.

Add the following to the beginning of Section 202.01.05 Admixtures
202.01.05 Admixtures.

When a High Range Water Reducer is used, the slump requirements are hereby waived and the slump of the concrete after the admixture is added shall not exceed 200 mm (8 in.).

As an option, in order to adjust the admixture dosage and change mixture properties, submit two mix designs and trial batches for minimum and maximum values of admixture to be used. Select an admixture dosage within the approved range. If electing to adjust the admixture dosage, give written notification prior to batching concrete.

202.01.08.01 Concrete Mix Design. The following shall be added:

The submitted and approved mix design strength will serve as the specified 28-day compressive strength. The mix design strength will be the basis of acceptance even when contract documents specify lower compressive strengths.

Proportion water to maintain batching consistency with regard to stockpile moisture contents and varying absorption values for both coarse and fine aggregates. If requested, submit a new mix design if either the coarse or fine aggregate absorption values vary from the approved mix design by more than 1%.

When the entire plant is running, the scale reading and cutoff weights shall not vary from the mix design by more than 1% for cement, flyash, and silica fume, 1.5% for any individual size aggregate, and 1% for the total combined aggregate in any batch. The total water shall not exceed the maximum water specified in the mix design.

Condition the stockpiles to a homogeneous moisture content. Begin conditioning stockpiles a minimum of 15 hours prior to batching, or as directed.

Curing compound not used within 6 months of the date of manufacture will require certification from the manufacturer that the curing compound still conforms to ASTM C309. Curing compound more than one year old or without a manufacture date on the container will not be allowed for use.

202.01.12 Freeze Thaw Environments. Add the following to the first paragraph of this Subsection of the Standard Specifications:

Provide detailed plan for cold weather curing and protection of concrete placed and cured in weather below 40 degrees F. Provide detailed plan for hot weather placements including curing and protection for concrete placed in ambient temperatures over 80 degrees F.

203 PIPE AND RELATED MATERIALS
203.07.03 Materials. Add the following to the first paragraph of this Subsection:

The steel pipe specified for use as the casing pipe on this project shall be ANSI Schedule 40 Steel.

Add the following sections:
203.25 Casing Spacers
Casing spacers shall be made of non-metallic and non-corrosive materials. Casing spacers shall be sized to support the sewer pipe fully within the casing pipe. Minimum runner height on the casing spacers shall be 5/8".

203.26 End Seals
End seals for casing shall be a minimum 1/8 inch thick manufactured synthetic rubber with stainless steel bands and fasteners.

204.00 MANHOLES AND CATCH BASINS
204.02.03 Cast Iron Frame and Cover. Add the following to the first paragraph of this Subsection:

Manhole covers shall be watertight and lockable Pamrex or East Jordan Iron Works hinged manhole frames and covers shall be provided and installed by the CONTRACTOR. Lids shall have the words "Storm Drain" cast into covers.

205.00 WATER
Add the following sections:

205.03 Domestic Water Systems

205.03.01 Ductile Iron Pipe and Fittings

A. Ductile Iron pipe of the specified diameters and conforming to AWWA Standard C150 and ANSI A21.50 shall be installed in the locations shown on the drawings. All Ductile Iron pipe and fittings shall receive polyethylene encasement.

B. Pipe Materials

Ductile Iron pipe shall be manufactured in accordance with the latest revision of ANSI/AWWA A21.51/C151. The pipe shall be designed for maximum of 100 psi rated operating pressure plus a 100 psi minimum surge allowance, a 2-to-1 factor of safety, Type 4 laying conditions, and a minimum depth of cover of three and a half (3.5) feet and a maximum of twelve (12) feet.

Pressure Class. The pipe shall have a nominal thickness equal to the following pressure classes:

1. 12-inch and smaller pipe shall be Pressure Class 350.
2. 16-inch pipe shall be Pressure Class 250.

The class or nominal thickness, net weight without lining, and name of manufacturer shall be clearly marked on each length of pipe. Additionally, the letter "DI" or "Ductile" and the country where cast shall be cast or stamped on the pipe.

C. Ductile Iron Pipe Coatings

Pipe shall have standard asphaltic pipe coating on the exterior and a standard thickness cement - mortar lining on the interior in accordance with ANSI/AWWA A21.4/C104, latest revision.

D. Ductile Iron Pipe Joints

Ductile Iron pipe shall be flanged, push-on, or mechanical joint as noted on the drawings. *All joints shall be restrained.* Push-on joints shall permit a minimum deflection of three degrees without leakage under design conditions.

Restrained joints for pipe shall be provided by either restraint glands for Mechanical Joint pipe, restraint gaskets for Push-On joints, or restrained push-on joints with stainless steel locking segments.

Restrained joints for Mechanical Joint fittings shall be by Ductile Iron wedge action restraint glands compatible with all ANSI/AWWA C111/A21.11 mechanical joints. Gland body, wedges, and wedge actuating components shall be cast from grade 65-45-12 ductile iron in accordance with ASTM A536. Ductile iron gripping wedges shall be heat treated within a range of 370 to 470 BHN. Wedge assemblies shall by xylan fluoropolymer coated. Casting bodies shall be coated with a polyester based powder to provide corrosion protection that is electrostatically applied and heat cured. Restraint glands shall be EBBA Iron Series 1100 Megalug, Stargrip Series 3000 with Starbond Coating, or approved equal.

Restraint gaskets shall be U.S. Pipe Field Lok 350 joint restraint, The Gripper Gasket, or approved equal. Restrained push-on joints shall be U.S. Pipe TR Flex or approved equal.

Ductile Iron flanged pipe shall conform to ANSI/AWWA C115/A21.15. Ductile Iron pipe with flanged ends shall conform to the requirements of AWWA C115 for Class 125 ANSI B16.1 flanges.

E. Ductile Iron Pipe Fittings

All fittings shall be Ductile Iron. Ductile Iron fittings shall conform to the latest revisions of either ANSI/AWWA A21.10/C110 or ANSI/AWWA A21.53/C153. Fittings shall have a standard asphaltic coating on the exterior and a standard thickness cement mortar lining on the interior in accordance with ANSI/AWWA A21.4/C104, of latest revision.

Fittings and accessories shall be furnished with flanged or mechanical ends in accordance with the drawings.

F. Gaskets

The gasket shall be of such size and shape to provide an adequate compressive force against the plain end and socket after assembly to affect a positive seal under all conditions of joint and gasket tolerances.

The size, mold number, gasket manufacturer's mark, the trademark of the joint, and year of manufacturer shall be molded on the gaskets. Markings shall not be on the sealing surfaces.

One gasket shall be furnished with each length of pipe.

Natural rubber gaskets will not be accepted. Flange gaskets shall be full face type with profile by ACIPCO (Toruseal®) or US Pipe (Flange-Tyte®), or approved equal.

Lubricant, where required, shall be nontoxic, shall not support the growth of bacteria, and shall have no deterioration effects on the gasket material nor shall it impart taste or odor to water in a

pipe. The lubricant shall be delivered to the site in unopened, sealed containers labeled with the trademark or trade name and the pipe manufacturer's name.

G. Polyethylene Encasement

Polyethylene encasement shall have a thickness of 4 mil and be black in color. Material shall be high-density, cross-laminated film conforming to Section 4.1.3 of AWWA Standard C105. Tube size shall be as listed in Table 1 of same Standard.

205.03.02 HDPE Pressure Pipe

A. Polyethylene pressure pipe and tubing shall be PE 3408, Pressure Class 200 (DR 9) copper tubing size conforming to AWWA C901.

205.03.03 PVC Pipe

PVC water transmission pipe of the specified diameters conforming to AWWA C900-07 shall be installed at the locations shown on the drawings.

B. Pipe Materials

PVC water transmission pipe shall be extruded from Class 12454B PVC compound providing a hydrostatic design basis (HDB) of 4,000 psi. The pipe outside diameters shall conform to dimensions of cast iron pipe. Pressure rating shall be 235 psi (DR 18), or as indicated on the drawings.

PVC pipe dimensions and tolerances of the pipe barrel shall conform to the requirements listed in Table 1, AWWA C900, when measured as specified in ASTM D2122. Standard pipe laying length shall be 20 ft., plus or minus 1-inch. The pipe delivered to the jobsite shall be marked as specified in AWWA C900, Section 6.1.

C. PVC Pipe Joints and Fittings

PVC pipe shall have elastomeric-gasket bell ends meeting the requirements for transmission pipe provided in ASTM D3139 when measured in accordance with ASTM D2122.

PVC gaskets and lubricants shall be made from materials that are compatible with the plastic material and with each other when used together. They shall be suitable for use in potable water systems and shall not support the growth of bacteria.

One gasket shall be furnished with each length of elastomeric-gasket bell-end pipe. Gaskets shall conform to the requirements of ASTM F477.

Fittings for PVC pipe shall be Ductile Iron as specified in the Drawings conforming to the requirements for Ductile Iron pipe defined in Section 205.03.01 above.

Restrained joints for pipe shall be by a bell restraint harness for C900 PVC pipe bells. Restraint Harness shall be EBBA Iron Series 1600 or approved equal. Restrained joints for Ductile Iron fittings shall be by Ductile Iron restraint glands for Mechanical Joint fittings. Restraint glands shall be EBBA Iron Series 2000PV or approved equal.

D. Manufacturer

PVC pipe shall be as manufactured by Diamond Plastics Corporation, Vinyltech PVC Pipe, North American Pipe Corporation, or equal. C900 PVC pipe as manufactured by JM Eagle will not be accepted on this project.

205.03.04 Gate Valves

A. General:

Gate valves shall be resilient seated wedge type, fusion bonded epoxy external and internal surfaces conforming to ANSI/AWWA C550, Ductile Iron or Cast Iron body design, non-rising stem (NRS) valves. The design pressure shall be 250 psig cold water working pressure.

Valve stem operation shall be counterclockwise to open. The valves shall comply with AWWA Standard C509 or C515, latest revision.

B. Ends:

Ends shall be designed for direct connection to the type of pipe which the valve is joined to, or as indicated on the drawings. Flanged ends and drilling shall comply with ANSI B16.1, Class 125. Mechanical Joint ends shall comply with ANSI/AWWA C111.

C. Operators:

All buried gate valves shall be equipped with standard 2-inch operating nuts. Extensions shall be provided to insure the operating nut is no more than 4 feet from the finished grade. Gate valves 20-inches or larger shall be equipped with spur or bevel gear actuators as noted on the drawings.

D. Valve Boxes and Covers:

Valve boxes with covers (new style) shall be provided for all buried valves as detailed in the plans. Valve boxes shall be 6-inch designed to fit within the conductor pipe defined below.

E. Conductor Pipe:

Conductor pipe for valve risers shall be 6-inch diameter PVC gravity sewer pipe (SDR 35) meeting the requirements of ASTM D 3034.

F. Gate valves 4-inches through 12-inches shall be Mueller A-2360, American Company Series 2500 or approved equal. Gate valves 14-inches and larger shall be Mueller A-2361 or American Company Series 2500.

205.03.05 Reducing/Transition Couplings and Sleeves

Reducing and transition couplings shall be installed where pipe of dissimilar size and/or material are to be joined at the locations shown on the drawings. Couplings shall meet the requirements of AWWA C219 and be rated for 200 psi.

Sleeve material shall be carbon steel or Ductile Iron with NSF-61 registered fusion bonded epoxy coating. Gaskets shall be resilient material coupling gaskets approved for water applications. Followers and middle rings shall be fusion bonded epoxy coated per NSF-61. Bolts and nuts for buried service shall be Type 304 stainless steel.

Transition couplings shall be used to connect new Ductile Iron to existing transite (AC) pipe. Couplings shall be designed specifically for the pipe material/size and application. Couplings shall install with a maximum of one bolt at each end.

Strait or reducing couplings shall be Romac Style RC 501, Dresser Style 253 or approved equal. Transition couplings shall be Hymax 2000 Series as manufactured by Total Piping Solutions, Inc., Romac Macro Two-Bolt Wide Range Ductile Iron Coupling, or approved equal.

205.03.06 Flanged Coupling Adapters

Flange coupling adaptors shall meet the requirements of AWWA C219. Sleeve material shall be carbon steel with NSF-61 registered fusion-bonded epoxy coating. Bolts and nuts for buried service applications shall be ANSI 304/303 stainless steel. Flanged coupling adapters shall be designed specifically for the pipe material/size and application and shall install with a maximum of one bolt on the compression end. Flange coupling adapters shall be HYMAX 2100 series flanged adapters as manufactured by Total Piping solution, Inc., or approved equal.

205.03.07 Flange and Mechanical Joint T-Head Bolts and Nuts

Flange Bolts and Nuts. Bolts and nuts shall be carbon steel with a minimum of 60,000 psi tensile strength conforming to ASTM A307, Grade A. Bolts shall be standard ANSI B1.1, Class 2A Coarse threads. Nuts shall conform to ASTM A563 and be standard ANSI B1.1, Class 2A coarse threads. All bolt heads and nuts shall be hexagonal. Identification of the head of the bolt shall be: A 307 A.

Mechanical Joint T-Head Bolts and Nuts. Bolts and nuts shall be weathering steel with a minimum yield strength of 45,000 psi. All T-Head bolts and nuts shall be threaded in accordance with ANSI B 1.1, Class 2A coarse threads. Heavy Hex nuts shall be used. Bolt heads shall be in accordance with the dimensions of ANSI/AWWA C111/A21.11-95.

Finish. All flange bolts and nuts and mechanical joint T-Head bolts and nuts shall be finished with the TRIPAC 2000 blue coating system to significantly reduce the effects of corrosion, or equal.

A multi-step process shall be utilized to chemically clean, abrasive blast and prime with zinc/nickel phosphate primer prior to application of the xylan fluoropolymer. Wear resistance (K-Factor) shall be in the range of 6 to 8 (Excellent) and minimal effects should be seen after a 3,000 hour salt spray test conforming to ASTM B-117. Bolts and nuts finished with the TRIPAC 2000 blue coating system do not require coating with mastic.

205.03.08 Hot-Tapping Sleeves

Tapping sleeves shall be full circumference band consisting of 18-8 Type 304 Stainless Steel, gaskets throughout sleeve, equipped with an AWWA C207, Class D ANSI 150# drilling and 18-8 Type 304 stainless steel flanged outlet rated for 200 psi working pressure. Bolts, nuts, and washers shall be 18-8 Type 304 Stainless Steel with heavy semi-finished hexagon nuts to ASTM A-307 standards. Tapping sleeve shall be equipped with a 3/4-inch NPT stainless steel test plug. Tapping sleeves shall be Smith-Blair Model 663 or Romac SST.

205.03.09 Warning Tape, Tracer Wire and Test (Tracer) Stations

Warning tape shall be 4 mil, detectable, 3-inch wide tape. Warning tape for water shall be colored blue with black letters clearly marked “CAUTION: BURIED WATER LINE BELOW”. Warning tape for gas and water shall be marked “CAUTION: BURIED GAS AND WATER LINES BELOW”.

Water pipe tracer wire shall be No. 12 stranded copper wire with blue THHN insulation.

Tracer wire shall be taped to the water pipe as indicated on the Trench detail. All wire splices shall be made using a split bolt connector wrapped with aqua-seal and electrical tape. Test stations shall consist of a valve box with cover and 3 pound anode per TMWA Construction Standards.

205.03.10 Concrete Thrust Blocks

Concrete thrust blocks shall be installed at all pipe horizontal deflections greater than 10 degrees. Concrete pads shall be installed under all Valves, Tee’s, and Reducers as indicated in TMWA Standard Drawing 10L-6 through 10L-8. Concrete thrust blocks and pads shall be constructed with concrete delivered by an approved TMWA supplier having a compressive strength of 3000 psi after 28 days.

205.03.11 Service Saddles

Service saddles shall be double strap type, AWWA approved for PVC or Ductile Iron pipe, of the size specified on the Drawings. Service saddle body shall be cast from ductile iron meeting, or exceeding ASTM A536 with a fusion bonded nylon coating, or coated with an impact and corrosion resistant fusion bonded epoxy, minimum 10-12 mills thick, and equipped with double Type 304 stainless steel straps. Service saddles shall have a NPT threaded inlet for installations on C900 PVC or Ductile Iron pipe. Maximum O.D. of service saddle’s range shall be equivalent to the O.D. of the pipe for which it will be installed. Service saddles shall be Smith-Blair 317 Taperseal, Romac Style 202NS or approved equal.

205.03.12 Compression Couplings and Adapters for Service Line Connections

Compression couplings and adaptors for connecting new CTS HDPE service lines to existing service line or meter setters shall be quick joint couplings as manufactured by the Ford Meter Box Company, Inc., Mueller 110 compression connections, or approved equal.

205.03.13 Corporation Stops (Service Replacements and Reconnections)

Corporation stops shall be ball valve, brass conforming to AWWA C800 and ASTM B-62, and suitable for a working pressure of 300 psi. Inlet end shall be male iron pipe thread (MIP); outlet end shall be compression connection suitable for connection to CTS O.D. HDPE tubing. Corporation stops shall be Ford Ballcorp quick joint connection Model No. FB1100-X-Q, Mueller 300 ball type corporation valves with Mueller 110 compression connection outlet Model No. B 25028, or approved equal.

205.03.14 Corporation Stops (Temporary Testing and Flush Assemblies)

Corporation stops shall be ball valve, brass conforming to AWWA C800 and ASTM B-62, and suitable for a working pressure of 300 psi. Inlet and outlet ends shall be male iron pipe thread (MIP).

Corporation stops for 2-inch temporary flushing and testing shall be Ford Ballcorp Model FB500-7, Mueller 300 ball type corporation valve Model No B-2969, or approved equal. Provide a brass cap to retire the connection after testing and flushing.

205.03.15 Water Meter Boxes

Meter boxes shall be per the TWMA Standards. Meter boxes shall be Christy B16 or B36 (size as specified in the drawings) with reinforced concrete B16D or B36D lid, respectively, or approved equal.

205.03.16 Retrofit Meter Setters

Retrofit meter setters shall be manufactured by Ford or approved equal.

205.03.17 Water Pipe Sand Bedding (Within Pipe Zone)

Water pipe sand bedding shall be imported, and shall be free from foreign materials such as ice, clay, rocks, sticks, vegetation, or other objectionable material. Water pipe sand bedding shall be Class A Backfill as specified in Section 200.03.02 of the Standard Specifications for Public Works Construction, Latest Edition.

205.03.18 Trench Backfill (Above Pipe Zone)

Trench backfill shall be Type 2, Class B Crushed Aggregate Base as specified in Section 200.01.03 of the Standard Specifications for Public Works Construction, Latest Edition.

205.03.19 Excavatable Cement Slurry

Excavatable cement slurry shall conform to Section 207.02.03 Slurry Cement Backfill, Class A, Excavatable, 50 to 200 PSI 28 Day Strength – of the Standard Specifications for Road and Bridge Construction, Nevada Department of Transportation, Latest Edition.

205.04 Construction Water Supply

(a) General. CONTRACTOR is responsible to obtain and utilize an adequate and appropriate water supply for all construction activities and adherence to permitting requirements. Owners of supply shall be negotiated with and an agreement signed with each before the water is removed. CONTRACTOR shall furnish copies of any such agreements to the CITY. All royalties occurring under such agreements shall be paid and any necessary rights of way obtained.

(b) Water Wells and Well Points for Dewatering. Be aware that water usage may be limited in the project area. Monitoring the usage and effects on adjacent wells may also be required by the Department of Conservation and Natural Resources, Division of Water Resources. Contact the Office of the State Engineer for possible restrictions at (775) 684-2800. If electing to obtain water from an existing well or to

drill a well for highway construction purposes, request a waiver be issued in accordance with Nevada Revised Statutes and the Nevada Administrative Code.

File all requests for waiver to the Engineer on the form from the Division of Water Resources website (http://water.nv.gov/). Ensure the request package includes the following information:

1. The location of the proposed water well by public survey, county assessor's parcel number and plot map.

2. The project and contract number.

3. The total amount of water that will be consumed each day.

4. The name, address, and telephone number of the person responsible for plugging the well. Also include the name, address, and telephone number of the owner of the land where the well is located if not the same as the person responsible for plugging the well.

5. A notarized affidavit signed by the person responsible for plugging the well which states that they will be responsible for plugging the well if it is abandoned.

6. The name, address, and telephone number of a person who will be available to answer questions concerning the contract.

7. The date the contract is scheduled to be completed.

Maintain a copy of the approved waiver onsite at all times during drilling operations.

206.00 REINFORCING STEEL

Add the following section:
206.04 Coating of Reinforcing Steel
Coating of reinforcing steel shall conform to AASHTO M284 (ASTM A775). Fabrication and handling of coated reinforcing steel shall conform to AASHTO M317 (ASTM D3963) except as provided herein.

Patching or repair material shall conform to AASHTO M284 (ASTM A775) and shall be obtained from the coating manufacturer utilized to coat the initial reinforcement.

Repair all damage, visible to the unaided eye, caused during shipment, storage, or placement of coated bars at the job-site with patching material conforming to Standard Specifications for Public Works.

211.00 CULVERT MARKERS AND GUIDE POSTS

Add the following section:

211.04 Materials – Add the following to this section:

The use of metal posts is mandatory for this contract.

212.00 GUARDRAIL
Add the following section:

212.04 Metal Guardrail Posts

Metal posts shall be of structural steel conforming to ASTM A36 and galvanized according to AASHTO M111.

214.00 PAINT
Add the following section:

214.04 Submittals

For each product and material used on the project, furnish four (4) copies of the following: Product Data Sheet (PDS), the manufacturer's technical data sheets, and paint colors available (where applicable).

For each paint system, furnish a Paint System Data Sheet (PSDS). Furnish copies of paint system submittals to coating applicator.

Indiscriminate submittal of manufacturer's literature is not acceptable.

Submit detailed chemical and gradation analysis for each proposed abrasive material.

Add the following section:
218.00 SANITARY SEWER LIFT STATION
See section 334.00 Sanitary Sewer Lift Station for both material and construction specifications.

PART 3 – CONSTRUCTION METHODS

300.00 – CLEARING AND GRUBBING
Add the following Section(s)

300.03.01 – Disposal of Materials
Disposal work shall also meet the following requirements:

(a) Woody debris may be chipped. Chips may be sold to CONTRACTOR's benefit or used for landscaping onsite as mulch or uniformly mixed with topsoil. Dispose chips that are unsaleable or unsuitable for landscaping or other uses.

(b) Limit offsite disposal of clearing and grubbing debris to locations that are approved by federal, state, and local authorities, and that will not be visible from Project.

(c) Dispose strippings unsuitable for topsoil or that exceed quantity required for topsoil offsite.

(d) Stockpile topsoil in sufficient quantity to meet Project needs.

Do not remove topsoil until after scalping is completed. Strip areas within limits to minimum depths shown or specified. Do not remove subsoil with topsoil. Stockpile strippings for topsoil, separately from other excavated material.

Perform clearing and grubbing only after adequate erosion and sediment controls are in place.

300.03.02 – Temporary Storage of Contaminated Materials Prior to Disposal
For the CONTRACTOR'S information, Horsemans Park, located at 2200 Loop Road off Vista Blvd, has space available for temporary stockpiling and treatment of contaminated soils. All such related efforts shall be coordinated through the CITY and no materials may be stockpiled until written permission to this effect is received and in place. This agreement shall in no way remove CONTRACTOR'S responsibility to treat and clean up contaminated soils. Horsemans Park shall not be utilized for stockpiling of granular import or non-contaminated export.

301.00 – REMOVAL OF EXISTING IMPROVEMENTS
Add the following Sections

301.02.05 Removal of Pavement Markings. Remove pavement marking film - traffic lines by using equipment with a combination of chemical and high pressure water, or by other approved means. Completely remove tape in such a manner that no residue or any other trace of the tape may be misconstrued by a driver to be a traffic marking under any condition of daylight, darkness, or wetness of the pavement. Exercise care to prevent damage to the pavement surface.

301.02.06 Removal of Asbestos Cement (Transite) Pipe.
301.02.06.01 General
Removal of Asbestos Cement Pipe ("Transite" or "A-C" pipe), locations and extents as shown in the plans, is identified as a Class II asbestos removal activity by OSHA's Subpart Z, 29 CFR 1926.1101, with the A-C pipe removal is being done utilizing a valid Negative Exposure Assessment (NEA).

Contractor's personnel performing work on asbestos or transite pipe, including without limitation cutting, tapping, repairing, handling or removing, must have successfully completed specialized OSHA training in the handling and disposal of asbestos prior to the performance of any such work, or Contractor shall hire a subcontractor that has successfully completed specialized OSHA training in the handling and disposal of asbestos to perform such work.

301.02.06.02 Execution Preparation

1. Establish a regulated work area (RWA) using barricade tape.
2. Provide a hand/face wash station at the entry point to the RWA.
3. Post asbestos-warning signs at the RWA entry point.
4. Establish a waste load-out area attached to the RWA.
5. Once RWA is established and work begins, no access should be permitted without the required personal protective equipment.

301.02.06.02 Execution Air Monitoring and Sampling of Exposure to Airborne Asbestos Fibers

As the work begins the competent person must conduct and record objective data to confirm the Initial Exposure Assessment (IEA), and that the specific job-site work activity confirms the findings of the IEA, and that the PELS are not being exceeded for this work activity.

301.02.06.03 Excavation and Pipe Removal

1. Machine excavate to expose A-C pipe.
2. Hand excavate areas under pipe where cuts/breaks are planned.
3. Excavation operations should be carefully executed so that pipe damage does not occur prior to removal.
4. Protective clothing and equipment shall consist of at a minimum: steel toe boots, hard hats, safety glasses, and rubber or leather gloves.
5. All pipe cutting or breaking operations require adequate wetting with potable water to prevent A-C materials from being crumbled by hand pressure and the asbestos fibers becoming air-borne (friable).
6. Plan pipe cuts/breaks as necessary to accommodate the size/weight of pipe being removed.
7. Use a hammer or snap pipe cutter (or equivalent tool) to make the initial cut and drain pipe of residual liquids.
8. Remove pipe sections at joint collars by breaking them with a sledgehammer, or cutting them with a snap cutter.
9. Where pipe re-connection is required, trim pipe ends with a snap pipe cutter. Wet, wrap and seal pipe ends in a min. 6-mil poly film wrap that is securely fastened and taped to close the pipe end. Wetting is required to prevent A-C materials from becoming friable.
10. When applicable, remove pipe sections from trench in an "intact" condition. Wet and containerize waste materials as you go. Using lifting straps and methods that do not damage the pipe.
11. Identify A-C materials and stock-pile the waste in a designated load-out area with the following label warnings:

DANGER

Contains Asbestos Fibers

Avoid Creating Dust

Cancer and Lung Disease Hazard

#1. Note: The label must also identify the generator of the ACP waste.

#2. Check all local jurisdiction (county) requirements for any regulations. CONTRACTORs should check with IEPA that you are performing this work. When work is over 260' in length, this CONTRACTOR must notify IEPA in writing (See IEPA website for "Notification" procedures or call 312-886-3006).

301.02.06.04 Disposal
Asbestos Cement (Transite) water pipes shall be cut, removed, handled, and/or disposed of in accordance will all applicable local, state, federal, and OSHA laws, regulations, and guidelines. Compliance with the above referenced laws, regulations, and guidelines shall be the sole responsibility of the Contractor. CITY and TMWA must be provided with chain of custody form for all transite or asbestos pipe disposed of by CONTRACTOR or its subcontractors.

301.02.08 Salvage of Materials. Salvage and use the material produced by the cold milling of bituminous surface as shouldering material.

Salvage, haul, and satisfactorily stockpile the material produced by the cold milling of bituminous surface at a location agreeable to the CITY.

302.00 SUBGRADE PREPARATION
302.02 Preparation of Subgrade
Modify the first paragraph as follows:
Scarifying and cultivating will be required for all soils. Unsuitable material found below the processing depth or subgrade specified herein shall be treated in accordance with Subsection 302.05 – "Unsuitable Material."

303.00 UNCLASSIFIED EXCAVATION
Add the following section:
303.01.01 General
Submit excavation plan for CITY's review. Excavation plan shall include the following:

(a) Methods and sequencing of excavation.

(b) Proposed locations of stockpiled excavated material.

(c) Proposed onsite and offsite spoil disposal sites.

(d) Numbers, types, and sizes of equipment proposed to perform excavations.

(e) Anticipated difficulties and proposed resolutions.

(f) Reclamation of onsite spoil disposal areas.

Add the following section:

303.02.10 General
Provide adequate survey control to avoid unauthorized overexcavation.

Prior to excavating, complete the following:

(a) Demolition work according to Section 02 41 00.

(b) Clearing and Grubbing work according to Section 201.

(c) Dewatering and Water Control During Construction according to Section 31 23 19.01.

(d) Excavation support as necessary to support sides of excavations and prevent detrimental settlement and lateral movement of existing facilities, adjacent property, and completed Work.

Minimize stockpiling excavated material suitable for use as fill or backfill until material is needed. Post signs indicating proposed use of material stockpiled. Post signs that are readable from all directions of approach to each stockpile. Signs should be clearly worded and readable by equipment operators from their normal seated position. Confine stockpiles to within easements, rights-of-way, and approved work areas.

Do not obstruct roads or streets. Do not stockpile excavated material adjacent to trenches and other excavations, unless excavation side slopes and excavation support systems are designed, constructed, and maintained for stockpile loads. Do not stockpile excavated materials near or over existing facilities, adjacent property, or completed Work, if weight of stockpiled material could induce excessive settlement.

Dispose of excavated materials, which are unsuitable or exceed quantity needed for fill or backfill, offsite. Dispose debris resulting from removal of underground facilities according to Section 202. Dispose debris resulting from removal of organic matter, trash, refuse, and junk according to Section 201.

305.00 – TRENCH EXCAVATION AND BACKFILL
Add the following section

305.01.01 General –

Notify CITY when:
(a) Structure is ready for backfilling, and whenever backfilling operations are resumed after a period of inactivity.

(b) Soft or loose subgrade materials are encountered wherever embankment or site fill is to be placed.

(c) Fill material appears to be deviating from Specifications.

Keep placement surfaces free of water, debris, and foreign material during placement and compaction of fill and backfill materials. Place and spread fill and backfill materials in horizontal lifts of uniform thickness, in a manner that avoids segregation, and compact each lift to specified densities prior to placing succeeding lifts. Slope lifts only where necessary to conform to final grades or as necessary to keep placement surfaces drained of water.

During filling and backfilling, keep level of fill and backfill around each structure even. Do not place fill or backfill, if fill or backfill material is frozen, or if surface upon which fill or backfill is to be placed is frozen.

Backfill material and excavated area shall be free of trash, wood, large rocks, or other deleterious materials.

Correct and repair any subsequent damage to structures, pavements, curbs, slabs, piping, and other facilities, caused by settlement of fill or backfill material.

Correct overexcavation by transitioning between overcut areas and designed slope adjoining areas, provided such cutting does not extend offsite or outside easements and right-of-ways, or adversely impacts existing facilities, adjacent property, or completed Work. Replace excavation carried below grade lines as follows:

(a) Concrete fill beneath footings according to Section 304.

(b) Granular fill beneath Slabs-On-Grade.

305.02 Maximum Length of Open Trench – Add the following to the end of the section.
With written approval from the CITY, CONTRACTOR may temporarily utilize steel plates to cover trenches. Steel plates shall have a skid-resistant coating so to provide traction to vehicles in below freezing weather conditions. Steel plates shall have cold-mix asphalt concrete pavement ramps constructed around the perimeter of the plate(s). The use of steel plates will NOT be permitted if inclement weather is forecast (rain, snow, etc.). Warning signs stating "STEEL PLATES ON ROADWAY", or similar, shall be properly placed to caution motorists.

305.08 Bedding – Add the following to the end of the section.

Bedding and leveling courses shall use Class C material as defined in the Standard Specifications and altered in the Special Conditions. Bedding and Leveling Material is required for use underneath Precast Reinforced Concrete Boxes. Material is not required under Cast-In-Place box sections as mentioned in the *Geotechnical Investigation Report Proposed North Truckee Drain Realignment, Sparks, Nevada* (Kleinfelder, 2009).

Furnish imported bedding material where, in the opinion of CITY, excavated material is unsuitable for bedding or insufficient in quantity. Place over the full width of the prepared trench bottom in two equal lifts when the required depth exceeds 8 inches. Hand grade and compact each lift to provide a firm, unyielding surface.

Install to form continuous and uniform support except at bell holes, if applicable, or minor disturbances resulting from removal of lifting tackle. For bell or coupling holes, excavate in bedding at each joint to permit proper assembly and inspection of joint and to provide uniform bearing along barrel of pipe or conduit.

305.09 Backfill and Densification – Remove and replace last paragraph with the following:

Process excavated material shall meet specified gradation requirements. Adjust moisture content as necessary to obtain specified compaction.

Do not allow backfill to free fall into the trench or allow heavy, sharp pieces of material to be placed as backfill until at least 2 feet of backfill has been provided over the top of pipe.

Backfill to grade with proper allowances for topsoil, crushed rock surfacing, and pavement thicknesses, wherever applicable. Backfill around structures with same class backfill as specified for adjacent trench unless otherwise shown or specified.

After each section of trench is backfilled, maintain the surface of the backfilled trench even with the adjacent ground surface until final surface restoration is completed.

Add gravel surfacing rock where applicable and as necessary to keep the surface of the backfilled trench even with the adjacent ground surface, and grade and compact as necessary to keep the surface of backfilled trenches smooth, free from ruts and potholes, and suitable for normal traffic flow.

Add topsoil/excavated material where applicable and as necessary to maintain the surface of the backfilled trench level with the adjacent ground surface.

305.18 – JACKING OPERATIONS

305.18.01 – Jacking Reinforced Concrete Pipe – Remove and replace the first and second paragraphs with the following: It shall be understood when pipe (hereafter to also include reinforced concrete box culvert) is specified to be jacked into place, the design of such pipe is based upon the superimposed loads and not upon the loads which may be placed upon the pipe as a result of the jacking operations. Any increase in pipe strength in order to withstand jacking loads shall be the responsibility of the CONTRACTOR.

Where pipe 60 inches or greater in inside diameter (or box 60 inches or greater in height or width) is to be jacked for a distance greater than 32 feet, a pilot tunnel shall be constructed first to insure accuracy of grade and alignment. The dimensions and support of the pilot tunnel will be optional with the CONTRACTOR, subject to approval of the CITY. Such approval shall in no way relieve the CONTRACTOR of the responsibility for damage of any nature which might occur as a result of the method used.

306.00 – STORM DRAIN, CULVERTS, AND SANITARY SEWER CONSTRUCTION

306.04.01 General – The following shall be added to the section:

Pipe laying shall proceed upgrade with spigot ends pointing in direction of flow. Pipe invert may deviate from line or grade up to 1/2 inch for line and 1/4 inch for grade, provided that finished pipeline will present a uniform bore, and such variation does not result in a level or reverse sloping invert, or less than minimum slope shown.

Prevent entry of foreign material into gasketed joints. Plug or close off pipes that are stubbed off for manhole, concrete structure, or for connection by others, with temporary watertight plugs.

- Lay with open joints.
- Only use concrete closure collars where shown or authorized by CITY.
- Prevent entry of foreign material into gasketed joints. Plug or close off pipes that are stubbed off for manhole, concrete structure, or for connection by others, with temporary watertight plugs.
- Service connections shall have minimum slope of 1/4 inch per foot.
- For square-end underdrains, cover top and sides of the joints with a strip of asphalt-saturated 30-pound roofing felt.

- Bell holes shall be excavated in the bedding or foundation, or both, when installing pipe with expanded bells so that the pipe is supported uniformly by the barrel and not by the bells.

Add the following sections to 306.07 Reinforced Concrete Boxes

Reinforced concrete boxes shall be installed as set forth in the plans. All boxes shall be constructed at the lines grades indicated on the plans. The CONTRACTOR shall have the option of using either Precast or Cast-In-Place boxes throughout the project. Regardless of material choice, CONTRACTOR shall adhere to performance specifications dictated.

If precast concrete boxes are chosen, CONTRACTOR shall utilize external sealing bands per ASTM C877-08 (latest edition) on box sections and manhole risers to ensure final product will be water tight at all locations and components.
If cast-in-place is chosen, non-swelling preformed joint sealant waterstops shall be used continuously along all joints to ensure watertightness, such as Henry Synco-Flex or approved equivalent.

At the upstream and downstream terminus, a water tight plug shall be constructed in each barrel of the reinforced concrete box culvert per Double 14'x10' RCB Plug Detail in the Structural Section (S-11) of the plans .

Add the following sections to 306.08 Sanitary Sewer Lift Station

306.08.01 Description. This work shall consist of furnishing and installing a sanitary sewer lift station and associated appurtenances conforming to the requirements of these Specifications, and of the sizes and dimensions and configuration required in the Plans, and installing such lift station at the location designated in the Plans, and in conformity with the lines, grades and configuration established by the CITY.

306.08.01.01 Installation of Structures. All structures such as the wet well, valve vault and the control panel base shall be constructed as detailed on the plans and as called for in these specifications. All access frames and covers shall be properly set and installed as recommended by the manufacturer.

Exterior electrical panel doors and vault lids shall be padlockable, with the padlock to be provided by the CITY.

The wetwell shall be constructed on a solid foundation. The bottom slab of the wetwell shall be set on a minimum of 18 inches of Class C granular backfill, and additional foundation shall be provided in unstable soils conditions. Prior to placement of granular backfill, subgrade shall be prepared as specified in the detail sheets of the Plans.

Surface water shall be directed away from the station in all directions

306.08.01.02 Installation of Pump and Motor. The pump and motor units shall be carefully installed as recommended by the manufacturer and the seals between pumps and pump bases must mate as intended. The pump and motor units shall be properly wired and field checked to see that they can be easily removed and replaced by means of the lifting chains and do not bind on the guide rails.

306.08.01.03 Installation of Electrical and Controls. The electrical and control system shall be as specified hereinbefore and shall all be installed in accordance with the National Electrical Code. The

complete system shall be provided and installed by a single supplier. The Contractor shall contact Nevada Energy (NVE) and install all lines to the control panel, including metering in accordance with their requirements. The electric meter shall be installed as close to the station as allowed by NVE.

306.08.01.04 Testing. Wet well testing shall consist of introducing water into the wet well to ensure that the pumps operate as proposed and that all controls and alarms shall be operated in the presence of the CITY to demonstrate that they operate as intended. All alarm conditions shall be simulated and shown to operate as intended.

Force main testing shall consist of the force main piping being subjected to a hydrostatic pressure-leakage test. Force mains shall be tested in sections not to exceed 4,000 lineal feet per test section. The main shall be subjected to a hydrostatic pressure of 100 psi for a period of two hours. The rate of leakage shall be determined in 15-minute intervals, and shall not exceed ten (10) gallons per inch of pipe diameter per mile of pipe per 24 hours.

Cracked or defective pipe, joints, fittings, or valves discovered in consequence of this test shall be removed and replaced with sound materials, and the test shall be repeated until the test results are satisfactory. Precautions shall be taken to remove or otherwise protect equipment in, or attached to, pipe to prevent damage or injury thereto.

307.00 DOMESTIC WATER AND IRRIGATION SYSTEMS
Add the following sections to 307.01 Description.

307.01.01 Coordination. Prior to beginning work on existing water mains, CONTRACTOR shall coordinate Truckee Meadows Water Authority Inspector to ensure that isolation valves are operational and that construction outages have been properly coordinated with TMWA as well as all impacted businesses. CONTRACTOR shall also coordinate with the TMWA inspector regarding testing, flushing material/product verification, etc.

307.01.02 Workmanship
All work shall be completed in conformance with the Standard Specifications for Public Works Construction, the appropriate AWWA, TMWA or ASTM standards referenced earlier, the drawings and these specifications.

307.01.03 Non-TMWA Potable Systems
When constructing potable pipelines and systems which are not under the jurisdiction of TMWA, CONTRACTOR shall adhere to the same standards as are followed for TMWA systems, including coordinating with TMWA inspector for outages, taps, disinfection, flushing, etc.

307.01.04 Miscellaneous

307.01.04.01 <u>Connection to Existing Facilities and Line Stops</u>

Connection to existing water pipelines and customer services are required at the locations noted on the drawings. Hot Tap connections are to be accomplished utilizing the TMWA Standard Distribution Hot Tap procedures.

Contractor shall verify the existing pipe location, depth and pipe OD of the pipe at connection locations prior to initiating the distribution tap operations or connection to existing water mains. See Potholing below.

Connection to existing water mains will require isolation of the existing water mains and disruption of water service. In some areas it may be necessary to accomplish this work after hours or on weekends due to commercial businesses in the affected area. Contractor shall coordinate all connections to existing water facilities with the TMWA Inspector.

Existing water customers are to be transferred to the new water mains after testing, disinfection and flushing of the new main. Contractor shall coordinate the transfer of these customers with the TMWA Inspector.

Provide Ductile-Iron pipe, elbows and restrained joints at the horizontal deflections and vertical offsets where noted on the drawings.

Contractor shall coordinate with the TMWA Inspector to insure that all noted isolation valves are operational prior to initiating work on connection to existing water mains. The Truckee Meadows Water Authority valves are to be used to isolate the designated work areas. Do not operate these valves. Coordinate all work on these valves with the TMWA Inspector.

Contractor shall limit service outages to a minimum. Where service outages are necessary, Contractor shall construct entire assemblies for the connections prior to cutting or tapping into the existing pipeline. This will allow quick installation of the assembly with minimum disruption of service.

Contractor shall use caution when excavating near the existing live water mains to insure no damage is done. Contractor is responsible for repairs of any damaged facilities caused as a result of excavation incidental to construction of the water facilities.

All ties to the existing facilities shall conform to the requirements of these specifications and the TMWA Standard Drawings and Specifications.

307.01.04.02 Potholing

Potholing involving exploratory excavation at connection to existing water facilities, marked utility crossings and other areas is required. The Contractor will be required to acquire the following information from these investigations:

A. Verification of pipe type, size (i.e., outside diameter), depth to existing surface and location for all connections to existing water facilities.

B. Verification of type, size, and location for all known utility crossings.

C. List of utilities that will require relocation.

D. Information required for surveying and staking of pipe alignment.

E. All potholing shall be completed prior to the start of construction on the facility.

Potholing shall be considered part of the trenching and is not a separate bid item.

307.01.04.03 Warning Tape and Tracer Wire

Warning tape shall be installed approximately 12-inches above all direct buried water pipe at the top of the pipe zone. Tracer wire and Test (tracer) stations shall be installed taped to the pipe per the drawings and TMWA Standards. Refer to the Trench Detail.

307.01.04.04 Incidental Items

The Contractor shall furnish all incidental items required to complete the work that is not specifically referred to herein as provided by the owner. Incidental items, which shall be

furnished by the Contractor, include but are not limited to potholing, pipe locator tape, tracer wire, tracer (Test) stations, flange gaskets, bolts, nuts, pipe coatings, corrosion protection, etc.

307.03 Trenching and Backfill
Add the following sections:

307.03.01 Trenching, Excavation, Bedding, and Backfill

A. All trenches shall be backfilled after pipe, fittings, and appurtenances have been installed, inspected, and approved for backfill.

B. All wood and waste material shall be removed from excavation preparatory to backfilling. Backfill material shall be approved in all cases by the TMWA Inspector and shall be free of trash, wood, large rock, or other objectionable debris.

C. Backfilling shall include the refilling and compacting of the fill in trenches or excavations. Type 2, Class B Crushed Aggregate Base backfill above the pipe zone in all areas shall be compacted throughout to a minimum of 95% maximum dry density (M.D.D.) at optimum moisture content per ASTM D 1557, unless specified otherwise.

D. Trench excavation work shall be performed in a safe and proper manner with suitable precautions being taken against hazards of every kind. Trench excavations shall provide adequate working space and clearances for the work to be performed therein, and for installation and removal of sheeting and shoring that may be required.

E. Backfilling during freezing weather shall not be done except by permission of the TMWA Inspector. No backfill materials shall be installed on frozen surfaces, nor shall frozen materials, snow, or ice be placed in any backfill.

307.03.02 Trench Configuration and Alignment

A. The new pipeline shall be laid to the alignments and grades shown on the Improvement Plans and as directed by the TMWA Inspector.

B. Trench width depicted in the typical trench detail(s) is a MINIMUM width. NO ADDITIONAL PAYMENT will be made for additional backfill materials (sand, cement slurry, and/or base) for trench widths in excess of those depicted in the typical trench detail(s). Theoretically, the trench width could be the entire width of the street from lip of curb to lip of curb.

C. The bottom of the trench shall be graded uniformly to provide a minimum cover over the top of the water pipe, provide continuous bedding support under the pipe, and to allow the pipe to be laid to the alignments shown in the Improvement Plans.

307.03.03 Water Pipe Sand Bedding and Backfill

A. The trench shall be over-excavated to a depth of at least 6-inches below the bottom of the water pipe. Water pipe sand bedding shall be brought to optimum moisture content and compacted to at least 90% maximum dry density (M.D.D.) per ASTM D 1557.

B. The pipe bedding at the trench bottom shall have a flat or semicircular cross section. The bottom of the trench for all pipes shall be graded and prepared to provide a firm and uniform bearing throughout the entire length of each joint except for excavation required at joints. Pipe couplings shall not rest on the trench bottom, and laying the pipe on mounds will not be allowed.

C. The pipe zone is to extend from the bottom of the excavation to 12-inches above the top of the pipe, and shall be backfilled with sand bedding as specified in Section 205.03.17 of this Specification, unless otherwise specified in the Improvement Plans. Where water and gas are in a common trench, the pipe zone extends from the bottom of the trench to 12-inches above the gas pipe. After center loading the pipe to prevent lateral movement, select granular imported material shall be placed in the trench simultaneously on each side of the pipe for the full width of the trench in layers not to exceed 8-inches in depth.

D. Above the pipe zone to the top of the trench or pavement section, backfill shall consist of Type 2, Class B Crushed Aggregate Base material as specified in Section 205.03.18 of this Specification. Backfill shall be placed in horizontal layers with thickness not to exceed 8-inches in depth.

E. Where existing underground pipes or conduits larger than 3-inches in diameter cross the trench above the new work, the backfill from the bottom of the trench to the spring line of the intersecting pipe or conduit shall be as specified in the Improvement Plans. This material shall extend 2 feet on either side of the intersecting pipe or conduit which will insure that the material will remain in place while other backfill is placed.

307.03.04 Sheeting and Shoring

A. Excavation for trenches shall be properly and substantially sheeted, braced, and shored as required. Sheeting, bracing, and shoring shall be designed and built to withstand all loads that might be caused by earth movement or pressure and shall be rigid, maintaining shape and position under all circumstances.

B. During backfilling, any shoring shall be carefully removed by the Contractor in such a manner as will result in a minimum of caving.

307.03.05 Disposal of Excavated Materials

A. Excavated material shall be the responsibility of the Contractor and shall be disposed of offsite with no direct payment.

307.03.06 Blasting

A. No blasting will be permitted on this project.

307.03.07 Maximum Length of Trench Open

A. At the end of each working day (shift), there shall be minimal open trench/excavation. Refer to General Construction Notes regarding restrictions for the use of steel plates serving as a temporary trench/excavation cover.

307.03.08 Control of Water

A. When water is encountered, the Contractor shall furnish, install, maintain, and operate all necessary machinery, appliances, and equipment to keep excavations free from water until the placing of the sand bedding material or pouring and curing of the excavatable cement slurry, laying and jointing of the pipe, pouring and curing of concrete, and placing of the backfill material has been completed, inspected, approved, and all danger of flotation and other damages is removed, with NO DIRECT PAYMENT. Groundwater pumped from the trench shall be disposed of in such a manner as will not cause injury to public or private property, or constitute a nuisance or menace to the public, and shall be subject to the approval of the City of Sparks and

TMWA.

307.03.09 Special Foundation Treatment

A. Whenever the bottom of the trench is soft, yielding, or in the opinion of the TMWA Project Representative, otherwise unsuitable as a foundation for the pipe, the unsuitable material shall be removed and replaced with suitable material as specified by the TMWA Project Representative. This will be considered Additional Trench Excavation Depth, and payment shall be made per the item as defined in the Bid Schedule.

307.07 Ductile Iron Pipe
Add the following:

307.07.01 Ductile Iron Pipe and Fittings

A. Pipe diameters are finished inside clear dimensions of the sizes indicated on the drawings. Pipe shall be furnished in lengths of 18 or 20 feet.

B. Joints shall be mechanical joint, push-on, or restrained joint as indicated on the drawings.

C. Pipe installation, including transportation, storage of materials, laying, and jointing shall be in accordance with AWWA C600. Pipe ends shall be cleaned of all lumps, blisters, and excess coating. Outside of plain end and the inside of bell shall be wiped clean and dry and be free from dirt, sand, grit, or any foreign material before the pipe is laid.

At times when pipe laying is not in progress, open ends of pipe shall be closed by a watertight plug.

D. Corrosion protection (polyethylene encasement) shall be provided for all Ductile Iron pipe and fittings. Overlap of Encasement Wrap shall be a minimum of one (1) foot and shall be secured with adhesive tape or similar method. The polyethylene encasement shall be terminated at least two feet past a joint or fitting and shall be securely tapped to the pipe.

E. Fittings shall be installed where shown on the drawings to provide a complete installation. Restrained joints and high deflection fittings shall be provided where indicated on the Drawings. Refer to the section on Thrust Restraint below.

307.07.02 Thrust Restraint

All horizontal elbows, tees, reducers, and valves shall be provided with thrust restraint. The thrust block shall be in accordance with the TMWA Standard Drawings and as noted in the project drawing details. Thrust blocks shall be made of concrete delivered by an approved TMWA supplier having a compressive strength of not less than 3000 psi after 28 days. Bag concrete is not acceptable. High-early strength concrete shall be used for thrust blocks at all tie-in, cut and cap and other locations deemed necessary by the TMWA INSPECTOR and/or as specified on the Improvement Plans.

307.08 Polyvinyl Chloride Pipe (PVC)
Add the following:

307.08.01 High Density Polyethylene (HDPE) Tubing and Connections

A. Tubing diameters are finished nominal tubing size with inside clear dimensions of the sizes indicated on Table 7, AWWA C901. Tubing shall be furnished in coil lengths of the size indicated on the drawings.

B. Connections shall be mechanical fittings providing a pressure seal and resistance to pullout.

C. Joints of tubing end to tubing end shall be by mechanical compression fittings.

D. Tubing installation shall conform to the TMWA Standard Detail 10H and AWWA C901.

307.10 Disinfecting of Domestic Water System
Replace Section 307.10.01 with the following:

307.10.01 Disinfection of Water Mains

A. CONTRACTOR shall submit to the CITY a flushing and disinfecting plan a minimum of 5 working days prior to conducting the effort. If the CONTRACTOR uses existing hydrants for flushing, the existing line(s) between the hydrant and the new pipe must also be disinfected per the specifications.

B. Prior to acceptance of the project, water pipe shall be disinfected and pressure tested. All work involved in disinfecting and pressure testing the water pipe shall conform to AWWA Standards.

C. Disinfection shall be accomplished by using calcium hypochlorite tablets as outlined in AWWA 651-latest edition.

D. It is imperative that the pipeline be kept clean and dry during construction in order to ensure proper disinfection of the pipeline and to allow flushing the pipeline. If excessive debris is discovered in the pipeline during disinfection and testing, the Contractor will be responsible for removal of the debris and retesting, flushing, and disinfection of the entire pipeline.

E. Disposal of the chlorinated water shall be the responsibility of the Contractor. The water shall be disposed of in a manner conforming to all local, state, and federal regulations. The Contractor will be required to designate a disposal site or method and shall coordinate the disposal of the chlorinated water with the TMWA Inspector and local authorities.

F. All work included in sterilization and testing of the pipeline shall be included in the unit bid price for pipe installation, and no separate payment will be made.

307.10.02 Pressure Testing of Water Mains

A. All pressure pipe testing shall be accomplished with water pressure. Air-pressure testing will not be permitted. Test pressure will be 150 psi, and shall not be less than 1.25 times the working pressure at the highest point along the test section. Working pressure is 100 psi. Test

pressure shall not vary more than ± 5 psi for the duration of the test. Test pressure shall not exceed pipe or thrust restraint design pressures. The hydrostatic test shall be at least 2-hour duration.

B. Before applying the specified test pressure, air shall be completely expelled from the sections of piping under test.

C. Allowable leakage shall be measured in gallon per hour as defined in AWWA C600 for Ductile Iron pipe and C605 for PVC pipe.

D. Pressure testing shall conform to AWWA C600 and C605 Standards for Installation of Ductile Iron and PVC Water Mains and Appurtenances. All work included in pressure testing of the pipeline shall be included in the unit bid price for pipe installation, and no separate payment will be made.

307.10.03 Bacteriological (Bac-T) Testing of Water Mains

A. Bacteriological (Bac-T) testing is required of all new and depressurized water mains.

B. Bacteriological testing will be coordinated by the TMWA Inspector and TMWA lab personnel, at no cost to the Contractor.

C. Results of bacteriological testing are available a minimum of 24-hours after the sample was collected. Absolutely no standby time will be paid to the Contractor during this period.

D. Service tie-overs and/or new water services may only be installed after the TMWA Inspector has been notified of a satisfactory bacteriological test result.

E. Bacteriological test samples will NOT be collected of Fridays, weekends, TMWA observed Holidays, or the day before a TMWA observed Holiday, unless authorized by the TMWA Inspector.

308.00 AGGREGATE BASE COURSES
Remove and replace 308.02 – Materials with the following:

The quality, gradation and size of all granular materials shall conform to the requirements of Subsection 200.01 – "Base Aggregates" and to the drawings and notes as shown on the Plans.
308.03.03 Subgrade Preparation. Subgrade preparation shall also be according Section 302. Obtain CITY's acceptance of subgrade before placing base course or surfacing material. Do not place base course or surfacing materials in snow or on soft, muddy, or frozen subgrade.

308.03.04 Untreated Aggregate Base. Maximum Completed Lift Thickness shall be 6 inches.

Spread lift on preceding course to required cross-section. Lightly blade and roll surface until thoroughly compacted. Blade or broom surface to maintain true line, grade, and cross-section.

Add keystone to achieve compaction and as required when aggregate does not compact readily due to lack of fines or natural cementing properties, as follows:

(a) Use leveling course or surfacing material as keystone.

(b) Spread evenly on top of base course, using spreader boxes or chip spreaders.

(c) Roll surface until keystone is worked into interstices of base course without excessive displacement.

(d) Continue operation until course has become thoroughly keyed, compacted, and will not creep or move under roller.

308.03.05 Leveling Course. Maximum Completed Lift Thickness shall be 4 inches.

Spread on roadway or preceding course to depth, grade, and cross-section shown. Lightly blade surface and roll until thoroughly compacted to line and grade shown. Maintain moisture levels to prevent loss of fines during processing.

308.03.06 Gravel Surfacing. Maximum Completed Lift Thickness shall be 6 inches.

Spread on preceding course in accordance with cross-section shown. Blade lightly and roll surface until material is thoroughly compacted.

308.03.07 Driveway Surfacing. Replace gravel surfacing on driveways that were gravel surfaced prior to construction. Provide compacted gravel surfacing to depth equal to original, but not less than 4 inches. Leave each driveway in as good or better condition as it was before start of construction.

308.03.08 Delivery and Compaction. Do not haul over surfacing in process of construction. Loads shall be of uniform capacity. Maintain consistent gradation of material delivered; loads of widely varying gradations will be cause for rejection.

Compaction equipment shall be adequate in design and number to provide compaction and to obtain specified density for each layer.

311.00 CONCRETE STRUCTURES AND MASONRY CONSTRUCTION

Add the following section to 311.04 Forms. Add section following the first paragraph found on page 311.00-5.

Fabricate metal forms to remain in place for concrete deck slabs from steel conforming to ASTM A653, Grade 275 (40) minimum, having a coating designation of Z500 (G165). Thickness and grade of form sheets and form supports shall be as designated on the shop drawings. Minimum thickness for form sheets shall be 0.80 mm (22 gage) and for form supports shall be 1.60 mm (16 gage).

Add the following sections to 311.10.01 Handling and Placing Concrete

Reinforcement supported from the ground shall rest on 3 inch high precast concrete blocks not less than 4 inches square, and having a compressive strength equal to the specified compressive strength of the concrete being placed.

The precast blocks shall have been cured as specified for concrete and shall contain soft steel wires imbedded therein for fastening to the reinforcing.

Add the following section to 311.10.07 Construction Joints. Add section following the third paragraph found on page 311.00-14.

Make horizontal construction joints in reinforced concrete walls by performing the following steps:

(a) Thoroughly clean and saturate surface of joint with water.

(b) Limit slurry concrete placement to 2-inch maximum thickness, 1-inch minimum thickness.

(c) Use positive measuring device such as bucket or other device that will contain only enough slurry concrete for depositing in visually measurable area of wall to ensure that portion of form receives appropriate amount of slurry concrete to satisfy placement thickness requirements.

(d) Do not deposit slurry concrete from pump hoses or large concrete buckets, unless specified placement thickness can be maintained and verified through inspection windows close to joint.

(e) Limit concrete placed immediately on top of slurry concrete to 12 inches thick. Thoroughly vibrate to mix concrete and slurry concrete together.

For bonding to existing concrete, thoroughly clean and mechanically roughen existing concrete surfaces to roughness profile of 1/4 inch and saturate surface with water for 24 hours prior to placing new concrete.

Add the following section to 311.13 Patching. Add section following the second paragraph found on page 311.00-21.

Provide detailed plan for cold weather curing and protection of concrete mortar placed and cured in weather below 40 degrees F. Provide detailed plan for hot weather placements including curing and protection for concrete mortar placed in ambient temperatures over 80 degrees F.

Provide informational submittals for concrete repair and patching methods and materials.

Repair material shall contain no chlorides or other chemicals causing steel corrosion. Repair mortar specifically mixed and then tested at Job Site shall be evaluated for appearance compatibility prior to use in exposed areas.

Use low-pressure spray or hand applied silica fume mortar for vertical and overhead repair.

For tie holes, fill with nonshrink grout, and match color of adjacent concrete and demonstrate on mockup panels first. Compact grout using steel hammer and steel tool to drive grout to high density. Cure grout with water.

For alternate form ties, mechanically roughen entire interior surface of through hole. Epoxy coat roughened surface and drive elastic vinyl plug to half depth. Dry pack entire hole from both sides of plug with nonshrink grout. Use only enough water to dry pack grout. Dry pack while epoxy is still tacky. If epoxy has dried, remove epoxy by mechanical means and reapply new epoxy. Compact grout using steel hammer and steel tool to drive grout to high density. Cure grout with water.

Exposed metal objects not intended to be exposed in as-built condition of structure including wire, nails, and bolts, shall be removed by chipping back concrete to depth of 1 inch and then cutting or removing metal object. Repair area of chipped-out concrete.

Add the following to 311.14.03 Bonded Grout Finish. Add as the first paragraph.

Deliver the coating to the job site in sealed containers bearing the manufacturer's original labels. The brand, color, and type shall be clearly marked on each container. Furnish a copy of the manufacturer's printed instructions.

A minimum of 30 days prior to applying concrete coating, provide a fully cured 4 foot by 8 foot concrete test panel that is of the same type of concrete that will be coated. Prepare the surface to receive concrete coating according to the manufacturer's recommendations and as specified herein. The color shall be as shown on the plans. Apply the concrete coating to the test panel according to the manufacturer's recommendations. Several test panels with different shades of color or variance of shades on the same test panel may be required to make a final color selection. Do not apply concrete coatings to structures designated for coating until the color is approved in writing. Once a color has been selected, do not deviate from the color specific to the manufacturer's product or the application rate used on the test panel.

Finish surfaces to receive coating to a smooth even surface of uniform texture and appearance, free of unsightly bulges, depressions, and other imperfections. Sand areas which do not exhibit the required smooth even surface of uniform texture and appearance with power sanders or other approved abrasive means. The use power carborundum stones or disks may be required to remove bulges and other imperfections.

Add the following to 311.14.03 Bonded Grout Finish. Add as the last paragraph.

Prepare the surface to receive concrete coating according to the manufacturer's recommendations and as specified herein. Apply the concrete coating according to the manufacturer's recommendations and with manufacturer certified personnel.

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

Provide drop cloths or other forms of protection for surrounding surfaces from overspray and splashing. Protect traffic and pedestrians from overspray. Satisfactorily clean, restore, or replace surfaces which may have been contaminated with concrete coatings.

Achieve a dry film thickness of 15 to 17 mils. The average thickness of the completed finish coating shall not exceed 1/8 of an inch.

The texture of the completed finish coat shall be tightly bonded to the surface and present a uniform fine textured surface.

Remove and replace concrete coating exhibiting poor performance such as pealing, chipping, flaking, or does not produce the required surface appearance.

Add the following to 311.18 Precast Concrete Box Culverts. Modify paragraph 2 as follows:
Square or rectangular precast reinforced concrete boxes shall conform to the specifications of AASHTO Designation M259 or M273, or ASTM C1433, as controlled by the…

Add the following to 311.18 Precast Concrete Box Culverts. Delete paragraph 15 and replace with the following: For multiple box installations utilizing the method of boring and jacking, a space greater than 3 feet but not greater than 5 feet measured from outside face to outside face shall separate each line of boxes.

320.00 PLANTMIX BITUMINOUS SURFACE
Delete the following section:
320.04.03.01 – Addition of Lime

Keep the following section:
320.04.03.01.01 – Lime Marination

323.00 ADJUSTMENT OF NEW AND EXISTING MANHOLES, CATCH BASINS, VAULTS, WATER AND GAS VALVES, AND MONUMENTS TO FINAL GRADES

Add the following section:
323.08 – Concrete Collars
Replace existing collars with concrete collars of the same size or replace the roadway structural section, matching the existing thicknesses, prior to placement of a minimum size collar. Use materials meeting the requirements of Section 204 as specified in the Standard Specifications for Public Works. Do not use aggregate to extend fast-setting concrete.

324.00 – PAINTING, PAVEMENT STRIPING, AND MARKING
Add the following paragraph to the first paragraph of 324.03.02 Workmanship. Make it the last sentence.
Applicator must have minimum of 5 years of practical experience in application of specified products.

Add the following paragraph to the second paragraph of 324.03.03 Surface Preparation of Steel Surfaces. Make it the last sentence.

Do not perform abrasive blast cleaning whenever relative humidity exceeds 85 percent, or whenever surface temperature is less than 5 degrees F above dewpoint of ambient air.

326.00 – REINFORCING AND STRUCTURAL STEEL
Add the following paragraph to 326.02.04 Bending Requirements
Before placing plan reinforcing steel, furnish two (2) sets of reinforcing steel bending and cutting diagrams. Furnishing the bending and cutting diagrams shall not be construed to mean that the bending and cutting diagrams will be reviewed for accuracy. Be solely responsible for the accuracy of the diagrams.

Submit 3 sets of proposed changes to plan reinforcing steel, separate from the bending and cutting diagrams. Allow 30 days for review and approval of such proposed changes. Additional contract time will not be given for proposed changes requiring corrections and re-submittal. Do not place reinforcing steel affected by proposed changes until given approval.

326.03.08 Bolts and Bolted Connections
The table on 326.00-7 is hereby deleted and the following substituted:

TABLE 1
Minimum Bolt Tension[1]

Nominal Bolt Diameter[2] mm (in.)	AASHTO M164 Bolts kN (lb)	AASHTO M253 Bolts kN (lb)
13 (1/2)	54 (12,050)	66 (14,900)
16 (5/8)	85 (19,000)	107 (24,000)
19 (3/4)	125 (28,000)	156 (35,000)
22 (7/8)	173 (39,000)	218 (49,000)
25 (1)	227 (51,000)	285 (64,000)
29 (1 1/8)	249 (56,000)	356 (80,000)
32 (1 1/4)	316 (71,000)	454 (102,000)
35 (1 3/8)	378 (85,000)	538 (121,000)
38 (1 1/2)	458 (103,000)	658 (148,000)

[1]Equal to 70% of specified minimum tensile strength of bolts.
[2]Metric diameters are nominal sizes based on English bolt sizes.

333.00 – LANDSCAPING
Add the following to end of Section 333.01 Description
The CONTRACTOR shall be required to repair or replace in kind any landscaping removed, damaged or otherwise changed during construction. In areas of mature landscaping where replacement of large diameter tree truck size is not possible, the CONTRACTOR shall replace trees with 4" diameter trucks.

334.00 – SANITARY SEWER LIFT STATION
334.01 Description. This Section covers the quality of materials and operating requirements necessary for sanitary sewer lift station installation.

334.02 Unit Responsibility. The sanitary sewer lift station including associated control panels, pumps, valves, wet well, valve vault and other appurtenances, shall be assembled by a single supplier, which will take responsibility for providing a complete and functioning lift station per the plans and specifications. The lift station shall be supplied by Jensen Precast or Romtec Utilities. The components and supplier may deviate from the configuration shown in the plans and/or stated herein, only upon approval from the CITY.

334.03 Component Specific Requirements.

334.03.1 Concrete Wet Well - Round Precast: ASTM C478, precast, reinforced concrete, 4,000 psi (minimum) with 0.45 maximum water/cementitious materials ratio.

a. Top: 12-inch minimum thickness flat top with 27" x 36" clear opening.

b. Base Section: 10-inch minimum thickness for floor slab and 11-inch minimum thickness for walls.

c. Joints: Bell and spigot, ASTM C 443.

d. Joint Sealant: ASTM C 990, bitumen or butyl rubber.

e. Flexible Resilient Pipe Connectors: ASTM C 923. Contractor to install per manufacturer's recommendations.

f. CONTRACTOR shall submit calculations, signed and sealed by a Civil or Structural Engineer in the State of Nevada, for structural design, seismic analysis and buoyancy uplift for the proposed wet well and the valve vault.

334.03.2 Concrete Wet Well Liner –

a. General:

i. The CONTRACTOR shall furnish all labor, materials, and equipment required for surface preparation and application of a protective liner to concrete surfaces as follows: Wet Well – All interior walls, fillet and underside of lid.

ii. The CONTRACTOR applying the liner shall have 5 years of documented experience applying the type of liner specified on the type of structures specified to receive the liner.

iii. Before starting the liner Work, the CONTRACTOR applying the protective liner system shall thoroughly inspect all concrete surfaces to be coated. The CONTRACTOR shall repair defective surfaces as directed by the CITY and as specified herein. The CONTRACTOR shall inspect the repaired areas of defective surfaces prior to commencing his Work. Commencing of Work shall be construed as acceptance of the surfaces and it shall be the responsibility of the CONTRACTOR to correct any defect appearing in the surfaces once the liner Work has begun.

b. Materials:

i. Materials specified in this Section are those which have been evaluated for the specific service. Standard products of manufacturers other than those specified will be accepted when it is proved to the satisfaction of the CITY they are equal in composition, durability, usefulness, and convenience for the purpose intended. All Materials shall be brought to the job site in the original sealed containers. They shall not be open or used until the CITY has physically inspected the contents and obtained necessary data from information printed on containers or labels. Materials exceeding storage life recommended by the manufacturer shall be rejected.

ii. The liner system shall be a high performance polyurethane liner. The cured liner shall provide a tough, cleanable, flexible, and abrasion resistant surface. The system shall be suitable for wastewater immersion and resistant to hydrogen sulfide attack. The liner system shall be a one coat system (80 mils DFT) utilizing Carboline Polibrid 705 or CITY approved equal. The final coat color shall be tan.

PROPERTIES	TYPICAL RESULTS	TEST METHODS
Resistance	352 lb. force/inch	ASTM D624
Abrasion	36.7 mg loss, CS17 wheel, 1000 gm. Load, 1000 cycles	ASTM D4060
Cathodic Disbondment	Zero bond and total disbondment both measured at 50mm radius, Current MA at 5.9 and 6.4	ASTM G95
Compressive Strength	4500 psi min. Full recovery when load removed	ASTM D695
Flexibility Elongation	No cracking observed, 60% elongation (65 mils) Method B	ASTM D522
Impact	160 in-lbs. direct and reverse	ASTM D2794
Tensile Strength Elongation	2,878 psi	ASTM D412
Water Vapor Transmission	0.08 gm./100 sq. in/24 hours (40-45 mils) 0.016 gm./100 sq. in/24 hours (75-80 mils)	ASTM F1249

c. Surface Preparation and Conditions:

   i. Remove all oil, grease, dirt, curing compounds and foreign matter from surface to be coated.

   ii. Prepare surfaces in accordance with ASTM D4258 and D4259. The concrete must be cured at least 28 days. Remove fins and other protrusions by stoning, sanding, or grinding. Abrasive blast to open all surface voids and remove all forms of oils, incompatible curing agents, hardeners, latence, and other foreign matter and produce a surface texture similar to that of a course sandpaper. Surface irregularities including but not limited to rock pockets and voids shall be patched with a product approved by the coating manufacturer. Vacuum off all sand and dust.

   iii. Follow manufacturer's directions for surface preparation, mixing, thinning, and application methods and techniques.

d. Execution:

   i. All Work shall be performed by skilled craftsmen qualified to perform the required Work in a manner comparable with the best standards of practice. Continuity of personnel shall be maintained and transfers of key personnel shall be coordinated with the CITY.

ii. Protective coverings or drop cloths shall be used to protect equipment, prepared surfaces, and applied liner or paints. Personnel entering the concrete structure shall take precautions to prevent damage or contamination of liner surfaces.

iii. To minimize pinholes required for off gassing, the CONTRACTOR shall apply the coating when the ambient air temperature and surface temperature are decreasing or holding stable. Coating application will not be allowed if the ambient air or surface temperature is increasing.

iv. All liner components shall be mixed in exact proportions specified by the manufacturer.

v. All liners shall be thoroughly mixed utilizing an approved slow-speed power mixer until all components are thoroughly combined and are of a smooth consistency.

vi. Drying time between coats shall be strictly observed as stated in manufacturers printed instructions.

vii. When two or more coats are specified, each coat shall contain sufficient approved color additive to act as an indicator of coverage, or the coats must be of contrasting color.

viii. The CONTRACTOR shall provide the necessary curing environment as required to meet the liner manufacturer's temperature and humidity recommendations for curing. The CONTRACTOR shall submit the liner manufacturer's literature to the CITY stating recommended drying time, temperature, and other data pertinent to proper curing of the liners.

ix. If liner is applied in enclosed areas, in order to preclude solvent entrapment during interior application, the CONTRACTOR shall provide a forced draft ventilation system of sufficient air volume which shall remain in continuous operation throughout the curing period to remove all solvent vapors and enhance curing. Operation and maintenance of the blower shall be the responsibility of the CONTRACTOR.

e. Testing:

i. CITY will perform, or have performed, such tests as he deems necessary to assure the Work is being accomplished in accordance with the requirements of the Contract. In the event such tests reveal noncompliance with the requirements of the Contract, the CONTRACTOR shall bear the cost of such corrective measures deemed necessary by the CITY, as well as the cost of subsequent retesting.

ii. Before application of the first coat, the surface must be approved by the CITY.

iii. Work performed in the absence of prescribed inspection may be required to be removed and replaced under the proper inspection, and the entire cost of removal and replacement, including the cost of all materials which may be furnished by the CITY and used in the work thus removed, shall be borne by the CONTRACTOR, regardless of whether the work removed is found to be defective or not. Work covered up without the authority of the CITY shall, upon order of the CITY, be uncovered to the extent required, and the CONTRACTOR shall similarly bear the entire cost of performing all the work and furnishing all materials necessary for the

removal of the covering and its subsequent replacement as directed and approved by the CITY.

iv. Thickness - Wet Film thickness gauge supplied by CONTRACTOR.

v. Holiday - Liner integrity of all interior coated surfaces shall be tested with an approved inspection device. Holiday detectors shall not exceed the voltage recommended by the manufacturer of the coating system. All holidays shall be marked, repaired in accordance with the manufacturer's printed recommendations, and retested. All equipment and materials required for holiday checking shall be supplied by the CONTRACTOR.

vi. No pinholes, sags or other surface irregularities will be permitted in the final coating.

f. Safety – CONTRACTOR shall conform with the safety requirements set forth by the latest revision of the OSHA Regulations for Construction and any other regulatory agencies applicable to the construction industry and manufacturer's printed instructions and appropriate technical bulletins and manuals.

334.03.3 Wet Well Access Door: 27" x 36" clear opening, angle frame, non-traffic loads including maintenance equipment and personnel, single door, 316 SS nuts and bolts, heavy-duty stainless steel hold-open arm that automatically locks door open at 90 degrees, hatch lock, release handle and stainless steel hinges.

334.03.4 Wet Well Accessories

a. Guide Rail: Stainless steel, Type 304, with pump guide brackets configured to match requirements of selected pumps.

i. Custom configuration to allow pump lift-in and lift-out from top to bottom of guide without binding. Construct lift-out assembly to be easily removable from the top of the guide rail.

b. Flexible Resilient Pipe Connectors: Flexible connector, ASTM C 923.

i. Fabricate structures with continuous joints to provide watertight construction.

334.03.5 Pumps: Furnish and install two single stage non-clog pumps with an autocoupling. Both pumps shall be electric centrifugal submersible units capable of being installed in a wet-well. Pumps shall individually be capable of handling raw, unscreened sewage, rags, fecal sludge, or similar contaminated liquid and capable of repeatedly passing rigid solids up to 3 inches in diameter from pump inlet through to discharge. The pump and motor shall be produced by one manufacturer and shall be an air-filled watertight design. Pumps shall be equipped with lifting eye.

a. Provide shop drawings and calculations per Section 22 of these Specifications.

b. Impeller: Impeller will be cast as one piece and shall be single-vane closed (double-shrouded), radial non-clog statically and dynamically balanced, to assure that vibration amplitudes, measured at the level of the upper bearing while operating in a vertical position, remain within the limits specified by the Hydraulic Institute Standards.

c. Safety: Motor insulation according to Class H, temperature rise according to Class A, explosion proof as standard, ATEX, FM and CSA. Equip with temperature and moisture sensors as standard. All stator windings and leads shall be insulated with moisture-resistant Class F Insulation, capable of withstanding l55^{o}C Max. temperature, dipped and baked three

times. Upon assembly, the stator shall be heat-shrink-fitted into the stator housing; the use of bolts, pins or other fastening devices, which would require penetration of the stator housing, shall not be acceptable. In each phase winding there shall be embedded a bi-metallic temperature sensor, wired in series and interlocked with the motor overload protection in the Control Panel. Any of these thermal sensors shall cut out electric power if the temperature in its winding exceeds 140^{o}C, but shall automatically reset when the winding temperature returns to normal. The motor shall be non-overloading through the selected performance curve and have a Service Factor 1.15.

i. Electric Motor: Premium efficiency IE3 motor in accordance with IEC 60034-30, 60 Hz, 120/208 volt 3-phase. Pump shall include a minimum of 50' SO type power cable. Motor shall be capable of 15 starts per hour.

1. The cable entry shall consist of a single cylindrical elastomer grommet, flanked by washers, all having a close tolerance fit against the cable outside diameter and the entry inside diameter and compressed by the body containing a strain relief function, separate from the function of sealing the cable.

d. Volute: Volute will be cast in one piece, with smooth internal contours and surfaces, providing obstruction-free passageways with low friction losses. Each pump shall be equipped with a stationary brass or nitrile rubber coated ring insert that is drive fitted to the volute insert.

e. Shaft: Pump shaft must have generous shoulder fillet radii to minimize stress concentration and fatigue. Deflection at the Shaft Seal within the operating range shall not be more than 0.002 inch.

f. Bearings: Pump shaft shall be supported by permanently lubricated bearings, designed for minimum 50,000 hours B-l0 Life at the pumps Best Efficiency Point, and shall be factory pre-lubricated. The lower impeller-side bearing will be a double-row, deep groove ball bearing, axially retained, to sustain both axial and radial loads. The upper motor-end bearing is a single-row, deep groove ball bearing axially floating, to sustain radial loads only. Single row lower bearings are not acceptable.

g. Watertight Integrity: Each Cable Entry Assembly shall contain an elastomer grommet, flanked by two washers, closely fitted to the cable O.D. A watertight seal shall be maintained by screwing a threaded cable entry gland into a cable inlet flange which bolts into the motor cap. The cable entry gland threads down to a positive stop, thereby tightly compressing the grommet around the cable. The gland will provide a strain-relieving , anti-kink feature, functioning independently from the separate sealing action. The cable inlet flange shall contain an o-ring groove on the bottom side of the flange to allow for watertight integrity of the bolt-on cable entry assembly when bolted into the entry holes in the motor cap.

h. Seals: Motor Compartment shall be isolated from the Liquid End by Single Mechanical Shaft Seals in tandem arrangement (dual-independent, both oriented to resist pressure from the impeller). The upper motor side seal shall run in an Oil Chamber, which separates the Motor Compartment from the Liquid End and provides permanent lubrication and cooling. The lower impeller side seal will also get lubrication from the Oil Chamber. Each seal will have a stationary portion and a positively driven rotary portion. Springs must be protected from the pumped liquid; and under no circumstances can solid particles accumulate on the external spring and hamper its effectiveness. Seals must not require repeated checking or re-adjustment, except periodic inspection of the oil chamber. At the interfaces of major castings,

sealing shall by accomplished by resilient Buna-N O-Rings, confined within closely fitted, high surface quality rabbet joints, compressed only to the prescribed dimension by metal-to-metal contact, allowing radial movement and preventing permanent set. Flat gaskets and seal rings, which may be squeezed unevenly or beyond the permanent deformation limit, are not allowed.

i. Seal Probe: A conductive seal probe shall be provided with pump. Probe shall be mounted into mechanical seal chamber and when interlocked with control panel, probe shall indicate the presence of contaminants within mechanical seal chamber.

j. Installation Mode: An autocoupling assembly shall be employed to eliminate the need for entering the wet well to service pumps. The system shall allow the lowering of the pump unit(s) into the well along rigid guide pipes, resulting in a self-engaging, firm, leak proof coupling of the volute outlet to a receiving base anchored to the floor which forms the discharge pipe connection. To assure a leak proof junction between movable and stationary components, a resilient seal ring shall be employed which is easily replaceable as part of the pump assembly, is axially and evenly compressed upon contact. Metal-to-metal contact faces shall not be allowed. Once seated, the pump shall be entirely supported by the autocoupling base, without any reliance on additional supports or bearing directly on the sump floor.

k. Pump and motor shaft shall be the same unit. The pump shaft is an extension of the motor shaft. The shaft shall be stainless steel. Couplings and/or shaft sleeves shall not be acceptable.

l. CONTRACTOR and the pump manufacturer shall provide one day of site start-up service and training.

334.03.6 Operating Conditions: Equipment furnished under this section shall be fully suitable for continuous operation at any specified condition or any condition lying between the extremes of the operating conditions specified in the following sections.

a. Pumps shall be selected to achieve Condition A performance, and must also operate continuously without objectionable vibration or cavitation at the head specified under Condition B. Conditions A & B shall be located within the Preferred Operating Region or the Allowable Operating Region, as established by the pump manufacturer in accordance with ANSI/HI 9.6.3 and published in the manufacturer's application data for the specific model proposed for this application.

i. Condition A (Guaranteed Performance)

Capacity, gpm	100
Total Dynamic Head, feet	19
Net Postive Suction Head Available (NPSHA), feet	22

ii. Condition B (Minimum Operating Head)

Capacity, gpm	From pump H/Q curve
Total Dynamic Head, feet	16
NPSHA, feet	22

b. Design Requirements:

i. Maximum efficiency, minimum 65%

Note: Efficiency shall be the maximum efficiency on the pump's efficiency/capacity curve for the selected impeller, not the efficiency at Operating Condition A, and shall include losses in the pump motor and discharge fitting.

ii. Operating speed, rpm, max 1,800

334.03.7 Piping: Ductile-Iron pipe and fittings

a. Ductile-Iron Pipe: AWWA C151/A21.51 with flanged ends unless otherwise indicated, cement lined.

b. Ductile-Iron Fittings: AWWA C110/A21.10, flanged, ductile or gray-iron standard pattern, cement lined.

c. Glands, Gaskets and Bolts: AWWA C111/A21.11, ductile or gray-iron glands, rubber gaskets and steel bolts. Bolds and nuts within wet well to be type 304 stainless steel.

334.03.8 Valve Vault - Precast: ASTM C858 precast, reinforced concrete, 4,000 psi (minimum) with 0.45 maximum water/cementitious materials ratio, size as shown on drawings.

a. Base Section: 8-inch minimum thickness for floor slab and 8-inch minimum thickness for walls.

b. Resilient Pipe Connectors: ASTM C 923, cast or fitted into manhole walls, for each pipe connection. Contractor to install per manufacturer's recommendations.

c. Joint Sealant: ASTM C 990, bitumen or butyl rubber.

334.03.9 Valves – The CONTRACTOR shall furnish all valves in accordance with the Drawings and Specifications. All valves, including component parts thereof, shall equal or exceed the requirements set forth herein, and shall be manufactured by a firm normally engaged in the manufacture of such valves. All valves furnished for the Work shall be new and shall be currently under manufacture. Valves discontinued by the manufacturer as of the bid opening date will not be acceptable.

a. Valve flanges may be raised or plain faced with either a smooth or serrated finish and shall be faced.

b. Shop Drawings shall be furnished for each valve type.

c. All valves shall be designed for a water working pressure of 150 psi unless otherwise shown on the Drawings or set forth in these Specifications.

d. All bearings for all valves shall be sealed and permanently lubricated.

e. Packing shall be U-cup or V-type, self-adjusting, wear compensating and shall be replaceable without removing the valve bonnet or plug.

f. All bodies shall be constituted of cast iron ASTM A-126, Class B. Flanges shall fully conform to the drilling and thickness requirements of ASNI B161.1. Body wall thickness shall conform to AWWA C504-80.

g. Valves shall be interior and exterior epoxy coated with 8 mil (minimum) per AWWA 550-81.

h. 2" Check Valve: PVC check valves, 2 inches and smaller, shall be of full flow design, pressure rated to 125 psi at 72°F, designed for both vertical or horizontal usage, and shall have either socket, threaded, or compression ends.

i. 4” Check Valves: Flanged swing check valves as manufactured by Valmatic Model 504A, or approved equal.

   a. The flapper shall be Buna-N having an “O” ring seating edge and be internally reinforced with steel.

   b. The valve shall be furnished with a backflow device.

j. Isolation Valves: Flanged eccentric plug valves as manufactured by Valmatic Model 5804R/7A or approved equal.

   ii. All eccentric plug valves shall be of the tight-closing, rubber seat type. Valves shall be bubble-tight at the full rated pressure in either direction. Valves shall be suitable for throttling service and/or operation after long periods of inactivity. Valves shall have a minimum expected life of five years.

   iii. Passage size shall be at least 80% of the full port area on all sizes.

   iv. Seating surfaces shall meet the requirements of AWWA C509-80.

   v. All valves operators shall turn clockwise to close.

   vi. Actuator mechanism shall be a handwheel gear type.

k. Pressure rating and manufacturer’s name shall be cast on each valve body.

l. All valves shall be leak tested to their full rating prior to shipment.

334.03.10 Valve Vault Access Door: Galvanized Steel Access Door, Double-leaf with 24” x 36” clear opening, steel angle frame, loading capacity to support AASHTO H20 concentrated wheel load. Equip door with adjustable counterbalancing springs, heavy-duty stainless steel hold-open arm that automatically locks door open at 90 degrees, hatch lock, release handle, and stainless steel hinges.

334.03.11 Pump Controls:

   a. Sequence: Cycle each pump on and off on a LEAD-LAG basis automatically to maintain well wastewater level. Automatic control operates both pumps in parallel if well level rises above lag levels, until shutoff level is reached. Automatic alternator, with manual disconnect switch, changes sequence of lead-lag wastewater pumps at completion of each pumping cycle.

   b. Motor Controllers: Magnetic, full voltage, nonreversing. Include undervoltage release, thermal-overload heaters in each phase, manual reset buttons, and handautomatic selector switches. Include circuit breakers to provide branch-circuit protection for each controller.

334.03.12 Pump Control Panel: Install engraved labels to identify switches and controls. Control panel shall comply with UL 508A, with NEMA Type 4 powder-coated sheet steel weatherproof enclosure, covered compartments sized to accommodate controllers, circuit breakers, transformers, alternators, and programmable logic controller.

The control panel shall be furnished by the pump manufacturer.

   a. Instrumentation/Configuration

      Electrical contractor to guarantee the accuracy and operation of all instrumentation, as well as provide calibration and testing. Control system warranty shall be no less than 1 year.

      i. Each pump shall be on its own separate circuit breaker.

ii. Level sensing probe (which will report wet-well level to the control system panel)

iii. Float switches

iv. Pump over-temperature sensor

v. Pump seal-leak sensor

vi. Magnetic switches

vii. Instrumentation transmitters

viii. Other sensing/signal devices not listed here

b. Instrumentation System Integrator

The City of Sparks will be responsible for installation and calibration of hardware and software necessary for communications between lift station and Truckee Meadows Water Reclamation Facility.

i. Antenna

ii. Radio

iii. Microprocessor-based Remote Terminal Unite (RTU) for monitoring and controlling water systems

334.04 Lift Station Equipment General Requirements & Electrical

Refer to Divisions 11, 13, and 16 specifications attached.

334.05 Lift Station Product Delivery, Storage, & Handling

Refer to attached Section 01600 Product Delivery, Storage, & Handling

334.06 Lift Station Startup & Demonstration Testing

Refer to attached Section 01650 System Start-Up.

334.07 Temporary Bypass Requirements. Whenever the gravity flow of the existing sanitary sewer system is disturbed, bypass pumping shall be provided.

Bypass pumping system shall:

A. Be in place and operated/manned 24 hours a day until completion. No interruption in service shall be allowed.

B. Contain sufficient capacity to pump peak flow of the sanitary sewer line. Contractor to perform metering, and/or coordinate with CITY, as necessary to determine flow.

C. Be water tight (no leakage allowed) from the intake to the discharge.

1. Aluminum “irrigation type” piping or glued PVC will not be allowed.

D. Be protected from pedestrian or vehicular damage (H-20 loading).

E. Contain start/stop controls for each pump.

F. Contain one standby pump, located on-site, of each size of pump utilized.

Bypass pumps shall:

A. Be fully automatic self-priming units that do not require the use of foot-valves or vacuum pumps in the priming system

B. Be electric or diesel powered.

C. Allow dry running to accommodate the cyclical nature of sewage flows.

D. Be sized to permit sewage to slowly return to normal flows and to prevent surcharging or causing other major disturbances downstream.

When working inside manholes or around force mains, exercise caution. Follow OSHA, Local, State, and Federal requirements. Take required measures to protect workforce against sewer gases, combustible or oxygen-deficient atmospheres.

Upon completion of final pumping operations, and upon receipt of written permission from the CITY, the temporary bypass pumping system may be removed and the site restored.

334.08 Warranty. Manufacturer's standard form in which manufacturer agrees to repair or replace components of pumping stations that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:

- Structural failures including precast concrete structures, hatches, and other accessories.
- Faulty operation of pumps, controls, or pumping and piping system accessories.
- Deterioration of metals, metal finishes, and other materials beyond normal use.

The following warranty periods shall be in effect:

- Precast Concrete Structures including Access Doors and Accessories: One year from date of Substantial Completion.
- Pumps: Provided by Pump Manufacturer: One year from date of Substantial Completion.
- Control Panel: Provided by Control Panel Manufacturer: One year from date of Substantial Completion.

334.09 Operation and Maintenance Manual and Record Drawings. Prior to placing the station into operation, the contractor shall provide the CITY with three (3) complete sets of record drawings and operations and maintenance manuals. The record drawings shall indicate all significant elevations of the station, including the bottom of the wetwell, pumps off, lead pump on, lag pump on, high water alarm, all pipe penetration inverts, top of wetwell, and top of ground elevations.

335.00 – NEVADA ENERGY ELECTRIC

335.01 Description. This Section covers the work germane to Nevada Energy Electrical utilities and facilities.

Remove and Replace AC – Removal per Orange Book Section 301 and patch shall be per Orange Book Standard Specifications and Detail R-121.

Traffic Control – per Section 23 of the Special Provisions.

Excavation and Backfill and Installation for 1-4” conduit – NV Energy Standards, Volume 17 and drawings for PID 3000412977.

Excavation and Backfill for 1-3” conduit – NV Energy Standards, Volume 17 and drawings for PID 3000251657.

Installation for 1-3” conduit – NV Energy Standards, Volume 17 and drawings for PID 3000412977.

Vault – Shall be Jensen Precast 557 vault with lid “B”, or approved equivalent, per NV Energy Standards Volume 17 and drawings for PID 3000412977.

Dig Pole Hole and Anchor Hole and backfill – NV Energy Standards, Volume 17 and drawings for PID 3000412977.

Dig Pole Hole and backfill – NV Energy Standards, Volume 17 and drawings for PID 3000251657.

Install Risers with 1-4" Conduit – NV Energy Standards, Volume 17 and drawings for PID 3000412977.

Install Risers with 1-3" Conduit – NV Energy Standards, Volume 17 and drawings for PID 3000251657.

336.00 – NEVADA ENERGY GAS

336.01 Description. This Section covers the work germane to Nevada Energy Gas utilities and facilities.

NV Energy Project # 3000267183 – Greg Street 8" Gas Main Relocation
NV Energy Project # 3000236040 – Larkin Circle Gas Main Relocations

Contractor shall coordinate with NV Energy regarding restrictions to the time frame the 8" gas main can be removed from service, specifically during the late fall through early spring.

Contractor performing tasks related to the installation of NV Energy gas facilities shall be listed on the NV Energy gas contractors list. If prime contractor is not on the approved list, the prime contractor shall hire a subcontractor that is qualified. Qualified contractors are listed on www.nvenergy.com.

All natural gas work shall be performed in accordance with NV Energy Standards Gas Construction Standards Volume 15, Orange book, and any additional requirements by the City of Sparks.

SECTION 01340
SUBMITTALS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Mechanics and administration of the submittal process for:
      a. Shop Drawings.
      b. Samples.
      c. Informational submittals.
   2. General content requirements for Shop Drawings.

B. Related Specification Sections include but are not necessarily limited to:
   1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. Division 01 - General Requirements.
   3. Operations and Maintenance Manual submittal requirements are specified in Specification Section 01342.
   4. Specification Sections in Division 02 through Division 16 identifying required submittals.

1.2 DEFINITIONS

A. Shop Drawings:
   1. See General Conditions.
   2. Product data and samples are Shop Drawing information.
   3. Initial and Revised Construction Baseline Schedules.
   4. Schedule of Values.

B. Informational Submittals:
   1. Submittals other than Shop Drawings and samples required by the Contract Documents that do not require approval.
   2. Representative types of informational submittal items include but are not limited to:
      a. Construction Record Schedules (progress schedules).
      b. Installed equipment and systems performance test reports.
      c. Manufacturer's installation certification letters.
      d. Instrumentation and control commissioning reports.
      e. Warranties.
      f. Service agreements.
      g. Construction photographs.
      h. Survey data.
      i. Health and safety plans.
      j. Work plans.
   3. For-Information-Only submittals upon which the Engineer is not expected to conduct review or take responsive action may be so identified in the Contract Documents.

1.3 SUBMITTAL SCHEDULE

A. Schedule of Shop Drawings:
   1. Submitted and approved within 90 days of receipt of Notice to Proceed.
   2. Account for multiple transmittals under any Specification Section where partial submittals will be transmitted.

B. Informational Submittals:
   1. Reports and installation certifications submitted within five (5) working days of conducting testing or examination.

1.4 PREPARATION OF SUBMITTALS

A. Legibility:
   1. All submittals and all pages of all copies of a submittal shall be completely legible.
   2. Submittals which, in the Engineer's sole opinion, are illegible will be returned without review.

B. Shop Drawings and Samples:
   1. Scope of any submittal and letter of transmittal:
      a. Limited to one (1) Specification Section.
      b. Do not submit under any Specification Section entitled (in part) "Basic Requirements" unless the product or material submitted is specified, in total, in a "Basic Requirements" Specification Section.
   2. Numbering letter of transmittal:
      a. Use the Specification Section number followed by a series number ("-xx" and beginning with "01"); increase the series number sequentially with each additional transmittal for that Specification Section.
   3. Describing transmittal contents:
      a. Provide listing of each component or item in submittal capable of receiving an independent review action.
      b. Identify for each item:
         1) Manufacturer and Manufacturer's Drawing or data number.
         2) Contract Document tag number(s).
         3) Unique page numbers for each page of each separate item.
      c. When submitting "or-equal" items that are not the products of named manufacturers, include the words "or-equal" in the item description.
   4. Contractor certification of review and approval:
      a. Contractor's review and approval certification stamp shall be applied either to the letter of transmittal or a separate sheet preceding each independent item in the submittal.
         1) Stamp may be either a wet ink stamp or electronically embedded.
         2) Clearly identify the person who reviewed the submittal and the date it was reviewed.
         3) Shop Drawing submittal stamp shall read "(Contractor's Name) has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval as stipulated in the General Conditions."

{or}

      b. Contractor shall execute Exhibit AA, Contractor's Submittal Certification form, to indicate Contractor has reviewed and approved the submittal contents.
         1) Clearly identify the person who reviewed the submittal and the date it was reviewed."
      c. Submittals containing multiple independent items shall be prepared with each item listed on the letter of transmittal or on an index sheet for all items listing the discrete page numbers for each page of each item, which shall be stamped with the Contractor's review and approval stamp.
         1) Each independent item shall have a cover sheet with the transmittal number and item number recorded.
            a) Provide clear space of 3 IN SQ for Engineer stamping.
         2) Individual pages or sheets of independent items shall be numbered in a manner that permits the entire contents of a particular item to be readily recognized and associated with Contractor's certification.
   5. Resubmittals:
      a. Number with original Specification Section and series number with a suffix letter starting with "A" on a (new) duplicate transmittal form.
      b. Do not increase the scope of any prior transmittal.
      c. Account for all components of prior transmittal.

1) If items in prior transmittal received "A" or "B" Action code, list them and indicate "A" or "B" as appropriate.
    a) Do not include submittal information for items listed with prior "A" or "B" Action in resubmittal.
2) Indicate "Outstanding-To Be Resubmitted At a Later Date" for any prior "C" or "D" Action item not included in resubmittal.
    a) Obtain Engineer's approval to exclude items.

6. For 8-1/2 x 11 IN, 8-1/2 x 14 IN, and 11 x 17 IN size sheets, provide three (3) copies of each submittal for Engineer plus the number required by the Contractor.
    a. The number of copies required by the Contractor will be defined at the Preconstruction Conference, but shall not exceed three (3).
    b. All other size sheets:
        1) Submit one (1) reproducible transparency or high resolution print and one (1) additional print of each Drawing until approval is obtained.
        2) Utilize mailing tube; do not fold.
        3) The Engineer will mark and return the reproducible to the Contractor for reproduction and distribution.
7. Contractor shall not use red color for marks on transmittals.
    a. Duplicate all marks on all copies transmitted, and ensure marks are photocopy reproducible.
    b. Engineer will use red marks or enclose marks in a cloud.
8. Transmittal contents:
    a. Coordinate and identify Shop Drawing contents so that all items can be easily verified by the Engineer.
    b. Provide submittal information or marks defining specific equipment or materials utilized on the Project.
        1) Generalized product information, not clearly defining specific equipment or materials to be provided, will be rejected.
    c. Identify equipment or material project application, tag number, Drawing detail reference, weight, and other Project specific information.
    d. Provide sufficient information together with technical cuts and technical data to allow an evaluation to be made to determine that the item submitted is in compliance with the Contract Documents.
    e. Submit items such as equipment brochures, cuts of fixtures, product data sheets or catalog sheets on 8-1/2 x 11 IN pages.
        1) Indicate exact item or model and all options proposed.
    f. When a Shop Drawing submittal is called for in any Specification Section, include as appropriate, scaled details, sizes, dimensions, performance characteristics, capacities, test data, anchoring details, installation instructions, storage and handling instructions, color charts, layout Drawings, rough-in diagrams, wiring diagrams, controls, weights and other pertinent data in addition to information specifically stipulated in the Specification Section.
        1) Arrange data and performance information in format similar to that provided in Contract Documents.
        2) Provide, at minimum, the detail specified in the Contract Documents.
    g. If proposed equipment or materials deviate from the Contract Drawings or Specifications in any way, clearly note the deviation and justify the said deviation in detail in a separate letter immediately following transmittal sheet.
9. Samples:
    a. Identification:
        1) Identify sample as to transmittal number, manufacturer, item, use, type, project designation, tag number, Specification Section or Drawing detail reference, color, range, texture, finish and other pertinent data.

2) If identifying information cannot be marked directly on sample without defacing or adversely altering samples, provide a durable tag with identifying information securely attached to the sample.

b. Include application specific brochures, and installation instructions.

c. Provide Contractor's review and approval certification stamp or Contractor's Submittal Certification form as indication of Contractor's checking and verification of dimensions and coordination with interrelated work.

d. Resubmit revised samples of rejected items.

C. Informational Submittals:

1. Prepare in the format and detail specified in Specification requiring the informational submittal.

1.5 TRANSMITTAL OF SUBMITTALS

A. Shop Drawings and Samples:

1. Transmit all submittals to:

HDR
9805 Double R Blvd. #101
Reno, NV 89521
Attn: Noel Laughlin

2. Utilize two (2) copies of attached Exhibit A to transmit all Shop Drawings and samples.
3. All submittals must be from Contractor.
   a. Submittals will not be received from or returned to subcontractors.

B. Informational Submittals:

1. Transmit under Contractor's standard letter of transmittal or letterhead.
2. Submit in triplicate or as specified in individual Specification Section.
3. Transmit to:

HDR
9805 Double R Blvd. #101
Reno, NV 89521
Attn: Noel Laughlin

4. Provide copy of letter of transmittal without attachments to Owner's Resident Project Representative.
   a. Exception for concrete, soils compaction and pressure test reports.
      1) Transmit one (1) copy of test reports to Resident Project Engineer.
      2) Transmit one (1) copy of test reports to location and individual indicated above for other informational submittals.

C. Electronic Transmission of Submittals:

1. Transmittals shall be made electronically.
   a. Use email.
   b. Protocols and processes will be determined at the Pre-Construction Conference.
2. Scan all transmittals into Adobe Acrobat Portable Document Format (PDF), latest version, with printing enabled.
   a. Do not password protect or lock the PDF document.
   b. Rotate sheets that are normally viewed in landscape mode so that when the PDF file is opened the sheet is in the appropriate position for viewing.
3. Required signatures may be applied prior to scanning for transmittal.

1.6 ENGINEER'S REVIEW ACTION

A. Shop Drawings and Samples:

1. Items within transmittals will be reviewed for overall design intent and will receive one (1) of the following actions:
    a. A - FURNISH AS SUBMITTED.
    b. B - FURNISH AS NOTED (BY ENGINEER).
    c. C - REVISE AND RESUBMIT.
    d. D - REJECTED.
    e. E - ENGINEER'S REVIEW NOT REQUIRED.
2. Submittals received will be initially reviewed to ascertain inclusion of Contractor's approval stamp.
    a. Submittals not stamped by the Contractor or stamped with a stamp containing language other than that specified herein will not be reviewed for technical content and will be returned without any action.
3. In relying on the representation on the Contractor’s review and approval stamp, Owner and Engineer reserve the right to review and process poorly organized and poorly described submittals as follows:
    a. Submittals transmitted with a description identifying a single item and found to contain multiple independent items:
        1) Review and approval will be limited to the single item described on the transmittal letter.
        2) Other items identified in the submittal will:
            a) Not be logged as received by the Engineer.
            b) Be removed from the submittal package and returned without review and comment to the Contractor for coordination, description and stamping.
            c) Be submitted by the Contractor as a new series number, not as a re-submittal number.
    b. Engineer, at Engineer’s discretion, may revise the transmittal letter item list and descriptions, and conduct review.
        1) Unless Contractor notifies Engineer in writing that the Engineer’s revision of the transmittal letter item list and descriptions was in error, Contractor’s review and approval stamp will be deemed to have applied to the entire contents of the submittal package.
4. Submittals returned with Action "A" or "B" are considered ready for fabrication and installation.
    a. If for any reason a submittal that has an "A" or "B" Action is resubmitted, it must be accompanied by a letter defining the changes that have been made and the reason for the resubmittal.
    b. Destroy or conspicuously mark "SUPERSEDED" all documents having previously received "A" or "B" Action that are superseded by a resubmittal.
5. Submittals with Action "A" or "B" combined with Action "C" (Revise and Resubmit) or "D" (Rejected) will be individually analyzed giving consideration as follows:
    a. The portion of the submittal given "C" or "D" will not be distributed (unless previously agreed to otherwise at the Preconstruction Conference).
        1) One (1) copy or the one (1) transparency of the "C" or "D" Drawings will be marked up and returned to the Contractor.
            a) Correct and resubmit items so marked.
    b. Items marked "A" or "B" will be fully distributed.
    c. If a portion of the items or system proposed are acceptable, however, the major part of the individual Drawings or documents are incomplete or require revision, the entire submittal may be given "C" or "D" Action.
        1) This is at the sole discretion of the Engineer.
        2) In this case, some Drawings may contain relatively few or no comments or the statement, "Resubmit to maintain a complete package."
        3) Distribution to the Owner and field will not be made (unless previously agreed to otherwise).

6. Failure to include any specific information specified under the submittal paragraphs of the Specifications will result in the submittal being returned to the Contractor with "C" or "D" Action.
7. Calculations required in individual Specification Sections will be received for information purposes only, as evidence calculations have been performed by individuals meeting specified qualifications, and will be returned stamped "E. Engineer's Review Not Required" to acknowledge receipt.
8. All costs, associated with the review of any Shop Drawing resubmitted more than twice shall be borne by the Contractor with said costs being deducted from the Contract Price.
9. Transmittals of submittals which the Engineer considers as "Not Required" submittal information, which is supplemental to but not essential to prior submitted information, or items of information in a transmittal which have been reviewed and received "A" or "B" action in a prior submittal, will be returned with action "E. Engineer's Review Not Required."
10. Samples may be retained for comparison purposes.
    a. Remove samples when directed.
    b. Include in bid all costs of furnishing and removing samples.
11. Approved samples submitted or constructed, constitute criteria for judging completed work.
    a. Finished work or items not equal to samples will be rejected.

PART 2 - PRODUCTS – (NOT APPLICABLE TO THIS SPECIFICATION SECTION)

PART 3 - EXECUTION – (NOT APPLICABLE TO THIS SPECIFICATION SECTION)

1

EXHIBIT A

Shop Drawing Transmittal No. _____-_____

(Spec Section) (Series)

Project Name:		Date Received:	
Project Owner:		Checked By:	
Contractor:	HDR Engineering, Inc.	Log Page:	
Address:	Address:	HDR No.:	
		Spec Section:	
		Drawing/Detail No.:	
Attn:	Attn:	1st. Sub	ReSub.
Date Transmitted:	Previous Transmittal Date:		

Item No.	No. Copies	Description	Manufacturer	Mfr/Vendor Dwg or Data No.	Action Taken*

Remarks:

* The Action designated above is in accordance with the following legend:

A - Furnish as Submitted

B - Furnish as Noted

C - Revise and Submit
1. Not enough information for review.
2. No reproducibles submitted.
3. Copies illegible.
4. Not enough copies submitted.
5. Wrong sequence number.
6. Wrong resubmittal number.
7. Wrong spec. section.
8. Wrong form used.
9. See comments.

D - Rejected

E - Engineer's review not required
1. Submittal not required.
2. Supplemental Information. Submittal retained for informational purposes only.
3. Information reviewed and approved on prior submittal.
4. See comments.

Engineer's review and approval is limited to determine whether items covered by this submittal will, after installation or incorporation in the Work, conform in general to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole. Any deviation from plans or specifications not depicted in the submittal or included but not clearly noted by the Contractor may not have been reviewed. Review by the Engineer shall not serve to relieve the Contractor of the contractual responsibility for any error or deviation from contract requirements.

Comments:

By Date

Distribution: Contractor | File | Field | Owner | Other

2

EXHIBIT AA

Contractor's Submittal Certification

Shop Drawing Transmittal No.: _____

Contract/Project Name: _____

_____

Company Name: _____

has

1. reviewed and coordinated this Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;

2. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;

3. determined and verified the suitability of all materials offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and

4. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.

☐ This Submittal **does not** contain any variations from the requirements of the Contract Documents.

☐ This Submittal **does** contain variations from the requirements of the Contract Documents. A separate description of said variations and a justification for them is provided in an attachment hereto identified as:

"Shop Drawing Transmittal No. _____Variation and Justification Documentation"

Insert picture file or electronic signature of Authorized Representative

_____ _____

Authorized Representative Date

Revision Log

1 **END OF SECTION**

SECTION 01342
OPERATION AND MAINTENANCE MANUALS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Administration of the submittal process for Operation and Maintenance Manuals.
   2. Content requirements for Operation and Maintenance Manuals.

B. Related Specification Sections include but are not necessarily limited to:
   1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. Division 01 - General Requirements.
   3. General submittal requirements are specified in Specification Section 01340 - Submittals.
   4. Sections in Division 02 through Division 16 identifying required Operation and Maintenance Manual submittals.

1.2 DEFINITIONS

A. Equipment Operation and Maintenance Manuals:
   1. Contain the technical information required for proper installation, operation and maintenance of process, electrical and mechanical equipment and systems.

B. Building Materials and Finishes Operation and Maintenance Manuals:
   1. Contain the information required for proper installation and maintenance of building materials and finishes.

1.3 SUBMITTALS

A. List of all the Operation and Maintenance Manuals required by the Contract as identified in Division 02 through Division 16.

B. Operation and Maintenance Manuals:
   1. Draft and final electronic copies.
   2. Final paper copies: Two (2).

1.4 SUBMITTAL SCHEDULE

A. List of Required Operation and Maintenance Manuals:
   1. Submit list with Specification Section number and title within 90 days after Notice to Proceed.

B. Draft Operation and Maintenance Manuals:
   1. Submit approvable draft manuals in electronic format (PDF) within 60 days following approval of the respective Shop Drawing.

C. Final Operation and Maintenance Manuals:
   1. Final approval of Operation and Maintenance Manuals in electronic format (PDF) must be obtained 7 days prior to Demonstration Testing.
   2. Provide paper copies and CD-ROMs of approved final Operation and Maintenance Manuals in electronic format (PDF), prior to issue of Substantial Completion.

1.5 PREPARATION OF SUBMITTALS

A. General:
   1. All pages of the Operation and Maintenance Manual submittal shall be legible.
      a. Submittals which, in the Engineer's sole opinion, are illegible will be rejected without review.

2. Identify each equipment item in a manner consistent with names and identification numbers used in the Contract Documents, not the manufacturer's catalog numbers.
3. Neatly type any data not furnished in printed form.
4. Operation and Maintenance Manuals are provided for Owner's use, to be reproduced and distributed as training and reference materials within Owner's organization.
    a. This requirement is:
        1) Applicable to both paper copy and electronic files.
        2) Applicable to materials containing copyright notice as well as those with no copyright notice.
5. Notify supplier and/or manufacturer of the intended use of Operations and Maintenance Manuals provided under the Contract.

B. Operation and Maintenance Manual Format and Delivery:
1. Draft electronic submittals:
    a. Provide manual in Adobe Acrobat Portable Document Format (PDF), latest version.
    b. Create one (1) PDF file for each equipment Operation and Maintenance Manual.
    c. Do not password protect or lock the PDF document.
    d. Drawings or other graphics must be converted to PDF file format from the original drawing file format and made part of the PDF document.
    e. Scanning of drawings is to be used only where actual file conversion is not possible and drawings must be scanned at a resolution of 300 dpi or greater.
    f. Rotate sheets that are normally viewed in landscape mode so that when the PDF file is opened the sheet is in the appropriate position for viewing.
    g. Create bookmarks in the navigation frame, for the Operation and Maintenance Manual cover, the Table of Contents, and each top level entry in the Operation and Maintenance Table of Contents.
    h. Using Adobe Acrobat Standard or Adobe Acrobat Professional, set the PDF document properties, initial view as follows:
        1) Select File →Properties→Initial View.
        2) Select the Navigation tab: Bookmarks Panel and Page.
        3) Select the Page layout: Single Page.
        4) Select the Magnification: Fit Page.
        5) Select Open to page: 1.
        6) Set the file to open to the cover page of the manual with bookmarks to the left, and the first bookmark linked to the cover page.
    i. Set the PDF file "Fast Web View" option to open the first several pages of the document while the rest of the document continues to load.
        1) To do this:
            a) Select Edit→Preferences→ Documents→Save Settings.
            b) Check the Save As optimizes for Fast Web View box.
    j. PDF file naming convention:
        1) Use the Specification Section number, the manufacturer's name and the equipment description, separated by underscores.
        2) Example: 11083_Sanitaire_Coarse_Bubble_Diffusers.pdf.
        3) Do not put spaces in the file name.
2. Final electronic submittals:
    a. Submit two (2) copies in PDF file format on two (2) CD-ROM discs (one (1) copy per CD-ROM), each secured in a jewel case.
    b. CD-ROM Labeling:
        1) Provide the following printed labeling on all CD-ROM discs:
            a) Project name.
            b) Specification Section.
            c) Equipment names and tag(s).
            d) Manufacturer name.
            e) Date (month, year).
    c. CD-ROM Jewel Case Holder:

1) Insert jewel cases containing labled CD-ROM discs in three-ring binder holder (C-Line Products, www.c-lineproducts.com stock number CLI-61968 or equivalent) at the front of each final paper copy.

3. Final paper copy submittals:
   a. Quantity: Provide two (2) copies.
   b. Paper: 8.5 x 11 IN or 11 x 17 IN bright white, 20 pound paper with standard three-hole punching.
   c. 3-Ring Binder:
      1) Provide D-ring binder with clear vinyl sleeves (i.e. view binder) on front and spine.
      2) Insert binder title sheet with the following information under the front and spine sleeves:
         a) Project name.
         b) Specification Section.
         c) Equipment names and tag(s),
         d) Manufacturer name,
         e) Date (month, year),
      3) Provide plastic sheet lifters prior to first page and following last page.
   d. Drawings:
      1) Provide all drawings at 11 x 17 IN size, triple folded and three-hole punched for insertion into manual.
      2) Where reduction is not practical to ensure readability, fold larger drawings separately and place in three-hole punched vinyl envelopes inserted into the binder.
      3) Identify vinyl envelopes with drawing numbers.
   e. Use plastic coated dividers to tab each section of each manual in accordance with the Table of Contents.

C. Equipment Operation and Maintenance Manual Content:
   1. Provide a cover page as the first page of each manual with the following information:
      a. Manufacturer(s) Name and Contact Information.
      b. Vendor's Name and Contact Information.
      c. Date (month, year).
      d. Project Owner and Project Name.
      e. Specification Section.
      f. Project Equipment Tag Numbers.
      g. Model Numbers.
      h. Engineer's Name.
      i. Contractor's Name.
   2. Provide a Table of Contents for each manual.
   3. Provide Equipment Record sheets as follows:
      a. Printed copies of the Equipment Record (Exhibits B1, B2 and B3), as the first tab following the Table of Contents.
      b. Exhibits B1-B3 are available as Fillable PDF Form documents from the Engineer.
      c. Each section of the Equipment Record must be completed in detail; simply referencing the related equipment Operation and Maintenance Manual sections for nameplate, maintenance, spare parts or lubricant information is not acceptable.
      d. For equipment involving separate components (for example, a motor and gearbox), a fully completed Equipment Record is required for each component.
      e. Submittals that do not include the Equipment Record(s) will be rejected without further content review.
   4. Provide a printed copy of the Manufacturer's Field Services report as required by Specification Section 01650 following the Equipment Record sheets.
   5. Provide the following detailed information:
      a. Use equipment tag numbers from the Contract Documents to identify equipment and system components.
      b. Equipment function, normal and limiting operating characteristics.

c. Instructions for assembly, disassembly, installation, alignment, adjustment, and inspection.
d. Operating instructions for start-up, normal operation, control, shutdown, and emergency conditions.
e. Lubrication and maintenance instructions.
f. Troubleshooting guide.
g. Mark each sheet to clearly identify specific products and component parts and data applicable to the installation for the Project; delete or cross out information that does not specifically apply to the Project.
h. Parts lists:
    1) A parts list and identification number of each component part of the equipment.
    2) Exploded view or plan and section views of the equipment with a detailed parts callout matching the parts list.
    3) A list of recommended spare parts.
    4) List of spare parts provided as specified in the associated Specification Section.
    5) A list of any special storage precautions which may be required for all spare parts.
i. General arrangement, cross-section, and assembly drawings.
j. Electrical diagrams, including elementary diagrams, wiring diagrams, connection diagrams, and interconnection diagrams.
k. Test data and performance curves.
l. As-constructed fabrication or layout drawings and wiring diagrams.
m. Copy of the equipment manufacturer's warranty meeting the requirements of the Contract.
n. Copy of any service contracts provided for the specific piece of equipment as part of the Contract.

6. Additional information as required in the associated equipment or system Specification Section.

D. Building Materials and Finishes Operation and Maintenance Manual Content:
1. Building products, applied materials and finishes:
    a. Include product data, with catalog number, size, composition and color and texture designations.
    b. Provide information for ordering custom manufactured products.
2. Necessary precautions:
    a. Include product MSDS for each approved product.
    b. Include any precautionary application and storage guidelines.
3. Instructions for care and maintenance:
    a. Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods and recommended schedule for cleaning and maintenance.
4. Moisture protection and weather exposed products:
    a. Include product data listing, applicable reference standards, chemical composition, and details of installation.
    b. Provide recommendations for inspections, maintenance and repair.
5. Additional requirements as specified in individual product specifications.

1.6 TRANSMITTAL OF SUBMITTALS

A. Operation and Maintenance Manuals.
1. Transmit all submittals to:
    a. {The address specified in Specification Section 01340 - SUBMITTALS}.

2. Transmittal form: Use Operation and Maintenance Manual Transmittal, Exhibit A.
3. Transmittal numbering:
    a. Number each submittal with the Specification Section number followed by a series number beginning with "-01" and increasing sequentially with each additional transmittal, followed by "-OM" (for example: 11061-01-OM).

4. Submit draft and final Operation and Maintenance Manual in electronic format (PDF) to Engineer, until manual is approved.

B. Expedited Return Delivery:
   1. Include prepaid express envelope or air bill in submittal transmittal package for any submittals Contractor expects or requires express return mail.
   2. Inclusion of prepaid express envelope or air bill does not obligate Engineer to conduct expedited review of submittal.

1.7 ENGINEER'S REVIEW ACTION

A. Draft Electronic (PDF) Submittals:
   1. Engineer will review and indicate one of the following review actions:
      a. A - ACCEPTABLE
      b. B - FURNISH AS NOTED
      c. C - REVISE AND RESUBMIT
      d. D - REJECTED
   2. Submittals marked as Acceptable or Furnish As Noted will be retained; however, the transmittal form will be returned with a request for the final paper and electronic documents to be submitted.
   3. Copies of submittals marked as Revise and Resubmit or Rejected will be returned with the transmittal form marked to indicate deficient areas.
   4. Resubmit until approved.

B. Final Paper Copy Submittals:
   1. Engineer will review and indicate one (1) of the following review actions:
      a. A - ACCEPTABLE
      b. D - REJECTED
   2. Submittals marked as Acceptable will be retained with the transmittal form returned as noted.
   3. Submittals marked as Rejected will be returned with the transmittal form marked to indicate deficient areas.
   4. Resubmit until approved.

PART 2 - PRODUCTS – (NOT APPLICABLE TO THIS SPECIFICATION SECTION)

PART 3 - EXECUTION – (NOT APPLICABLE TO THIS SPECIFICATION SECTION)

END OF SECTION

EXHIBIT A **Operation and Maintenance Manual Transmittal _____-_____ - OM**
(Spec Section) (Series)

Project Name: Date Received:

Project Owner: Checked By:

Contractor: Owner: Log Page:

Address: Address: HDR No.:

Attn: Attn:

1st. Sub. ReSub.

Date Transmitted: Previous Transmittal Date:

No. Copies	Description of Item	Manufacturer	Dwg. or Data No.	Action Taken*

Remarks:

To: From:

HDR Engineering, Inc.

Date:

* The Action designated above is in accordance with the following legend:

A - Acceptable

B - Furnish as Noted

C - Revise and Resubmit

D - Rejected

Comments:

By Date

Distribution: Contractor File Field Owner Other

EXHIBIT B1

Equipment Record

Equipment Data and Spare Parts Summary

Project Name					Specification Section:
Equipment Name					Year Installed:
Project Equipment Tags					
Equipment Manufacturer					Project or Sales Order #
Address					Phone
E-mail	Web Site				
Local Vendor/Service Center					
Address					Phone
E-mail	Web Site				

MECHANICAL NAMEPLATE DATA

Equip.			Serial #	
Make			Model #	
ID #	Frame #	HP	RPM	Capacity
Size	TDH	Impeller Dia.	CFM	PSI
Other:				

ELECTRICAL NAMEPLATE DATA

Equip.				Serial #				
Make				Model #				
ID #	Frame #	HP	V.	Amp.	HZ	PH	RPM	SF
Duty	Code	Ins. Cl.	Type	NEMA	C Amb.	Temp. Rise	Rating	
Other:								

SPARE PARTS PROVIDED PER CONTRACT

Part #	Part Name	Quantity

RECOMMENDED SPARE PARTS

Part #	Part Name	Quantity

EXHIBIT B2

Equipment Record

Recommended Maintenance Summary

Equipment Name	Project Equipment Tags

RECOMMENDED BREAK-IN MAINTENANCE (1st OIL CHANGE, ETC.)	INITIAL COMPLETION FOLLOWING START-UP (Note 1)							
	D	W	M	Q	S	A	RT	Hours

RECOMMENDED PREVENTIVE MAINTENANCE	PM TASK INTERVAL (Note 1)							
	D	W	M	Q	S	A	RT	Hours

Note 1: D = Daily W = Weekly M = Monthly Q = Quarterly S = Semiannual A = Annual RT= Run Time Hours = Run Time Hours

EXHIBIT B3

Equipment Record

Lubrication Summary

Equipment Name	Project Equipment Tags

Lubricant Point						
Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					
Lubricant Point						
Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					
Lubricant Point						
Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					
Lubricant Point						
Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					
Lubricant Point						
Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					
Lubricant Point						
Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					

END OF SECTION

SECTION 01600
PRODUCT DELIVERY, STORAGE, AND HANDLING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Scheduling of product delivery.
   2. Packaging of products for delivery.
   3. Protection of products against damage from:
      a. Handling.
      b. Exposure to elements or harsh environments.

B. Related Specification Sections include but are not necessarily limited to:
   1. Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. General Requirements.

C. Payment:
   1. No payment will be made to Contractor for equipment or materials not properly stored and insured or without approved Shop Drawings.
      a. Previous payments for items will be deducted from subsequent progress estimate(s) if proper storage procedures are not observed.

1.2 DELIVERY

A. Scheduling: Schedule delivery of products or equipment as required to allow timely installation and to avoid prolonged storage.

B. Packaging: Deliver products or equipment in manufacturer's original unbroken cartons or other containers designed and constructed to protect the contents from physical or environmental damage.

C. Identification: Clearly and fully mark and identify as to manufacturer, item, and installation location.

D. Protection and Handling: Provide manufacturer's instructions for storage and handling.

PART 2 - PRODUCTS - (NOT APPLICABLE TO THIS SPECIFICATION SECTION)

PART 3 - EXECUTION

3.1 PROTECTION, STORAGE AND HANDLING

A. Manufacturer's Instruction:
   1. Protect all products or equipment in accordance with manufacturer's written directions.
      a. Store products or equipment in location to avoid physical damage to items while in storage.
      b. Handle products or equipment in accordance with manufacturer's recommendations and instructions.
   2. Protect equipment from exposure to elements and keep thoroughly dry.
   3. When space heaters are provided in equipment, connect and operate heaters during storage until equipment is placed in service.

3.2 STORAGE FACILITIES

A. Temporary Storage Building:
   1. Provide a weatherproof temporary storage building specifically for the purpose of providing for protection of products and equipment.
      a. Size building to accommodate anticipated storage items; however, not less than 10'x12'.
   2. Equip building with lockable doors and lighting, and provide electrical service for equipment space heaters and heating or ventilation as necessary to provide storage environments acceptable to specified manufacturers.
   3. Provide methods of storage of products and equipment off the ground.
   4. Provide this structure within 60 days after Notice to Proceed.
      a. Locate building on-site where shown on the Drawings or in location approved by Engineer.
      b. Remove building from site prior to startup and demonstration period.

3.3 FIELD QUALITY CONTROL

A. Inspect Deliveries:
   1. Inspect all products or equipment delivered to the site prior to unloading.
      a. Reject all products or equipment that are damaged, used, or in any other way unsatisfactory for use on Project.

B. Monitor Storage Area: Monitor storage area to ensure suitable temperature and moisture conditions are maintained as required by manufacturer or as appropriate for particular items.

END OF SECTION

SECTION 01650
FACILITY START-UP

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Procedures and actions, required of the Contractor, which are necessary to achieve and demonstrate Substantial Completion.
   2. Requirements for Substantial Completion Submittals.

B. Related Sections include but are not necessarily limited to:
   1. Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. General Requirements.
   3. Section 11005 - Equipment: Basic Requirements.
   4. Section 13440 - Instrumentation for Process Control: Basic Requirements.

1.2 DEFINITIONS

A. Pre-Demonstration Period: The period of time, of unspecified duration after initial construction and installation activities during which Contractor, with assistance from manufacturer's representatives, performs in the following sequence:
   1. Finishing type construction work to ensure the Project has reached a state of Substantial Completion.
   2. Equipment start-up.
   3. Personnel training.

B. Demonstration Period: A period of time, of specified duration, following the Pre-Demonstration Period, during which the Contractor initiates flow through the facility and starts up and operates the facility, without exceeding specified downtime limitations, to prove the functional integrity of the mechanical and electrical equipment and components and the control interfaces of the respective equipment and components comprising the facility as evidence of Substantial Completion.

C. Substantial Completion: See the General Conditions.

1.3 SUBMITTALS

A. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.

B. Submit in the chronological order listed below prior to the completion of the Pre-Demonstration Period.
   1. Master operation and maintenance training schedule:
      a. Submit 14 days (minimum) prior to first training session for Owner's personnel.
      b. Schedule to include:
         1) Target date and time for Owner witnessing of each system initial start-up.
         2) Target date and time for Operation and Maintenance training for each system, both field and classroom.
         3) Target date for initiation of Demonstration Period.
      c. Submit for review and approval by Owner.
      d. Include holidays observed by Owner.
      e. Attend a schedule planning and coordination meeting 30 calendar days prior to first anticipated training session.

1) Provide a status report and schedule-to-complete for requirements prerequisite to manufacturer's training.
2) Identify initial target dates for individual manufacturer's training sessions.

f. Owner reserves the right to insist on a minimum seven (7) days' notice of rescheduled training session not conducted on master schedule target date for any reason.
g. Schedule to be resubmitted until approved.

2. Substantial Completion Submittal:
   a. File Contractor's Notice of Substantial Completion and Request for Inspection.
   b. Approved Operation and Maintenance manuals received by Engineer minimum one (1) week prior to scheduled training.
   c. Written request for Owner to witness each system pre-demonstration start-up.
      1) Request to be received by Owner minimum one (1) week before scheduled training of Owner's personnel on that system.
   d. Equipment installation and pre-demonstration start-up certifications.
   e. Letter verifying completion of all pre-demonstration start-up activities including receipt of all specified items from manufacturers or suppliers as final item prior to initiation of Demonstration Period.

1.4 COST OF START-UP

A. Contractor to pay all costs associated with Facility start-up.

PART 2 - PRODUCTS - (NOT APPLICABLE TO THIS SPECIFICATION SECTION)

PART 3 - EXECUTION

3.1 GENERAL

A. Facility Start-up Divided into Two Periods:
   1. Pre-Demonstration Period including:
      a. Completion of construction work to bring Project to a state of Substantial Completion.
      b. Start-up of Equipment.
      c. Training of Personnel.
      d. Completion of the filing of all required submittals.
      e. Filing of Contractor's Notice of Substantial Completion and Request for Inspection.
   2. Demonstration Period including:
      a. Demonstration of functional integrity of facility.

3.2 PRE-DEMONSTRATION PERIOD

A. Completion of Construction Work:
   1. Complete the work to bring the Project to a state of substantial completion.

B. Equipment Start-up:
   1. Requirements for individual items of equipment are included in Specification Sections.
   2. Prepare the equipment so it will operate properly and safely and be ready to demonstrate functional integrity during the Demonstration Period.
   3. Perform Equipment Start-up without introducing product flow.
   4. Introduce product flow to complete Equipment Start-up.
   5. Procedures include but are not necessarily limited to the following:
      a. Test or check and correct deficiencies of:
         1) Power, control, and monitoring circuits for continuity prior to connection to power source.
         2) Voltage of all circuits.
         3) Phase sequence.

4) Cleanliness of connecting piping systems.
5) Alignment of connected machinery.
6) Vacuum and pressure of all closed systems.
7) Lubrication.
8) Valve orientation and position status for manual operating mode.
9) Pumping equipment using product flow.
10) Instrumentation and control signal generation, transmission, reception, and response.
    a) See Specification Section 13440.
11) Tagging and identification systems.
12) All equipment: Proper connections, alignment, calibration and adjustment.

b. Calibrate all safety equipment.
c. Manually rotate or move moving parts to assure freedom of movement.
d. "Bump" start electric motors to verify proper rotation.
e. Perform other tests, checks, and activities required to make the equipment ready for Demonstration Period.
f. Documentation:
    1) Prepare a log showing each equipment item subject to this paragraph and listing what is to be accomplished during Equipment Start-up.
    2) Provide a place for the Contractor to record date and person accomplishing required work.
    3) Submit completed document before requesting inspection for Substantial Completion certification.

6. Obtain certifications, without restrictions or qualifications, and deliver to Engineer:
    a. Manufacturer's equipment installation check letters.
    b. Instrumentation Supplier's Instrumentation Installation Certificate.

C. Personnel Training:
1. See individual equipment specification sections.
2. Conduct all personnel training after completion of Equipment Start-up for the equipment for which training is being conducted.
    a. Personnel training on individual equipment or systems will not be considered completed unless:
        1) All pretraining deliverables are received and approved before commencement of training on the individual equipment or system.
        2) No system malfunctions occur during training.
        3) All provisions of field and classroom training specifications are met.
    b. Training not in compliance with the above will be performed again in its entirety by the manufacturer at no additional cost to Owner.
3. Field and classroom training requirements:
    a. Hold classroom training on-site.
    b. Notify each manufacturer specified for on-site training that the Owner reserves the right to video record any or all training sessions.
        1) Organize each training session in a format compatible with video recording.
    c. Training instructor qualification: Factory trained and familiar with giving both classroom and "hands-on" instructions.
    d. Training instructors:
        1) Be at classes on time.
        2) Session beginning and ending times to be coordinated with the Owner and indicated on the master schedule.
        3) Normal time lengths for class periods can vary, but brief rest breaks should be scheduled and taken.
    e. Organize training sessions into maintenance verses operation topics and identify on schedule.
    f. Plan for minimum class attendance of 5 people at each session and provide sufficient classroom materials, samples, and handouts for those in attendance.

g. Instructors to have a typed agenda and well prepared instructional material.
    1) The use of visual aids, e.g., films, pictures, and slides is recommended for use during the classroom training programs.
    2) Deliver agendas to the Engineer a minimum of seven (7) days prior to the classroom training.
    3) Provide equipment required for presentation of films, slides, and other visual aids.
h. In the on-site training sessions, cover the information required in the Operation and Maintenance Manuals submitted according to Specification Section 01342 and the following areas as applicable.
    1) Operation of equipment.
    2) Lubrication of equipment.
    3) Maintenance and repair of equipment.
    4) Troubleshooting of equipment.
    5) Preventive maintenance procedures.
    6) Adjustments to equipment.
    7) Inventory of spare parts.
    8) Optimizing equipment performance.
    9) Capabilities.
    10) Operational safety.
    11) Emergency situation response.
    12) Takedown procedures (disassembly and assembly).
i. Address above Paragraphs 1), 2), 8), 9), 10), and 11) in the operation sessions. Address above Paragraphs 3), 4), 5), 6), 7), and 12) in the maintenance sessions.
j. Maintain a log of classroom training provided including: Instructors, topics, dates, time, and attendance.

D. Complete the filing of all required submittals:
    1. Shop Drawings.
    2. Operation and Maintenance Manuals.
    3. Training material.

E. Filing of Contractor's Notice of Substantial Completion and Request for Inspection of Project:
    1. File the notice when the following have been completed:
        a. Construction work (brought to state of Substantial Completion).
        b. Equipment Start-up.
        c. Personnel Training.
        d. Submittal of required documents.
    2. Engineer will review required submittals for completeness within 7 calendar days of Contractor's notice. If complete, Engineer will complete inspection of the Work, within 10 calendar days of Contractor's notice.
    3. Engineer will inform Contractor in writing of the status of the Work reviewed, within 14 calendar days of Contractor's notice.
        a. Work determined not meeting state of Substantial Completion:
            1) Contractor: Correct deficiencies noted or submit plan of action for correction within 7 days of Engineer's determination.
            2) Engineer: Reinspect work within 5 days of Contractor's notice of correction of deficiencies.
            3) Reinspection costs incurred by Engineer will be billed to Owner who will deduct them from final payment due Contractor.
        b. Work determined to be in state of tentative Substantial Completion: Engineer to prepare tentative "Engineer's Certificate of Substantial Completion."
        c. Engineer's Certificate of Substantial Completion:
            1) Certificate tentatively issued subject to successful Demonstration of functional integrity.
            2) Issued for Facility as a whole.

3) Issued subject to completion or correction of items cited in the certificate (punch list).
4) Issued with responsibilities of Owner and Contractor cited.
5) Executed by Engineer.
6) Accepted by Owner.
7) Accepted by Contractor.

d. Upon successful completion of Demonstration Period, Engineer will endorse certificate attesting to the successful demonstration, and citing the hour and date of ending the successful Demonstration Period of functional integrity as the effective date of Substantial Completion.

3.3 DEMONSTRATION PERIOD

A. General:
1. Demonstrate the functional integrity of the mechanical, electrical, and control interfaces of the respective equipment and components comprising the facility as evidence of Substantial Completion.
2. Duration of Demonstration Period: 168 consecutive hours.
3. If, during the Demonstration Period, the aggregate amount of time used for repair, alteration, or unscheduled adjustments to any equipment or systems that renders the affected equipment or system inoperative exceed 10 percent of the Demonstration Period, the demonstration of functional integrity will be deemed to have failed.
   a. In the event of failure, a new Demonstration Period will recommence after correction of the cause of failure.
   b. The new Demonstration Period shall have the same requirements and duration as the Demonstration Period previously conducted.
4. Conduct the demonstration of functional integrity under full operational conditions.
5. Owner will provide operational personnel to provide decisions affecting system performance.
   a. Owner's assistance will be available only for system decisions.
   b. Contractor will perform all other functions including but not limited to equipment operation and maintenance until successful completion of the Demonstration Period.
6. Owner reserves the right to simulate operational variables, equipment failures, routine maintenance scenarios, etc., to verify the functional integrity of automatic and manual backup systems and alternate operating modes.
7. Time of beginning and ending any Demonstration Period shall be agreed upon by Contractor, Owner, and Engineer in advance of initiating Demonstration Period.
8. Throughout the Demonstration Period, provide knowledgeable personnel to answer Owner's questions, provide final field instruction on select systems and to respond to any system problems or failures which may occur.
   a. Provide final field instruction on the following systems:
   b. For the above systems, provide a total of 4 HRS instruction, divided among the systems as follows:
      1) Pumps.
      2) Controls
9. Provide all labor, supervision, utilities, chemicals, maintenance, equipment, vehicles or any other item necessary to operate and demonstrate all systems being demonstrated.

END OF SECTION

SECTION 11005
EQUIPMENT: BASIC REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Requirements of this Specification Section apply to all equipment provided on the Project including those found in other Divisions even if not specifically referenced in individual "Equipment" Articles of those Specification Sections.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
1. American Bearing Manufacturers Association (ABMA).
2. American Gear Manufacturers Association (AGMA).
3. ASTM International (ASTM):
   a. F593, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
4. Hydraulic Institute (HI):
   a. 9.6.4, Centrifugal and Vertical Pumps for Vibration Measurements and Allowable Valves.
5. Institute of Electrical and Electronics Engineers, Inc. (IEEE).
6. National Electrical Manufacturers Association (NEMA):
   a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
   b. ICS 6, Enclosures for Industrial Control and System.
   c. MG 1, Motors and Generators.
7. InterNational Electrical Testing Association (NETA):
   a. ATS, Acceptance Testing Specification for Electrical Power Distribution Equipment and Systems.
8. National Fire Protection Association (NFPA):
   a. 70, National Electrical Code (NEC):
      1) Article 430, Motors, Motor Circuits, and Controllers.
9. National Institute for Certification in Engineering Technologies (NICET).
10. National Institute of Standards and Technology (NIST).
11. Occupational Safety and Health Administration (OSHA):
    a. 29 CFR 1910, Occupational Safety and Health Standards, referred to herein as OSHA Standards.
12. Underwriters Laboratories, Inc. (UL).
    a. 508, Standard for Safety Industrial Control Equipment.
    b. 508A, Standard for Safety Industrial Control Panels.

B. Electrical Equipment and Connections Testing Program: See Section 16080.

C. Miscellaneous:
1. A single manufacturer of a "product" to be selected and utilized uniformly throughout Project even though:
   a. More than one (1) manufacturer is listed for a given "product" in Specifications.
   b. No manufacturer is listed.
2. Equipment, electrical assemblies, related electrical wiring, instrumentation, controls, and system components shall fully comply with specific NEC requirements related to area classification and to NEMA 250 and NEMA ICS 6 designations shown on Electrical Power Drawings and defined in Division 16.

1.3 DEFINITIONS

A. Product: Manufactured materials and equipment.

B. Major Equipment Supports - Supports for Equipment:
   1. Located on or suspended from elevated slabs with supported equipment weighing 2000 LBS or greater, or;
   2. Located on or suspended from roofs with supported equipment weighing 500 LBS or greater, or;
   3. Located on slab-on-grade or earth with supported equipment weighing 5000 LBS or more.

C. Equipment:
   1. One (1) or more assemblies capable of performing a complete function.
   2. Mechanical, electrical, instrumentation or other devices requiring an electrical, pneumatic, electronic or hydraulic connection.
   3. Not limited to items specifically referenced in "Equipment" articles within individual Specifications.

D. Installer or Applicator:
   1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
   2. Installer and applicator are synonymous.

1.4 SUBMITTALS

A. Shop Drawings:
   1. General for all equipment:
      a. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.
      b. Data sheets that include manufacturer's name and complete product model number.
         1) Clearly identify all optional accessories that are included.
      c. Acknowledgement that products submitted comply with the requirements of the standards referenced.
      d. Manufacturer's delivery, storage, handling, and installation instructions.
      e. Equipment identification utilizing numbering system and name utilized in Drawings.
      f. Equipment installation details:
         1) Location of anchorage.
         2) Type, size, and materials of construction of anchorage.
         3) Anchorage setting templates.
         4) Manufacturer's installation instructions.
      g. Equipment area classification rating.
      h. Shipping and operating weight.
      i. Equipment physical characteristics:
         1) Dimensions (both horizontal and vertical).
         2) Materials of construction and construction details.
      j. Equipment factory primer and paint data.
      k. Manufacturer's recommended spare parts list.
      l. Equipment lining and coatings.
      m. Equipment utility requirements include air, natural gas, electricity, and water.
   2. Mechanical and process equipment:
      a. Operating characteristics:
         1) Technical information including applicable performance curves showing specified equipment capacity, rangeability, and efficiencies.
         2) Brake horsepower requirements.
         3) Copies of equipment data plates.
      b. Piping and duct connection size, type and location.
      c. Equipment bearing life certification.
      d. Equipment foundation data:
         1) Equipment center of gravity.
         2) Criteria for designing vibration, special or unbalanced forces resulting from equipment operation.

3. Electric motor:
    a. Motor manufacturer and model number.
    b. Complete motor nameplate data.
    c. NEMA design type.
    d. Winding insulation class and temperature rise.
    e. Starts per hour.
    f. Performance data:
        1) Guaranteed minimum efficiencies at 100 percent, 75 percent, and 50 percent of full load
        2) Locked rotor and full load current at rated terminal voltage and minimum permissible or specified terminal voltage.
    g. Bearing data and lubrication system.
    h. Thermal protection system.
    i. Fabrication and/or layout drawings:
        1) Dimensioned outlined drawing.
        2) Connection diagrams including accessories (strip heaters, thermal protection, etc.).
    j. Electrical gear:
        1) Unless specified in a narrow-scope Specification Section, provide the following:
            a) Equipment ratings: Voltage, continuous current, kVa, watts, short circuit with stand, etc., as applicable.
        2) Control panels:
            a) Panel construction.
            b) Point-to-point ladder diagrams.
            c) Scaled panel face and subpanel layout.
            d) Technical product data on panel components.
            e) Panel and subpanel dimensions and weights.
            f) Panel access openings.
            g) Nameplate schedule.
            h) Panel anchorage.
4. Systems schematics and data:
    a. Provide system schematics where required in system specifications.
        1) Acknowledge all system components being supplied as part of the system.
        2) Provide technical data for each system component showing compliance with the Contract Document requirements.
        3) For piping components, identify all utility connections, vents and drains which will be included as part of the system.

B. Operation and Maintenance Manuals:
1. See Specification Section 01340 for requirements for:
    a. The mechanics and administration of the submittal process.
    b. The content of Operation and Maintenance Manuals.

C. Informational Submittals:
1. Certification that equipment has been installed properly, has been initially started up, has been calibrated and/or adjusted as required, and is ready for operation.
2. Testing and monitoring reports in accordance with PART 3 of this Specification Section.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. General:
1. Furnished equipment manufacturer's field quality control services and testing as specified in the individual equipment Specification Sections.
2. Execute pre-demonstration requirements in accordance with Specification Section 01650.
3. Perform and report on all tests required by the equipment manufacturer's Operation and Maintenance Manual.

4. Provide testing of electrical equipment and connections in accordance with Division 16.
5. Equip testing and analysis personnel with all appropriate project related reference material required to perform tests, analyze results, and provide documentation including, but not limited to:
    a. Contract Drawings and Specifications.
    b. Related construction change documentation.
    c. Approved Shop Drawings.
    d. Approved Operation and Maintenance Manuals.
    e. Other pertinent information as required.

B. Equipment Monitoring and Testing Plans:
1. Approved in accordance with Shop Drawing submittal schedule.
2. Included as a minimum:
    a. Qualifications of firm, field personnel, and analysis personnel doing the Work.
    b. List and description of testing and analysis equipment to be utilized.
    c. List of all equipment to be testing, including:
        1) Name and tag numbers identified in the Contract Documents.
        2) Manufacturer's serial numbers.
        3) Other pertinent manufacturer identification,

C. Instruments Used in Equipment and Connections Quality Control Testing:
1. Minimum calibration frequency:
    a. Field analog instruments: Not more than 6 months.
    b. Field digital instruments: Not more than 12 months.
    c. Laboratory instruments: Not more than 12 months.
    d. If instrument manufacturer's calibration requirements are more stringent, those requirements shall govern.
2. Carry current calibration status and labels on all testing instruments.
3. See individual testing programs for additional instrumentation compliance requirements.

D. Electrical Equipment and Connections Testing Program:
1. Perform testing on Division 16 equipment and connections in accordance with Division 16 requirements.
2. Testing of motors:
    a. Bump motor to check for correct rotation.
3. Repair or replace equipment shown to be out of range of the acceptable tolerance until the equipment meets or exceeds acceptability standards.

E. Other Testing:
1. Perform tests and inspections not specifically listed but required to assure equipment is safe to energize and operate.

F. Electric Motors:
1. Design for frequent starting duty equivalent to duty service required by driven equipment.
2. Design for full voltage starting.
3. Design bearing life based upon actual operating load conditions imposed by driven equipment.
4. Size for altitude of Project.
5. Furnish with stainless steel nameplates which include all data required by NEC Article 430.
6. Use of manufacturer's standard motor will be permitted on integrally constructed motor driven equipment specified by model number in which a redesign of the complete unit would be required in order to provide a motor with features specified.
7. Motor enclosure and winding insulation application:
    a. The following shall apply unless modified by specific Specification Sections:

MOTOR LOCATION	MOTOR ENCLOSURE / WINDING INSULATION
Class I, Division 1 Areas	Explosion Proof, Approved for Class I Division 1 Locations

G. Submersible Motors: Refer to individual narrow-scope Specification Sections for submersible motor requirements.

2.2 ACCESSORIES

A. Anchorage:
   1. Cast-in-place anchorage:
      a. Provide ASTM F593, Type 316 stainless steel anchorage for all equipment.
      b. Configuration and number of anchor bolts shall be per manufacturer's recommendations.
      c. Provide two (2) nuts for each bolt.
   2. Drilled anchorage:
      a. Adhesive anchors.
      b. Epoxy grout per.
      c. Threaded rods same as cast-in-place.

B. Data Plate:
   1. Attach a stainless steel data plate to each piece of rotary or reciprocating equipment.
   2. Permanently stamp information on data plate including manufacturer's name, equipment operating parameters, serial number and speed.

C. Lifting Eye Bolts or Lugs:
   1. Provide on all equipment 50 LBS or greater.
   2. Provide on other equipment or products as specified in the narrow-scope Specification Sections.

2.3 FABRICATION

A. Design, fabricate, and assemble equipment in accordance with modern engineering and shop practices.

B. Manufacture individual parts to standard sizes and gages so that repair parts, furnished at any time, can be installed in field.

C. Furnish like parts of duplicate units to be interchangeable.

D. Ensure that equipment has not been in service at any time prior to delivery, except as required by tests.

E. Furnish equipment which requires periodic internal inspection or adjustment with access panels which will not require disassembly of guards, dismantling of piping or equipment or similar major efforts.
   1. Quick opening but sound, securable access ports or windows shall be provided for inspection of chains, belts, or similar items.

F. Fabricate equipment which will be subject to Corrosive Environment in such a way as to avoid back to back placement of surfaces that can not be properly prepared and painted.
   1. When such back to back fabrication can not be avoided, provide continuous welds to seal such surfaces from contact with corrosive environment.
   2. Where continuous welds are not practical, after painting seal the back to back surfaces from the environment.

G. Control Panels Engineered and Provided with the Equipment by the Manufacturer:
   1. Manufacturer’s standard design for components and control logic unless specific requirements are specified in the specific equipment Specification Section.
   2. NEMA or IEC rated components are acceptable, whichever is used in the manufacturer’s standard engineered design, unless specific requirements are required in the specific equipment Specification Section.

3. Affix entire assembly with a UL 508A label "Listed Enclosed Industrial Control Panel" prior to delivery.
    a. Control panels without an affixed UL 508A label shall be rejected.

2.4 SHOP OR FACTORY PAINT FINISHES

A. Electrical Equipment:
    1. Provide factory-applied paint coating system(s) for all electrical equipment components except those specified to receive field painting.

B. Field paint other equipment in accordance with Specifications.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install equipment as shown on Drawings and in accordance with manufacturer's directions.

B. Utilize templates for anchorage placement for slab-mounted equipment.

C. For equipment having drainage requirements such as seal water, provide 3/4 IN PVC or clear plastic tubing from equipment base to nearest floor or equipment drain.
    1. Route clear of major traffic areas and as approved by Engineer.

D. DO NOT construct foundations until major equipment supports are approved.

E. Extend all non-accessible grease fittings using stainless steel tubing to a location which allows easy access of fittings from closest operating floor level.

F. Equipment Base:
    1. Construct level in both directions.
    2. Take particular care at anchor bolt locations so these areas are flat and level.

3.2 INSTALLATION CHECKS

A. For all equipment specifically required in detailed specifications, secure services of experienced, competent, and authorized representative(s) of equipment manufacturer to visit site of work and inspect, check, adjust and approve equipment installation.
    1. In each case, representative(s) shall be present during placement and start-up of equipment and as often as necessary to resolve any operational issues which may arise.

B. Secure from equipment manufacturer's representative(s) a written report certifying that equipment:
    1. Has been properly installed and lubricated.
    2. Is in accurate alignment.
    3. Is free from any undue stress imposed by connecting piping or anchor bolts.
    4. Has been operated under full load conditions, and that it operated satisfactorily and is ready for Owner operation.
        a. Secure and deliver a field written report to Owner immediately prior to leaving jobsite.

C. No separate payment shall be made for installation checks.
    1. All or any time expended during installation check does not qualify as Operation and Maintenance training or instruction time when specified.

3.3 IDENTIFICATION OF EQUIPMENT AND HAZARD WARNING SIGNS

A. Identify equipment and install hazard warning signs in accordance with Specifications.

3.4 FIELD PAINTING AND PROTECTIVE COATINGS

A. For required field painting and protective coatings, comply with Specifications.

3.5 WIRING CONNECTIONS AND TERMINATION

A. Clean wires before installing lugs and connectors.

B. Coat connection with oxidation eliminating compound for aluminum wire.

C. Terminate motor circuit conductors with copper lugs bolted to motor leads.

D. Tape stripped ends of conductors and associated connectors with electrical tape.
   1. Wrapping thickness shall be 150 percent of the conductor insulation thickness.

E. Connections to carry full ampacity of conductors without temperature rise.

F. Terminate spare conductors with electrical tape.

3.6 FIELD QUALITY CONTROL

A. Furnish equipment manufacturer services as specified in the individual equipment Specifications.

B. Inspect wire and connections for physical damage and proper connection.

C. Bump motor to check for correct rotation:

3.7 DEMONSTRATION

A. Demonstrate equipment in accordance with Specification Section 01650.

END OF SECTION

SECTION 13440
INSTRUMENTATION FOR PROCESS CONTROL: BASIC REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Basic requirements for complete instrumentation system for process control.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. Canadian Standards Association (CSA).
   2. FM Global (FM).
   3. The Instrumentation, Systems, and Automation Society (ISA):
      a. 7.0.01, Quality Standard for Instrument Air.
      b. S5.1, Instrumentation Symbols and Identification.
      c. S5.3, Graphic Symbols for Distributed Control/Shared Display Instrumentation, Logic and Computer Systems.
      d. S5.4, Standard Instrument Loop Diagrams.
      e. S20, Standard Specification Forms for Process Measurement and Control Instruments, Primary Elements and Control Valves.
   4. National Electrical Manufacturers Association (NEMA):
      a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
   5. National Fire Protection Association (NFPA):
      a. 70, National Electrical Code (NEC).
   6. National Institute of Standards and Technology (NIST).
   7. Underwriters Laboratories, Inc. (UL):
      a. 913, Standard for Safety, Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations.

B. Qualifications:
   1. Instrumentation subcontractor:
      a. Experience:
         1) Have satisfactorily provided a control system for a minimum of five (5) projects of similar magnitude and function.

C. Miscellaneous:
   1. Comply with electrical classifications and NEMA enclosure types shown on Drawings.

1.3 DEFINITIONS

A. Hazardous Areas: Class I, II or III areas as defined in NFPA 70.

B. Outdoor Area: Exterior locations where the equipment is normally exposed to the weather and including below grade structures, such as vaults, manholes, handholes and in-ground pump stations.

C. Intrinsically Safe Circuit: A circuit in which any spark or thermal effect is incapable of causing ignition of a mixture of flammable or combustible material in air under test conditions as prescribed in UL 913.

1.4 SYSTEM DESCRIPTION

A. Control System Requirements:
   1. This Specification Section provides the general requirements for the instrument and control system.

B. All signals shall be directly linearly proportional to measured variable unless specifically noted otherwise.

C. Single Instrumentation Subcontractor:
   1. Furnish and coordinate instrumentation system through a single instrumentation subcontractor.
      a. The instrumentation subcontractor shall be responsible for functional operations of all systems, performance of control system engineering, supervision of installation, final connections, calibrations, preparation of Drawings and Operation and Maintenance Manuals, start-up, training, demonstration of substantial completion and all other aspects of the control system.
   2. Ensure coordination of instrumentation with other work to ensure that necessary wiring, conduits, contacts, relays, converters, and incidentals are provided in order to transmit, receive, and control necessary signals to other control elements, to control panels, and to receiving stations.

1.5 SUBMITTALS

A. Shop Drawings:
   1. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.
   2. Submittals shall be original printed material or clear unblemished photocopies of original printed material.
      a. Facsimile information is not acceptable.
   3. Limit the scope of each submittal to one (1) Specification Section.
      a. Each submittal must be submitted under the Specification Section containing requirements of submittal contents.
      b. Do not provide any submittals for Specification Section 13440.
   4. Product technical data including:
      a. Equipment catalog cut sheets.
      b. Instrument data sheets:
         1) ISA S20 or approved equal.
         2) Separate data sheet for each instrument.
      c. Materials of construction.
      d. Minimum and maximum flow ranges.
      e. Pressure loss curves.
      f. Physical limits of components including temperature and pressure limits.
      g. Size and weight.
      h. Electrical power requirements and wiring diagrams.
      i. NEMA rating of housings.
      j. Submittals shall be marked with arrows to show exact features to be provided.
   5. Loop diagrams per ISA S5.4 as specified in Specification Section 13448.
   6. Comprehensive set of wiring diagrams as specified in Specification Section 13448.
   7. Panel fabrication drawings as specified in Specification Section 13448.
   8. PLC equipment drawings.
   9. HMI graphics.
   10. Nameplate layout drawings.

11. Drawings, systems, and other elements are represented schematically in accordance with ISA S5.1 and ISA S5.3.
    a. The nomenclature, tag numbers, equipment numbers, panel numbers, and related series identification contained in the Contract Documents shall be employed exclusively throughout submittals.
12. All Shop Drawings shall be modified with as-built information/corrections.
13. All panel and wiring drawings shall be provided in both hardcopy and softcopy.
    a. Furnish electronic files on CD-ROM or DVD-ROM media.
    b. Drawings in {AUTO CAD} {MicroStation} format.
14. Provide a parameter setting summary sheet for each field configurable device.
15. Certifications:
    a. Documentation verifying that calibration equipment is certified with NIST traceability.
    b. Approvals from independent testing laboratories or approval agencies, such as UL, FM or CSA.
        1) Certification documentation is required for all equipment for which the specifications require independent agency approval.
16. Testing reports: Source quality control reports.

B. Operation and Maintenance Manuals:
1. See Specification Section 01342 for requirements for:
    a. The mechanics and administration of the submittal process.
    b. The content of Operation and Maintenance Manuals.
2. Warranties: Provide copies of warranties and list of factory authorized service agents.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not remove shipping blocks, plugs, caps, and desiccant dryers installed to protect the instrumentation during shipment until the instruments are installed and permanent connections are made.

1.7 SITE CONDITIONS

A. Unless designated otherwise on the Drawings, area designations are as follows:
1. Outdoor area:
    a. Wet.
    b. Hazardous when specifically designated on the Drawings or in the Specifications.

PART 2 - PRODUCTS

2.1 NEMA TYPE REQUIREMENTS

A. Provide enclosures/housing for control system components in accordance with the following:
1. Areas designated as wet: NEMA Type 4 or 4X as shown.
2. Areas designated as Class I hazardous, Groups A, B, C, or D as defined in NFPA 70:
    a. Utilize intrinsically safe circuits to the maximum extent practical and as depicted in the Contract Documents.
3. Areas designated as Class II hazardous, Groups E, F, or G as defined in NFPA 70:
    a. NEMA Type 9 unless all electrical components within enclosure utilize intrinsically safe circuitry.
        1) Utilize intrinsically safe circuits to the maximum extent practical and as depicted in the Contract Documents.
4. Either architecturally or non-architecturally finished areas designated as dry, noncorrosive, and nonhazardous: NEMA Type 12.
5. Areas designated to be subject to temporary submersion: NEMA 6P.

2.2 PERFORMANCE AND DESIGN REQUIREMENTS

A. System Operating Criteria:
   1. Stability: After controls have taken corrective action, as result of a change in the controlled variable or a change in setpoint, oscillation of final control element shall not exceed two (2) cycles per minute or a magnitude of movement of 0.5 percent full travel.
   2. Response: Any change in setpoint or change in controlled variable shall produce a corresponding corrective change in position of final control element and become stabilized within 30 seconds.
   3. Agreement: Setpoint indication of controlled variable and measured indication of controlled variable shall agree within 3 percent of full scale over a 6:1 operating range.
   4. Repeatability: For any repeated magnitude of control signal, from either an increasing or decreasing direction, the final control element shall take a repeated position within 0.5 percent of full travel regardless of force required to position final element.
   5. Sensitivity: Controls shall respond to setpoint deviations and measured variable deviations within 1.0 percent of full scale.
   6. Performance: All instruments and control devices shall perform in accordance with manufacturer's specifications.

2.3 ACCESSORIES

A. Provide identification devices for instrumentation system components.

B. Provide corrosion resistant spacers to maintain 1/4 IN separation between equipment and mounting surface in wet areas, on below grade walls and on walls of liquid containment or processing areas.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Wherever feasible, use bottom entry for all conduit entry to instruments and junction boxes.

B. Install electrical components per Division 16.

C. Panel-Mounted Instruments:
   1. Mount and wire so removal or replacement may be accomplished without interruption of service to adjacent devices.
   2. Locate all devices mounted inside enclosures so terminals and adjustment devices are readily accessible without use of special tools and with terminal markings clearly visible.

D. See Specification Section 16120.

3.2 FIELD QUALITY CONTROL

A. See Specification Section 01650.

B. Maintain accurate daily log of all startup activities, calibration functions, and final setpoint adjustments.
   1. Documentation requirements include the utilization of the forms located at the end of this Specification Section.
      a. Loop Check-out Sheet.
      b. Instrument Certification Sheet.
      c. Final Control Element Certification Sheet.

C. Instrumentation Calibration:
   1. Verify that all instruments and control devices are calibrated to provide the performance required by the Contract Documents.

2. Calibrate all field-mounted instruments, other than local pressure and temperature gages, after the device is mounted in place to assure proper installed operation.
3. Calibrate in accordance with the manufacturer's specifications.
4. Bench calibrate pressure and temperature gages.
    a. Field mount gage within seven (7) days of calibration.
5. Check the calibration of each transmitter and gage across its specified range at 0, 25, 50, 75, and 100 percent.
    a. Check for both increasing and decreasing input signals to detect hysteresis.
6. Replace any instrument or device which cannot be properly adjusted.
7. Calibration equipment shall be certified by an independent agency with traceability to NIST.
    a. Certification shall be up-to-date.
    b. Use of equipment with expired certifications shall not be permitted.
8. Calibration equipment shall be at least three (3) times more accurate as the device being calibrated.

D. Loop check-out requirements are as follows:
1. Check control signal generation, transmission, reception and response for all control loops under simulated operating conditions by imposing a signal on the loop at the instrument connections.
    a. Use actual signals where available.
    b. Closely observe control components.
        1) Verify that readings at all loop components are in agreement.
        2) Make corrections as required.
            a) Following any corrections, retest the loop as before.
2. Check all interlocks to the maximum extent possible.
3. In addition to any other as-recorded documents, record all setpoint and calibration changes on all affected Contract Documents and turn over to the Owner.

E. Provide verification of system assembly, power, ground, and I/O tests.

F. Verify existence and measure adequacy of all grounds required for instrumentation and controls.

END OF SECTION

Loop Check-out Sheet

Project Name:	Owner's Project No. (if applicable):	Page of
Project Owner:	Regulatory Agency Project No. (if applicable):	
HDR Project No.:	Date:	

LEAK AND TERMINATION/CONTINUITY CHECKS

DESCRIPTION	FIELD					CONTROL CAB	
	LEAK CHECK(1)			TERM/CONT CHECK(2)		TERM/CONT CHECK(2)	
	Device Tag No.	Process Conn.	Signal Tube	Device Tag No.	Termination Ident.	Device Tag No.	Termination Ident.

1. Leak check for pneumatic signal tubing to be per ISA-PR7.1.
2. Termination/continuity check includes check at terminated equipment for: (a) correct polarity, (b) appropriate signal generation, transmission and reception, and (c) correct shield & ground terminations.

OPERATOR INTERFACE CHECK-OUT

MONITORING POINTS OBSERVED

PARAMETER TYPE	TAG NO.	TAG NO.	TAG NO.	TAG NO.	TAG NO.	TAG NO.
PROCESS VAR						
EQUIP STATUS						
ALARM POINT						

OPERATOR CONTROL FUNCTIONS CHECKED

FUNCTION TYPE	TAG NO.	LOCATION	TAG NO.	LOCATION	TAG NO.	LOCATION

AS LEFT SETTINGS

TAG NO.	SWITCH & ALARM SP	CONTROLLERS			
		Gain	Reset, rpm	Deriv. (rate), min	PV Set Point

Describe all interlocks checked, equipment started/stopped, valves/operators stroked. Describe modes of operation checked, and location of operator interface (local/remote).

I certify that the control loop referenced on this page has been completely checked and functions in accordance with applicable drawings and specifications.

Certified by:_____ Date:_____
(Work Performed By)

Loop Check-out Sheet

Project Name:	BIG PROJECT	Owner's Project No. (if applicable):	Page 1 of 2
Project Owner:	ABC Company	Regulatory Agency Project No. (if applicable):	
HDR Project No.:	10050-211-134	Date: 12/19/98	
Control Loop No.	107		

LEAK AND TERMINATION/CONTINUITY CHECKS

DESCRIPTION	FIELD					CONTROL CAB	
	LEAK CHECK(1)			TERM/CONT CHECK(2)		TERM/CONT CHECK(2)	
	Device Tag No.	Process Conn.	Signal Tube	Device Tag No.	Termination Ident.	Device Tag No.	Termination Ident.
P201 Start Sig				VFD-107	21, 22	PLC Cab	103, 104
P201, Speed inp				VFD-107	27, 28	PLC Cab	67, 68, 69
P201 Start out				VFD-107	31, 32	PLC Cab	72, 73, 74
Press transmit	PIT-107	JS	--	PIT-107	+ / -	PLC Cab	98, 99, 100

1. Leak check for pneumatic signal tubing to be per ISA-PR7.1.
2. Termination/continuity check includes check at terminated equipment for: (a) correct polarity, (b) appropriate signal generation, transmission and reception, and (c) correct shield & ground terminations.

OPERATOR INTERFACE CHECK-OUT

MONITORING POINTS OBSERVED

PARAMETER TYPE	TAG NO.	TAG NO.	TAG NO.	TAG NO.	TAG NO.	TAG NO.
PROCESS VAR	PI-107A	SI-107				
EQUIP STATUS	P201 ON	P201 OFF	V-107 open	V-107 close		
ALARM POINT	PAH-107					

OPERATOR CONTROL FUNCTIONS CHECKED

FUNCTION TYPE	TAG NO.	LOCATION	TAG NO.	LOCATION	TAG NO.	LOCATION
H-O-A sel sw	HS-107A	VFD-107				
L-O-R sel sw	HS-107B	@ P201				
S/S switch	HS-107C	MCC	HS-107D	MCC		

AS LEFT SETTINGS

TAG NO.	SWITCH & ALARM SP	CONTROLLERS			
		Gain	Reset, rpm	Deriv. (rate), min	PV Set Point
PAH-107	120 psi				
SC-107		2.0	5.0	0.2	80 psi

Describe all interlocks checked, equipment started/stopped, valves/operators stroked. Describe modes of operation checked, and location of operator interface (local/remote).

(1) HS-107B in Local: (a) start/stop operation via HS-107A and HS-107C, D (b) Manual/auto operation via HS-107A. In auto, pump stopped on hi press, started on lo press. (2) HS-107B in Remote: Observed operation from PLC-pump stopped on hi press, started on lo press. (3) Observed V-107 open/close automatically in accord with pump run condition. (4) Observed all indications and terminations shown above. (5) Tuned SC-107

I certify that the control loop referenced on this page has been completely checked and functions in accordance with applicable drawings and specifications.

Certified by: Joe Smith (Work Performed By) Date: 12/19/98

Loop Check-out Sheet

Project Name:	BIG PROJECT	Owner's Project No. (if applicable):	Page 2 of 2
Project Owner:	ABC Company	Regulatory Agency Project No. (if applicable):	
HDR Project No.:	10050-211-134	Date: 12/19/98	
Control Loop No.	107		

LEAK AND TERMINATION/CONTINUITY CHECKS

DESCRIPTION	FIELD					CONTROL CAB	
	LEAK CHECK(1)			TERM/CONT CHECK(2)		TERM/CONT CHECK(2)	
	Device Tag No.	Process Conn.	Signal Tube	Device Tag No.	Termination Ident.	Device Tag No.	Termination Ident.
V-107 open ZS				ZSO-107	+ / -	PLC Cab	112, 113
V-107 close ZS				ZSC-107	+ / -	PLC Cab	114, 115

1. Leak check for pneumatic signal tubing to be per ISA-PR7.1.
2. Termination/continuity check includes check at terminated equipment for: (a) correct polarity, (b) appropriate signal generation, transmission and reception, and (c) correct shield & ground terminations.

OPERATOR INTERFACE CHECK-OUT

MONITORING POINTS OBSERVED

PARAMETER TYPE	TAG NO.	TAG NO.	TAG NO.	TAG NO.	TAG NO.	TAG NO.
PROCESS VAR						
EQUIP STATUS	ZOI-107	ZCI-107				
ALARM POINT						

OPERATOR CONTROL FUNCTIONS CHECKED

FUNCTION TYPE	TAG NO.	LOCATION	TAG NO.	LOCATION	TAG NO.	LOCATION

AS LEFT SETTINGS

TAG NO.	SWITCH & ALARM SP	CONTROLLERS			
		Gain	Reset, rpm	Deriv. (rate), min	PV Set Point

Describe all interlocks checked, equipment started/stopped, valves/operators stroked. Describe modes of operation checked, and location of operator interface (local/remote).

Checked terminations and verified indications shown above.

I certify that the control loop referenced on this page has been completely checked and functions in accordance with applicable drawings and specifications.

Certified by: Joe Smith (Work Performed By) Date: 12/19/98

Instrument Certification Sheet

Project Name:	Owner's Project No. (if applicable):
Project Owner:	Regulatory Agency Project No. (if applicable):
HDR Project No.	Date:
Control Loop No.:	
Instrument Tag No.	Transmitter/gauge span:
Manufacturer:	Switch set-point:
Model No.	Switch dead band:
Serial No.	Switch range:

TRANSMITTERS AND INDICATORS

	INCREASING INPUT			DECREASING INPUT		
% OF SPAN	**INPUT**	**OUTPUT**	**ERROR (% of span)**	**INPUT**	**OUTPUT**	**ERROR (% of span)**
0%						
25%						
50%						
75%						
100%						
Other (if applicable)						
Other (if applicable)						

SWITCHES

	INCREASING INPUT			DECREASING INPUT		
ACTUATION POINT	**INPUT**	**OUTPUT**	**ERROR (% of range)**	**INPUT**	**OUTPUT**	**ERROR (% of range)**
High (Increasing input)						
Low (Decreasing input)						

Maximum allowable error (per Contract Documents): _____

Remarks: _____

CALIBRATION EQUIPMENT UTILIZED

DEVICE TYPE	MFR/MODEL NO.	ACCURACY	NIST TRACEABILITY?

Certified by: _____ Date Certified: _____

Instrument Certification Sheet

Project Name:	BIG PROJECT	Owner's Project No. (if applicable):	
Project Owner:	ABC Company	Regulatory Agency Project No. (if applicable):	
HDR Project No.	10050-211-134	Date: 12/19/98	
Control Loop No.:	222		
Instrument Tag No.	TSH-222	Transmitter/gauge span:	
Manufacturer:	ACE, Inc.	Switch set-point:	50 F
Model No.	TL-2983-SH5	Switch dead band:	5 F
Serial No.	10293583	Switch range:	32-200 F

TRANSMITTERS AND INDICATORS

	INCREASING INPUT			DECREASING INPUT		
% OF SPAN	**INPUT**	**OUTPUT**	**ERROR (% of span)**	**INPUT**	**OUTPUT**	**ERROR (% of span)**
0%						
25%						
50%						
75%						
100%						
Other (if applicable)						
Other (if applicable)						

SWITCHES

	INCREASING INPUT			DECREASING INPUT		
ACTUATION POINT	**INPUT**	**OUTPUT**	**ERROR (% of range)**	**INPUT**	**OUTPUT**	**ERROR (% of range)**
High (Increasing input)	49.8 F	Contact Close	0.1%	45.1 F	Contact Open	0.2%
Low (Decreasing input)						

Maximum allowable error (per Contract Documents): 1.0% Switch Range

Remarks:

CALIBRATION EQUIPMENT UTILIZED

DEVICE TYPE	MFR/MODEL NO.	ACCURACY	NIST TRACEABILITY?
Temperature (dry block) calibrator	Hart Scientific XL5897T	0.1 F	Yes

Certified by: Joe Smith Date Certified: 12/19/98

Instrument Certification Sheet

Project Name:	BIG PROJECT	Owner's Project No. (if applicable):	
Project Owner:	ABC Company	Regulatory Agency Project No. (if applicable):	
HDR Project No.	10050-211-134	Date:	12/19/98
Control Loop No.:	106		
Instrument Tag No.	PIT-106A	Transmitter/gauge span:	0-200 psi
Manufacturer:	ACE, Inc.	Switch set-point:	
Model No.	1275-X	Switch dead band:	
Serial No.	3049569TSH	Switch range:	

TRANSMITTERS AND INDICATORS

	INCREASING INPUT			DECREASING INPUT		
% OF SPAN	**INPUT**	**OUTPUT**	**ERROR (% of span)**	**INPUT**	**OUTPUT**	**ERROR (% of span)**
0%	0.00 psi	4.02 mA	0.13	0.00 psi	4.00 mA	0.00
25%	50.00 psi	8.00 mA	0.00	50.00 psi	8.01 mA	0.06
50%	100.00 psi	12.01 mA	0.06	100.00 psi	12.00 mA	0.00
75%	150.00 psi	16.00 mA	0.00	150.00 psi	16.01 mA	0.06
100%	200.00 psi	20.00 mA	0.00	200.00 psi	19.99 mA	0.06
Other (if applicable)						
Other (if applicable)						

SWITCHES

	INCREASING INPUT			DECREASING INPUT		
ACTUATION POINT	**INPUT**	**OUTPUT**	**ERROR (% of range)**	**INPUT**	**OUTPUT**	**ERROR (% of range)**
High (Increasing input)						
Low (Decreasing input)						

Maximum allowable error (per Contract Documents): 0.15% span

Remarks: Adjusted zero-otherwise no adjustments required

CALIBRATION EQUIPMENT UTILIZED

DEVICE TYPE	MFR/MODEL NO.	ACCURACY	NIST TRACEABILITY?
Pressure calibrator	Hathaway/Beta XL5946P	0.025% full scale	Yes
Pressure module	Hathaway/Beta XL5948P-6:0-150 psi	0.025% full scale	Yes

Certified by: Joe Smith Date Certified: 12/19/98

Final Control Element Certification Sheet

Project Name:	Owner's Project No. (if applicable):
Project Owner:	Regulatory Agency Project No. (if applicable):
HDR Project No.	Date:
Control Loop No.:	

Tag No.	
Description:	
Manufacturer:	
Model No.	
Serial No.	

Actuator:	Pneumatic: _____ Electric: _____
Positioner:	Direct: _____ Reverse: _____
Positioner:	Input: _____ Output: _____
I/P Converter:	Input: _____ Output: _____
Valve to	_____ on air failure
Valve to	_____ on power failure

I/P CONVERTER

	INCREASING INPUT			DECREASING INPUT		
% OF SPAN	**INPUT**	**OUTPUT**	**ERROR (% of span)**	**INPUT**	**OUTPUT**	**ERROR (% of span)**
0%						
25%						
50%						
75%						
100%						

Specified I/P converter accuracy: _____ % of span.

FINAL CONTROL ELEMENT

	INCREASING INPUT			DECREASING INPUT		
% OF SPAN	**INPUT**	**TRAVEL**	**ERROR (% of full travel)**	**INPUT**	**TRAVEL**	**ERROR (% of full travel)**
0%						
25%						
50%						
75%						
100%						

Remarks: _____

CALIBRATION EQUIPMENT UTILIZED

DEVICE TYPE	MFR/MODEL NO.	ACCURACY	NIST TRACEABILITY?

Certified by: _____ Date Certified: _____

Final Control Element Certification Sheet

Project Name:	BIG PROJECT	Owner's Project No. (if applicable):	
Project Owner:	ABC Company	Regulatory Agency Project No. (if applicable):	
HDR Project No.	10050-211-134	Date:	12/19/98
Control Loop No.:	056		

Tag No.	LCV-056A
Description:	Control Valve
Manufacturer:	ACE, Inc.
Model No.	XYZ-123
Serial No.	748569AP2

Actuator:	Pneumatic: X Electric:
Positioner:	Direct: X Reverse:
Positioner:	Input: 9-15 psi Output: 0-100%
I/P Converter:	Input: 4-20 mA Output: 3-15 psi
Valve to	Open on air failure
Valve to	Open on power failure

I/P CONVERTER

	INCREASING INPUT			DECREASING INPUT		
% OF SPAN	INPUT	OUTPUT	ERROR (% of span)	INPUT	OUTPUT	ERROR (% of span)
0%	4.00 mA	3.01 psi	0.08	4.00 mA	3.02 psi	0.17
25%	8.00 mA	6.04 psi	0.33	8.00 mA	6.05 psi	0.42
50%	12.00 mA	9.00 psi	0.00	12.00 mA	9.01 psi	0.08
75%	16.00 mA	11.97 psi	0.25	16.00 mA	12.03 psi	0.25
100%	20.00 mA	14.99 psi	0.08	20.00 mA	14.99 psi	0.08

Specified I/P converter accuracy: 0.50% % of span.

FINAL CONTROL ELEMENT

	INCREASING INPUT			DECREASING INPUT		
% OF SPAN	INPUT	TRAVEL	ERROR (% of full travel)	INPUT	TRAVEL	ERROR (% of full travel)
0%	9.00 psi	0%	-	9.00 psi	0%	-
25%	10.50 psi	25%	-	10.50 psi	25%	-
50%	12.00 psi	50%	-	12.00 psi	50%	-
75%	13.50 psi	75%	-	13.50 psi	75%	-
100%	15.00 psi	100%	-	15.00 psi	100%	-

Remarks: LCV-056A is not furnished with position transmitter, so travel checks were visual.

CALIBRATION EQUIPMENT UTILIZED

DEVICE TYPE	MFR/MODEL NO.	ACCURACY	NIST TRACEABILITY?
Multi-fct calibrator	Fluke-XL743B	0.01% Rdg + 0.015% FS	Yes
Pressure Module	Fluke-XL700POS (0-30")	0.05% FS	Yes

Certified by: Joe Smith Date Certified: 12/19/98

SECTION 13441
CONTROL LOOP DESCRIPTIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Instrumentation control loops.

1.2 QUALITY ASSURANCE

A. See Specification Section 13440.

1.3 SYSTEM DESCRIPTION

A. The control loop descriptions provide the functional requirements of the control loops represented in the Contract Documents.

B. The control loop descriptions are not intended to be an inclusive listing of all elements and appurtenances required to execute loop functions, but are rather intended to supplement and complement the Drawings and other Specification Sections.
   1. The control loop descriptions shall not be considered equal to a bill of materials.

C. Provide instrumentation hardware and software as necessary to perform control functions specified herein and shown on Drawings.

1.4 SUBMITTALS

A. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.

B. See Specification Section 13440.

C. Operation and Maintenance Manuals:
   1. See Specification Section 01342 for requirements for:
      a. The mechanics and administration of the submittal process.
      b. The content of Operation and Maintenance Manuals.

D. Control Strategy for Record Documents:
   1. Obtain this Specification Section 13441 in electronic format (Microsoft Word) from Engineer at beginning of Project.
   2. Revise and update the file monthly during construction and start-up to reflect all changes that occur due to specific equipment and systems supplied on the Project.
      a. Show all revisions in 'track change' mode.
      b. Change Specification Section Title to read "Control Loop Descriptions - Contractor Record Document."
      c. Reference all changes by Request for Information (RFI) number or Change Proposal Request (CPR) number.
      d. Submit revised file monthly to Engineer for review.
   3. Deliver the revised and updated file as a final control loop description Record Document in the Operation and Maintenance Manual described in Specification Section 01342.
   4. Provide both paper copy and electronic copy (on CD-ROM) of the Record Document control loop descriptions in the Operation and Maintenance Manual described in Specification Section 01340.

PART 2 - PRODUCTS - (NOT APPLICABLE TO THIS SPECIFICATION SECTION)

PART 3 - EXECUTION

3.1 CONTROL LOOPS

A. Lift Pumps 1 and 2.
   1. General:
      a. Either pump can be run in manual.
      b. If a pump is called to run in auto and fails to start in a preset time the other pump shall be started and an alarm generated.
   2. Automatic:
      a. The lead pump can be selected.
      b. When the level reaches the lead pump start level the lead pump shall start.
      c. When the level reaches the stop level the lead pump shall stop.
      d. If, when lead pump is running, the level rises to the lag pump start level both pumps shall run.
      e. If level drops to the stop level both pumps shall stop.
      f. If level rises to high alarm level an alarm shall be generated.
   3. If level rises to high float switch, no matter which position switches are in both pumps shall be started and shall run until level reaches the stop level. An alarm shall be generated.
   4. Alarms:
      a. Pump not started when called.
      b. High wetwell level.
      c. High-High wetwell level (float switch).
      d. Intrusion.
      e. Pump motor high temperature (also stops pump).
      f. Pump seal leakage.

END OF SECTION

SECTION 13442
PRIMARY METERS AND TRANSMITTERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Level components.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. American Iron and Steel Institute (AISI).
   2. American National Standards Institute (ANSI).
   3. American Society of Mechanical Engineers (ASME):
      a. B16.5, Pipe Flanges and Flanged Fittings.
      b. B31.1, Power Piping.
      c. Section II, Part A SA-182, Forged or Rolled Alloy Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service.
      d. Section II, Part A SA-479, Stainless Steel Bars and Shapes for Use in Boilers and Other Pressure Vessels.
   4. ASTM International (ASTM):
      a. A126, Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
      b. A182, Standard Specification for Forged or Rolled Alloy and Stainless Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service.
      c. A269, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
      d. A276, Standard Specification for Stainless Steel Bars and Shapes.
      e. A479, Standard Specification for Stainless Steel Bars and Shapes for Use in Boilers and Other Pressure Vessels.
      f. B16, Standard Specification for Free-Cutting Brass Rod, Bar and Shapes for Use in Screw Machines.
   5. Federal Communications Commission (FCC)
      a. 47 CFR 15, Radio Frequency Devices.
   6. Instrumentation, Systems, and Automation Society (ISA).
   7. National Electrical Manufacturers Association (NEMA):
      a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).

1.3 SYSTEM DESCRIPTION

A. The instruments specified in this Specification Section are the primary element components for the control loops.
   1. These instruments are integrated with other control system components specified under Specification Section 13440 series to produce the functional control defined in the Contract Documents.

1.4 SUBMITTALS

A. Shop Drawings:
   1. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.
   2. See Specification Section 13440.

B. Operation and Maintenance Manuals:
   1. See Specification Section 01342 for requirements for:
      a. The mechanics and administration of the submittal process.
      b. The content of Operation and Maintenance Manuals.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the manufacturers listed in the Articles describing the elements are acceptable.

2.2 LEVEL ELEMENTS

A. Float-Tilt Type Level Switches:
   1. Acceptable manufacturers:
      a. Anchor Scientific Inc.
      b. Consolidated Electric.
      c. Or approved equal.
   2. Materials:
      a. Float material: Polypropylene or Teflon coated type 316 stainless steel.
      b. Cable jacket: PVC, neoprene.
      c. Cable clamp: Polypropylene or 316 stainless steel.
   3. Design and fabrication:
      a. Sealed switch in float.
      b. Provide switch complete with flexible electrical cables, approximately 40 FT.
      c. SPDT contact rated at 4.5 amp at 120 Vac.
      d. Direct acting float switch:
         1) Switch actuates on rising level.
         2) Switch deactuates when liquid falls 1 IN below actuation level.
      e. Terminate cables in junction box.
      f. Process temperature: 100 DegF.
      g. Install floats per Drawing details.
      h. Install cable weight.
   4. Schedule:

TAG NUMBER	SERVICE	CONTACT NO/NC	MOUNTING ELEVATION
LSH-103	Raw Sewage	√	

B. Submersible Level Transmitter:
   1. Acceptable manufacturer:
      a. Druck Model PTX 1290.
   2. Materials:
      a. Wetted parts: Titanium and Teflon coated elastomeric diaphragm.
      b. Cable: Manufactures standard.
   3. Design and Fabrication:
      a. 2 wire 4-20 ma.
      b. Provide vented cable length to reach control panel, approximately 40 FT.
      c. Provide sensor termination enclosure.
      d. Intrinsically safe Class 1, Div. 1.

4. Schedule:

TAG NUMBER	SERVICE	RANGE
LT-102	Raw Sewage	0 – 20 FT

2.3 ACCESSORIES

A. Furnish all mounting brackets, hardware and appurtenances required for mounting primary elements and transmitters.
   1. Materials, unless otherwise specified, shall be as follows: 316 stainless steel.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install instrument mounting pipe stands level and plumb.

C. Keep foreign matter out of the system.

D. Instrument Mounting:
   1. Mount all instruments where they will be accessible from fixed ladders, platforms, or grade.
   2. Mount all local indicating instruments with face forward toward the normal operating area, within reading distance, and in the line of sight.
   3. Mount instruments level, plumb, and support rigidly.
   4. Mount to provide:
      a. Protection from heat, shock, and vibrations.
      b. Accessibility for maintenance.
      c. Freedom from interference with piping, conduit and equipment.

3.2 TRAINING

A. Provide on-site training in accordance with Specification Section 01650.

END OF SECTION

SECTION 13445
INDICATORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Digital panel meters.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. National Electrical Manufacturers Association (NEMA).

B. Miscellaneous:
   1. Ensure units comply with electrical area classifications and NEMA enclosure type shown on Drawings.

1.3 SUBMITTALS

A. Shop Drawings:
   1. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.
   2. See Specification Section 13440.
   3. Product technical data including:
      a. Acknowledgement that products submitted meet requirements of standards referenced.
      b. Manufacturer's installation instructions.

B. Operation and Maintenance Manuals:
   1. See Specification Section 01342 for requirements for:
      a. The mechanics and administration of the submittal process.
      b. The content of Operation and Maintenance Manuals.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the manufacturers listed in the paragraphs describing the devices are acceptable.

2.2 INDICATORS

A. Digital Panel Meters:
   1. Acceptable manufacturers:
      a. Newport.
      b. Chessell Corporation.
      c. Or approved equal.
   2. Materials:
      a. Case: Polycarbonate.
   3. Design and fabrication:
      a. Solid-state electronics.
      b. Capable of receiving signals linearly proportional to process variable indicated.
      c. Display:
         1) Minimum of two (2) updates per second of process variable indication.

2) Seven (7) segment digits which shall be:
   a) LED or vacuum fluorescent.
   b) Minimum 0.50 IN high.
3) Use of multipliers not acceptable.
4) Engineering units.

d. Accuracy: +0.1 percent of full scale. +1 count at 77 DegF.
e. Operating temperature: 32 to 140 DegF.
f. Relative humidity: 95 percent at 104 DegF (non-condensing).
g. 1/8 DIN indicating meter.
h. Splash cover.
i. 4-20 mA DC input.

4. Schedule:

TAG NUMBER	DESCRIPTION	DIGITS	SCALE
LI-102	Wetwell Level	3	Feet

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

END OF SECTION

SECTION 13446
CONTROL AUXILIARIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Signal modules.
   2. Pilot devices:
      a. Selector switches.
      b. Pushbuttons.
      c. Indicating lights.
   3. Relays/timers:
      a. Control relay.
      b. Time delay relays.
   4. Termination equipment:
      a. Terminal blocks.
      b. Fuse holders.
   5. Power supplies:
      a. DC power supplies.
   6. Running time indicator.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. The Instrumentation, Systems, and Automation Society (ISA):
      a. S18.1, Annunciator Sequences and Specifications.
   2. National Electrical Manufacturers Association (NEMA):
      a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
      b. ICS 2, Industrial Control and Systems: Controllers, Contactors, and Overload Relays Rated 600 Volts.
   3. Underwriters Laboratories, Inc. (UL).

B. Miscellaneous:
   1. Assure units comply with electrical area classifications and NEMA enclosure type shown on Drawings.

1.3 SUBMITTALS

A. Shop Drawings:
   1. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.
   2. See Specification Section 13440.

B. Operation and Maintenance Manuals:
   1. See Specification Section 01342 for requirements for:
      a. The mechanics and administration of the submittal process.
      b. The content of Operation and Maintenance Manuals.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the manufacturers listed in the applicable Articles below are acceptable.

B. Provide similar components from the same manufacturer for uniformity of appearance, operations, and maintenance.

2.2 SIGNAL MODULE

A. Acceptable Manufacturers:
   1. AGM Electronics.
   2. Moore Industries.
   3. Or approved equal.

B. Design and Fabrication:
   1. Solid state electronics.
   2. Transmit analog output signal directly proportional to measured input signal.
   3. Power source: 24 Vdc.
   4. Analog input: 4-20 mA DC.
   5. Output signal: 4-20 mA DC.
   6. Impedance:
      a. Current input: 50 ohms.
      b. Current output: 1650 ohms.
   7. Accuracy: Better than ± 0.10 percent of span.
   8. Isolation: Up to 500 V rms (input, output and case).
   9. Temperature effect: ±0.0025 percent of span per DegF.
   10. Ambient temperature range: 0-140 DegF.
   11. Factory calibrated.

2.3 PILOT DEVICES

A. Selector Switches:
   1. Acceptable manufacturers:
      a. Eaton.
      b. Allen-Bradley.
      c. Or approved equal.
   2. Design and fabrication:
      a. Heavy-duty type.
      b. Oiltight.
      c. Rotary cam units conforming to NEMA ICS 2-216.22.
      d. Mounting hole: 30.5 mm.
      e. Supply switches having number of positions required with contact blocks to fulfill functions shown and specified.
      f. UL listed.
      g. Maintained contact type.
      h. Knob type operators.
      i. Black colored operators.
      j. Designed with cam and contact block with approximate area of 2 IN SQ.
      k. Legend plate marked per Contract Documents.
      l. Contact block requirements:
         1) Dry and indoor locations: Standard contact blocks rated for 10 A continuous current.
         2) Wet or outside locations: Hermetically sealed contact blocks.

B. Pushbuttons:
   1. Acceptable manufacturers:
      a. Eaton.
      b. Allen-Bradley.
      c. Or approved equal.
   2. Materials:
      a. Backing diaphragm: Buna-N.
   3. Design and fabrication:
      a. Heavy-duty type.
      b. Oiltight.
      c. Conforming to NEMA ICS 2-216.22.
      d. Mounting hole: 30.5 mm.
      e. Diaphragm backed.
      f. UL listed.
      g. Emergency stop pushbuttons to have mushroom head operator and maintained contact.
      h. Non-illuminated type:
         1) Momentary contact with necessary contact blocks.
         2) Molded, solid color melamine buttons.
         3) Standard flush operators with full shroud.
         4) Green colored buttons for START or ON and red color for STOP or OFF.
         5) Appropriate contact blocks to fulfill functions shown or specified.
      i. Contact block requirements:
         1) Dry and indoor locations: Standard contact blocks rated for 10 A continuous current.
         2) Wet or outside locations: Hermetically sealed contact blocks.
         3) Legend plate marked per Contract Documents.
      j. Illuminating type:
         1) Momentary contact with necessary contact blocks.
         2) Serves as both pushbutton control and indicating light.
         3) Green colored lenses for start or on and red for STOP or OFF.
         4) LED full voltage light unit with lens and panel gasket.
         5) Legend plate marked per Contract Documents.
         6) Appropriate contact blocks to fulfill functions shown or specified.

C. Indicating Lights:
   1. Acceptable manufacturers:
      a. Eaton.
      b. Allen-Bradley.
      c. Or approved equal.
   2. Design and fabrication:
      a. Heavy duty type.
      b. Oiltight.
      c. Type allowing replacement of bulb without removal from control panel.
      d. LED.
      e. UL listed.
      f. 120 or 24 V lamp.
      g. Legends marked per Contract Documents.
      h. Nominal 2 IN SQ face.
      i. Mounting hole: 30.5 mm.
      j. Push-to-test indicating lights.
      k. Glass lens.
      l. Color code lights as follows:
         1) Green: ON or running.
         2) Amber: Standby; auto mode; ready.
         3) Red: OFF or stopped.
      m. Legend plate engraved for each light.

2.4 RELAYS/TIMERS

A. Control Relays:
   1. Acceptable manufacturers:
      a. Idec.
      b. Potter & Brumsfield.
      c. Allen-Bradley.
      d. Or approved equal.
   2. Design and fabrication:
      a. Plug-in general purpose relay.
      b. Blade connector type.
      c. Switching capacity: 10 A.
      d. Contact material: Silver cadmium oxide.
      e. Provide relays with a minimum of 3 SPDT contacts.
      f. Coil voltage: 120 Vac or 24 Vdc.
      g. Relay sockets are DIN rail mounted.
      h. Internal neon or LED indicator is lit when coil is energized.
      i. Clear polycarbonate dust cover with clip fastener.
      j. Check button.
      k. Temperature rise:
         1) Coil: 85 DegF max.
         2) Contact: 65 DegF max.
      l. Insulation resistance: 100 Meg min.
      m. Frequency response: 1800 operations/hour.
      n. Operating temperature: -20 to +150 DegF.
      o. Life expectancy:
         1) Electrical: 500,000 operations or more.
         2) Mechanical: 50,000,000 operations or more.
      p. UL listed or recognized.

B. Time Delay Relays:
   1. Acceptable manufacturers:
      a. Eagle Signal Controls.
      b. Idec.
      c. Or approved equal.
   2. Design and fabrication:
      a. Melt design test and performance requirements of NEMA ICS 2-218.
      b. Heavy-duty.
      c. Solid-state construction.
      d. External adjusting dial.
      e. Auxiliary relays as required to perform functions specified or shown on Drawings.
      f. Operates on 117 Vac (±10 percent) power source.
      g. Contact rating: A150 per NEMA ICS 2-125.
      h. Furnish with "on" and "timing out" indicators.

2.5 TERMINATION EQUIPMENT

A. Terminal Blocks:
   1. Acceptable manufacturers:
      a. Phoenix Contact.
      b. Allen-Bradley.
      c. Or approved equal.
   2. Design and fabrication:
      a. Modular type with screw compression clamp.
      b. Screws: Stainless steel.
      c. Current bar: Nickel-plated copper allow.
      d. Thermoplastic insulation rated for -40 to +90 DegC.

e. Wire insertion area: Funnel-shaped to guide all conductor strands into terminal.
f. Install end sections and end stops at each end of terminal strip.
g. Install machine-printed terminal markers on both sides of block.
h. Spacing: 6 mm.
i. Wire size: 22-12 AWG.
j. Rated voltage: 600 V.
k. Din rail mounting.
l. UL listed.

3. Standard-type block:
   a. Rated current: 30 A.
   b. Color: Gray body.
4. Bladed-type block:
   a. Terminal block with knife blade disconnect which connects or isolated the two (2) sides of the block.
   b. Rated current: 10 A.
   c. Color:
      1) Panel control voltage leaves enclosure - normal: Gray body, orange switch.
      2) Foreign voltage entering enclosure: Orange body, orange switch.
5. Grounded-type block:
   a. Electrically grounded to mounting rail.
   b. Use to terminal ground wires and analog cable shields.
   c. Color: Green and yellow body.

B. Fuse Holders:
1. Acceptable manufacturers:
   a. Phoenix Contact.
   b. Allen-Bradley.
   c. Or approved equal.
2. Design and fabrication:
   a. Modular-type with screw compression clamp.
   b. Screws: Stainless steel.
   c. Current bar: Nickel-plated copper alloy.
   d. Thermoplastic insulation rated for -40 to +105 DegC.
   e. Wire insertion area: Funnel-shaped to guide all conductor strands into terminal.
   f. Blocks can be ganged for multi-pole operation.
   g. Install end sections and end stops at each end of terminal strip.
   h. Install machine-printed terminal markers on both sides of block.
   i. Spacing: 9.1 mm.
   j. Wire size: 30-12 AWG.
   k. Rated voltage: 300 V.
   l. Rated current: 12 A.
   m. Fuse size: 1/4 x 1-1/4.
   n. Blown fuse indication.
   o. DIN rail mounting.
   p. UL listed.

2.6 POWER SUPPLIES

A. DC Power Supplies:
1. Acceptable manufacturers:
   a. Phoenix Contact.
   b. Rockwell Automation.
   c. Or approved equal.
2. Design and fabrication:
   a. Converts 120 Vac input to DC power at required voltage.
   b. DIN rail mount with enclosure (i.e., not open frame).
   c. Switching type.

d. AC input: 120 Vac +/-15 percent, nominal 60 Hz.
e. Efficiency: Minimum 86 percent.
f. Rated mean time between failure (MTBF): 500,000 HRS.
g. Voltage regulation:
   1) Static: Less than 1.0 percent V_{out}.
   2) Dynamic: +/-2 percent V_{out} overall.
h. Output ripple/noise: Less than 100 mV peak to peak (20 MHz).
i. Overload, short circuit and open circuit protection.
j. Temperature rating: 0 to 60 DegC full rated, derated linearly to 50 percent at 70 DegC.
k. Humidity rating: Up to 90 percent, non-condensing.
l. LED status indication for DC power.

2.7 RUNNING TIME INDICATORS

A. Acceptable Manufacturer:
   1. Eagle Signal Controls.
   2. Cramer.
   3. Or approved equal.

B. Design and Fabrication:
   1. Six-digit wheels including a 1/10 digit.
   2. Non-reset type.
   3. Time range in hours.
   4. Automatic recycle at zero.
   5. Accuracy: 1 percent.
   6. Sealed against dirt and moisture.
   7. Tamperproof.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Mount signal modules, relays and timers on separate subpanel in control panel.

END OF SECTION

SECTION 13448
CONTROL PANELS AND ENCLOSURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Requirements for control panels and enclosures utilized as follows:
      a. Unless noted otherwise, all control panels and enclosures housing control components that are specified in Specification Section 13442, Specification Section 13446, Specification Section 13447, Specification Section 13449 or Specification Section 13500.

B. This Specification Section is only applicable to panels furnished with Division 11 equipment packages when so stated in the applicable Division 11 Specification Section.

C. This Section is only applicable to panels housing Division 16 specified equipment (e.g., motor starters, lighting controls, etc.) when so stated in the applicable Division 16 Specification Section.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. American National Standards Institute (ANSI).
   2. ASTM International (ASTM):
      a. B75, Standard Specification for Seamless Copper Tube.
   3. National Electrical Manufacturers Association (NEMA):
      a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
      b. ICS 4, Industrial Control and Systems: Terminal Blocks.
   4. National Fire Protection Association (NFPA):
      a. 70, National Electrical Code (NEC):
         1) Article 409, Industrial Control Panels.
   5. Underwriters Laboratories, Inc. (UL):
      a. 508A, Standard for Safety Industrial Control Panels.

B. Miscellaneous:
   1. Approved supplier of Industrial Control Panels under provisions of UL 508A.
      a. Entire assembly shall be affixed with a UL 508A label "Listed Enclosed Industrial Control Panel" prior to shipment to the jobsite.
      b. Control panel(s) without an affixed UL 508A label shall be rejected and sent back to the Contractor’s factory.

1.3 DEFINITIONS

A. The term "panel" refers to control panels or enclosures listed in the schedule included in this Specification Section.

B. Foreign Voltages: Voltages that may be present in circuits when the panel main power is disconnected.

C. Intrinsically Safe:
   1. A device, instrument or component that will not produce sparks or thermal effects under normal or abnormal conditions that will ignite a specified gas mixture.
   2. Designed such that electrical and thermal energy limits inherently are at levels incapable of causing ignition.

D. Cable: Multi-conductor, insulated, with outer sheath containing either building wire or instrumentation wire.

E. Instrumentation Cable:
   1. Multiple conductor, insulated, twisted or untwisted, with outer sheath.
   2. Instrumentation cable is typically either TSP (twisted-shielded pair) or TST (twisted-shielded triad), and is used for the transmission of low current or low voltage signals.

F. Ground Fault Circuit Interrupter (GFCI): A type of device (e.g., circuit breaker or receptacle) which detects an abnormal current flow to ground and opens the circuit preventing a hazardous situation.

G. Programmable Logic Controller (PLC): A specialized industrial computer using programmed, custom instructions to provide automated monitoring and control functions by interfacing software control strategies to input/output devices.

H. Remote Terminal Unit (RTU): An industrial data collection device designed for location at a remote site, that communicates data to a host system by using telemetry such as radio, dial-up telephone, or leased lines.

I. Input/Output (I/O): Hardware for the moving of control signals into and/or out of a PLC or RTU.

J. Supervisory Control and Data Acquisition (SCADA): Used in process control applications, where programmable logic controllers (PLCs) perform control functions but are monitored and supervised by computer workstations.

K. Digital Signal Cable: Used for the transmission of digital communication signals between computers, PLCs, RTUs, etc.

L. Uninterruptible Power Supply (UPS): A backup power unit that provides continuous power when the normal power supply is interrupted.

M. Loop Calibrator: Portable testing and measurement tool capable of accurately generating and measuring 4-20ma DC analog signals.

1.4 SUBMITTALS

A. Shop Drawings:
   1. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.
   2. See Specification Section 13440.
   3. Prepared with computer aided design (CAD) software.
   4. Printed on 11 by 17 IN sheets.
   5. Drawings shall include a title block containing the following:
      a. Plant or facility name where panel(s) are to be installed.
      b. Drawing title.
      c. Drawing number.
      d. Revision list with revision number and date
      e. Drawing date.
      f. Drawing scale.
      g. Manufacturer name, address, and telephone number.
   6. Cover sheet for each drawing set shall indicate the following:
      a. Plant or facility name.
      b. Project name.
      c. Submittal description.
      d. Revision number.
      e. Issue date.
   7. Table of contents sheet(s) shall indicate the following for each drawing in the set:
      a. Drawing number.
      b. Drawing title.

c. Sheet number.

8. Legend and abbreviation sheet shall indicate the following:
   a. Description of symbols and abbreviations used.
   b. Panel construction notes including enclosure NEMA rating, finish type and color, wire type, wire color strategy, conductor sizes, and wire labeling strategy.
   c. Confirmation that the panel(s) are to be affixed with a UL 508A label prior to shipment from the factory.
9. Bill of Material for each panel shall include the following component information:
   a. Instrument tag number.
   b. Quantity.
   c. Functional name or description.
   d. Manufacturer.
   e. Complete model number.
   f. Size or rating.
10. Panel exterior layout drawings to scale and shall indicate the following:
   a. Panel materials of construction, dimensions, and total assembled weight.
   b. Panel access openings.
   c. Conduit access locations.
   d. Front panel device layout.
   e. Nameplate schedule:
      1) Nameplate location.
      2) Legend which indicates text, letter height and color, and background color.
   f. Alarm annunciator window engraving schedule.
   g. Layouts of graphic panels or mosaic displays.
11. Panel interior layout drawings shall be drawn to scale and shall indicate the following:
   a. Sub-panel or mounting pan dimensions.
   b. Interior device layouts.
   c. PLC/RTU general arrangement layouts.
   d. Wire-way locations, purpose, and dimensions.
   e. Terminal strip designations.
   f. Location of external wiring and/or piping connections.
   g. Location of lighting fixtures, switches and receptacles.
12. Wiring diagrams shall consist of the following:
   a. Panel power distribution diagrams.
   b. Control and instrumentation wiring diagrams.
   c. PLC/RTU I/O information:
      1) Model number of I/O module.
      2) Description of I/O module type and function.
      3) Rack and slot number.
      4) Terminal number on module.
      5) Point or channel number.
      6) Programmed point addresses.
      7) Signal function and type.
   d. Wiring diagrams shall identify each wire as it is to be labeled.

B. Manufacturer catalog cut sheets for enclosure, finish, panel devices, control auxiliaries, and accessories.

C. Electrical load calculations for each panel:
   1. Total connected load.
   2. Peak electrical demand for each panel.

D. Climate control calculations for each panel.
   1. Verify that sufficient dissipation and/or generation of heat is provided to maintain interior panel temperatures within the rated operating temperatures of panel components.

E. Operation and Maintenance Manuals:
   1. See Specification Section 01342 for requirements for:
      a. The mechanics and administration of the submittal process.
      b. The content of Operation and Maintenance Manuals.
   2. See Specification Section 13440.

F. Informational Submittals:
   1. Record Drawings:
      a. Updated panel drawings delivered with the panel(s) from the Contractor's factory.
      b. Drawings shall be enclosed in transparent plastic and firmly secured within each panel.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
   1. Enclosures:
      a. Hoffman Engineering Co.
      b. Rittal.
      c. Hammond Manufacturing.
      d. Millbank Mfg. Co.
      e. Or approved equal.
   2. Panel heaters:
      a. Hoffman Enclosures, Inc.
      b. Rittal.
      c. Hammond Manufacturing.
      d. Or approved equal.
   3. Cooling fans and exhaust packages:
      a. Hoffman Enclosures, Inc.
      b. Rittal.
      c. Or approved equal.
   4. Internal corrosion inhibitors:
      a. Hoffman Enclosures, Inc.; Model A-HCI.
      b. Northern Technologies International Corporation (NTIC); Model Zerust VC.
      c. Cortec Corporation; Model VpCl Emitting Systems.
      d. Or approved equal.

2.2 ACCESSORIES

A. Panel Nameplates and Identification:
   1. See Section 10400.

2.3 FABRICATION

A. General:
   1. Fabricate panels with instrument arrangements and dimensions identified in the Contract Documents.
   2. Provide panel(s) with the required enclosure rating per NEMA 250 to meet classifications identified in the Contract Documents.
   3. Panel(s) shall be completely assembled at the Contractor's factory.
      a. No fabrication other than correction of minor defects or minor transit damage shall be performed on panels at the jobsite.
   4. Painting:
      a. Panels fabricated from steel shall have their internal and external surfaces prepared, cleaned, primed, and painted.

1) Mechanically abrade all surfaces to remove rust, scale, and surface imperfections.
2) Provide final surface treatment with 120 grit abrasives or finer, followed by spot putty to fill all voids.
3) Utilize solvent or chemical methods to clean panel surfaces.
4) Apply surface conversion of zinc phosphate prior to painting to improve paint adhesion and to increase corrosion resistance.
5) Electrostatically apply polyester urethane powder coating to all inside and outside surfaces.
6) Bake powder coating at high temperatures to bond coating to enclosure surface.
   a) Panel interior shall be white with semi-gloss finish.
   b) Panel exterior shall be ANSI #61 gray with flat finish.
7) Application of alkyd liquid enamel coating shall be allowed in lieu of polyester urethane powder for wall mounted NEMA 1 or NEMA 12 rated panels.

b. Panels fabricated from stainless steel, aluminum, or fiberglass shall not be painted.

5. Finish opening edges of panel cutouts to smooth and true surface conditions.
   a. Panels fabricated from steel shall have the opening edges finished with the panel exterior paint.
6. Panel shall meet all requirements of UL 508A.
   a. If more than one (1) disconnect switch is required to disconnect all power within a panel or enclosure, provide a cautionary marking with the word "CAUTION" and the following or equivalent, "Risk of Electric Shock-More than one (1) disconnect switch required to de-energize the equipment before servicing."
7. Provide control panel in accordance with NFPA 70, Article 409.
   a. In the event of any conflict between NFPA 70, Article 409 and UL 508A, the more stringent requirement shall apply.

B. Free-Standing Panels:
1. Welded construction.
2. Completely enclosed, self-supporting, and gasketed dusttight.
3. Rolled lip around all sides of enclosure door opening.
4. Seams and corners welded and ground smooth to touch and smooth in visual appearance.
5. Full height, fully gasketed flush pan doors.
6. Full length piano hinges rated for 1.5 times door plus instrument weight.
7. Doors with door closure clamps and padlock hasp.
8. Appropriate conduit, wiring, and instrument openings shall be provided.
9. Lifting eyebolts to allow simple, safe rigging and lifting of panel during installation.

C. Wall Mounted Panels:
1. Seams continuously welded and ground smooth.
2. Rolled lip around all sides of enclosure door opening.
3. Gasketed dust tight.
4. Door clamps and padlock hasp
5. Continuous heavy GA hinge pin on doors.
   a. Hinges rated for 1.5 times door plus instrument weight.
6. Front full opening door.
7. Brackets for wall mounting.

D. Internal Panel Wiring:
1. Panel wire duct shall be installed between each row of components, and adjacent to each terminal strip.
   a. Route wiring within the panel in wire-duct neatly tied and bundled with tie wraps.
   b. Follow wire-duct manufacturer's recommended fill limits.
   c. Wire-duct shall have removable snap-on covers and perforated walls for easy wire entrance.
   d. Wire-duct shall be constructed of nonmetallic materials with rating in excess of the maximum voltage carried therein.

2. Wiring shall be installed such that if wires are removed from one (1) device, source of power will not be disrupted to other devices.
3. Splicing and tapping of wires permitted only at terminal blocks.
4. Wire bunches to doors shall be secured at each end so that bending or twisting will be around longitudinal axis of wire.
    a. Protect bend area with sleeve.
5. Arrange wiring neatly, cut to proper length, with surplus wire removed.
    a. Arrange wiring with sufficient clearance.
    b. Provide abrasion protection for wire bundles that pass through openings or across edges of sheet metal.
6. AC circuits shall be routed separate from analog signal cables and digital signal cables.
    a. Separate by at least 6 IN, except at unavoidable crossover points and at device terminations.
7. Provide at least 6 IN of separation between intrinsically safe devices and circuits and non-intrinsically safe devices and circuits.
8. Wiring to pilot devices or rotary switches shall be individually bundled and installed with a "flexible loop" of sufficient length to permit the component to be removed from panel for maintenance without removing terminations.
9. Conductors for AC and DC circuits shall be type MTW stranded copper listed for operation with 600 V at 90 DegC.
    a. Conductor size shall be as required for load and 16 AWG minimum.
    b. Internal panel wiring color code:
        1) AC circuits:
            a) Power wiring: Black.
            b) Control interconnections: Yellow.
            c) Neutral: White.
            d) Ground: Green.
        2) Low voltage DC circuits:
            a) Power wiring: Blue.
            b) Control interconnections: Violet.
        3) Foreign voltage circuits: Pink.
        4) Annunciator circuits: Red.
        5) Intrinsically safe circuits: Orange.
10. Analog signal cables shall be of 600 V insulation, stranded copper, twisted-shielded pairs.
    a. Conductor size: 18 AWG minimum.
    b. Terminate shield drain conductors to ground only at one (1) end of the cable.
11. High precision 250 ohm resistors with 0.25 percent accuracy shall be used where 4-20 mA DC analog signals are converted to 1-5 Vdc signals.
    a. Resistors located at terminal strips.
    b. Resistors terminated using individual terminal blocks and with no other conductors.
    c. Resistor leads shall be un-insulated and of sufficient length to allow test or calibration equipment (e.g., HART communicator, loop calibrator) to be properly attached to the circuit with clamped test leads.
12. Analog signals for devices in separate enclosures shall not be wired in series.
    a. Loop isolators shall be used where analog signals are transmitted between control enclosures.
13. Wire and cable identification:
    a. Wire and cables numbered and tagged at each termination.
    b. Wire tags:
        1) Slip-on, PVC wire sleeves with legible, machine-printed markings.
        2) Adhesive, snap-on, or adhesive type labels are not acceptable.
    c. Markings as identified in the Shop Drawings.

E. Grounding Requirements:
1. Equipment grounding conductors shall be separated from incoming power conductors at the point of entry.

2. Minimize grounding conductor length within the enclosure by locating the ground reference point as close as practical to the incoming power point of entry.
3. Bond electrical racks, chassis and machine elements to a central ground bus.
    a. Nonconductive materials, such as paint, shall be removed from the area where the equipment contacts the enclosure.
4. Bond the enclosure to the ground bus.
    a. It is imperative that good electrical connections are made at the point of contact between the ground bus and enclosure.
5. Panel-mounted devices shall be bonded to the panel enclosure or the panel grounding system by means of locknuts or pressure mounting methods.
6. Sub-panels and doors shall be bonded to ground.

F. Termination Requirements:
1. Wiring to circuits external to the panel connected to interposing terminal blocks.
2. Terminal blocks rigidly mounted on DIN rail mounting channels.
3. Terminal strips located to provide adequate space for entrance and termination of the field conductors.
4. One (1) side of each strip of terminal blocks reserved exclusively for the termination of field conductors.
5. Terminal block markings:
    a. Marking shall be the same as associated wire marking.
    b. Legible, machine-printed markings.
    c. Markings as identified in the shop drawings.
6. Terminal block mechanical characteristics, and electrical characteristics shall be in accordance with NEMA ICS 4.
7. Terminal blocks with continuous marking strips.
    a. Each terminal block shall be identified with machine printed labels.
8. Terminals shall facilitate wire sizes as follows:
    a. 120 Vac applications: Conductor size 12 AWG minimum.
    b. Other: Conductor size 14 AWG minimum..
9. Analog signal cable shield drain conductors shall be individually terminated.
10. Install minimum of 20 percent spare terminals.
11. Bladed, knife switch, isolating type terminal blocks where control voltages enter or leave the panel.
12. Fused terminal blocks shall be used in the following circuits:
    a. Control voltage is used to energize a solenoid valve.
    b. DC power is connected to 2-wire, loop-powered instruments.
13. Fused terminal blocks shall be provided with blown fuse indicators.
14. When control circuits require more than one (1) field conductor connected to a single wiring point, a sufficient number of terminal points shall be connected internally to allow termination of only one (1) field conductor per terminal block.
15. DIN rail mounting channels shall be installed along full length of the terminal strip areas to facilitate future expansion.
16. Connections to devices with screw type terminals shall be made using spade-tongue, insulated, compression terminators.

G. Component Mounting and Placement:
1. Components shall be installed per manufacturer instructions.
2. Control relays and other control auxiliaries shall be mounted on DIN rail mounting channels where practical.
3. Front panel devices shall be mounted within a range of 40 to 70 IN above the finished floor, unless otherwise shown in the Contract Documents.
4. PLC/RTU and I/O rack installation:
    a. Located such that the LED indicators and switches are readily visible with the panel door open.
    b. Located such that repair and/or replacement of component can be accomplished without the need to remove wire terminations or other installed components.

5. Locate power supplies with sufficient spacing for circulation of air.
6. Where components such as magnetic starters, contactors, relays, and other electromagnetic devices are installed within the same enclosure as the PLC/RTU system components, provide a barrier of at least 6 IN of separation between the "power area containing the electromagnetic devices" and the "control area".
7. Components mounted in the panel interior shall be fastened to an interior sub-panel using machine screws.
    a. Fastening devices shall not project through the outer surface of the panel enclosure.
8. Excess mounting space of at least 20 percent for component types listed below to facilitate future expansion:
    a. Fuse holders.
    b. Circuit breakers.
    c. Control relays.
    d. Time delay relays.
    e. Intrinsically safe barriers and relays.
9. Components installed on sub-panels shall be provides with a minimum spacing between component and wire duct of 1 IN.
    a. Minimum of 2 IN separation between terminal strips and wire ducts.

H. Power Distribution:
1. Main incoming power circuits shall be protected with a thermal magnetic circuit breaker.
    a. Limit load to maximum of 80 percent of circuit breaker rating.
2. Component types listed below shall be individually fused so that they may be individually de-energized for maintenance:
    a. PLC/RTU power supply modules.
    b. Outlets.
    c. Lights.
3. Each control panel with PLC/RTU components shall be furnished with power protection in the form of a double conversion UPS.
4. Equip each panel with necessary power supplies with ratings required for installed equipment and with minimum 25 percent spare capacity.
5. Constant voltage transformers, balancing potentiometers, and rectifiers as necessary for specific instrument requirements.

I. Internal Panel Lighting and Service Receptacles:
1. Panels less than or equal to 4 FT wide:
    a. One (1) electrical GFCI duplex receptacle.
    b. One (1) compact fluorescent light fixture with manual switch(es).
2. Panels or panel faces greater than 4 FT wide:
    a. One (1) duplex electrical GFCI receptacle per 6 FT of length.
    b. Continuous fluorescent lighting strip with manual switches.

J. Environmental Controls:
1. Outdoor panels:
    a. Outdoor temperature range of 0 DegF through 120 DegF.
    b. Thermostat controlled heaters to maintain temperature approximately 10 DegF above ambient for condensation prevention inside the panels.
    c. Panel ventilation package with thermostat.
2. Environmental control components:
    a. Panel heaters:
        1) Thermostat controlled.
        2) Fan driven.
        3) Components mounted in an anodized aluminum housing.
        4) Designed for sub-panel mounting.
        5) Powered from 120 Vac and protected with a dedicated circuit breaker.
    b. Exhaust packages:
        1) Fan with louver or grill and replaceable filter.

2) Designed to be mounted within a panel cutout to provide positive airflow through the panel.
3) Cooling fan and exhaust louvers shall be designed and listed to maintain a NEMA 4 enclosure rating.
4) Fitted with replaceable, high-density foam or synthetic fiber.
5) Cooling fan controlled with a separately mounted thermostat with bi-metal sensor and adjustable dial for temperature setting.
6) Powered from 120 Vac and protected with a dedicated circuit breaker.

c. Internal corrosion inhibitors:
1) Contains chemical which vaporizes and condenses on surfaces in the enclosure.
2) Inhibitor shall be applied in accordance with manufacturer instructions for the enclosure volume.
3) Inhibitor shall be applied in the panel(s) prior to shipment from the Contractor's factory.

2.4 MAINTENANCE MATERIALS

A. Extra Materials:
1. Quantity of 10 percent replacement lamps for each type installed (minimum of 5 of each type).
2. Minimum 12 replacement filters for each type installed.
3. One (1) quart of exterior finish touch-up paint.
4. One (1) complete set of replacement corrosion inhibitors in sealed packages for each panel.

PART 3 - EXECUTION

3.1 FACTORY TESTING

A. Scope: Inspect and test entire panel assembly to verify readiness for shipment.

B. Location: Contractor's factory.

C. Factory Tests:
1. Tests shall be fully documented and signed by the Contractor's factory supervisor.
2. The panel shop shall fully test the control panel for correct wiring.
a. Each I/O point shall be checked by measuring or connecting circuits at the field terminal blocks.
3. Burn-in test: Panel(s) shall be fully energized for a minimum period of 48 HRS.
4. A PLC Central Processing Unit (CPU) shall be obtained and connected to the panel(s) if necessary for testing purposes.
5. Testing equipment (such as digital multi-meters, analog loop calibrators, and laptop computers with PLC programming software) shall be used as required for testing.
6. The following functions shall be tested as a minimum:
a. Demonstrate functions of the panel(s) required by the Contract Documents.
b. Correctness of wiring from all panel field terminals to all I/O points and to all panel components.
c. Simulate and test each discrete signal at the field terminal strips.
d. Simulate and test each analog signal using loop calibrators.
e. Correct operation of communications between PLC system Central Processing Units (CPUs) and Remote I/O bases.
f. Correct operation of single-loop controllers (including digital communication to microprocessor based devices).
g. Correct operation of all digital communication devices.
h. Demonstrate online and offline diagnostic tests and procedures.
i. The Contractor shall notify the Engineer in writing a minimum of 15 calendar days prior to the Factory Tests.
1) Engineer has the option to witness all required tests.

7. Make following documentation available to the Engineer at test site during the tests:
    a. Contract Documents.
    b. Factory Demonstration Testing procedures.
    c. List of equipment to be testing including make, model, and serial number.
    d. Shop Drawing submittal data for equipment being tested.
8. Deficiencies shall be corrected prior to shipment from the Contractor's factory.

3.2 INSTALLATION

A. Install free-standing panels on concrete pad.

B. Anchor panels in a manner to prevent the enclosure from racking, which may cause the access doors to become misaligned.

C. Obtain approved panel layouts prior to installation of conduits.

D. Install products in accordance with manufacturer's instructions.

3.3 SCHEDULE

A. Station Control Panel:
1. Components:
    a. Control panel, freestanding, NEMA 4.
    b. Manual transfer switch, NEMA 3R.
    c. Generator receptacle.
    d. Service/metering switchboard, NEMA 3R.
2. Control panel:
    a. Front door, inner swing subpanel and backboard.
    b. Front panel devices:
        1) Nameplate.
        2) Alarm light (top of panel).
    c. Metal sunshades spaced 2 IN out from cabinet and completely shading exposed top, sides and rear of panel.
    d. Inner swing subpanel:
        1) Level indicator.
        2) Pump 1 and 2 ready lights.
        3) Pump 1 and 2 running lights.
        4) Pump 1 and 2 running time meters.
        5) Pump 1 and 2 monitor relays/indicator.
        6) Pump 1 and 2 HOA switches.
        7) Pump 1 – Pump 2 Lead switch.
        8) Site light switch.
        9) Arc flash warning label.
        10) Voltage warning label.
        11) Nameplates and legend plates for devices.
    e. Back panel:
        1) Main circuit breaker for single 120/208 V, 3 phase, 4 wire feed.
        2) Pump circuit breakers and NEMA Size 1 starters.
        3) Component circuit breakers and GFCI outlet.
        4) Cabinet light and switch.
        5) Intrusion switch.
        6) Power distribution blocks.
        7) Surge protection device.
        8) Ground block/bus.
        9) Control relays.
        10) Intrinsically safe relays.
        11) Wetwell level transmitter termination panel.
        12) PLC.

13) UPS (battery and charger).
14) DC loop power supply.
15) Exterior connection terminal strip.
16) Ethernet switch, 4 port.
17) Ethernet UHF radio.
18) Radio power supply.
19) Radio antenna lead surge suppressor.
20) Antenna lead in cable, for field installation.
21) Antenna, for field installation.
22) Other components for complete installation.

3. Service/metering switchboard:
   a. See Section 16440.
   b. Wall mount, NEMA 3R.
   c. Socket for NV Energy meter.
   d. 120/208 volt, 3 phase, 4 wire, 100 Amp.
   e. Ground bus.
   f. Neutral bus.
   g. 100 amp, 3 pole main breaker.
   h. Rated as service equipment.
   i. Mount on rear of control panel or on separate strut support.
   j. Voltage Warning label.
   k. Arc flash warning label.
4. Manual transfer switch/generator outlet:
   a. Rated 100A, 3 phase, 4 wire, 120/208 V.
   b. Double throw 100A, heavy duty safety switch, nonfused, see Section 16410.
   c. NEMA 3R.
   d. Lockable in each position.
   e. Voltage warning label.
   f. Arc flash warning label.
   g. Mount on side of control panel.

END OF SECTION

SECTION 16010
ELECTRICAL: BASIC REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Basic requirements for electrical systems.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. Aluminum Association (AA).
   2. American Iron and Steel Institute (AISI).
   3. ASTM International (ASTM):
      a. A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
      b. A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
   4. ETL Testing Laboratories (ETL).
   5. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
      a. C2, National Electrical Safety Code (NESC).
   6. National Electrical Manufacturers Association (NEMA):
      a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
   7. National Fire Protection Association (NFPA):
      a. 70, National Electrical Code (NEC).
   8. Underwriters Laboratories, Inc. (UL).

B. Where UL test procedures have been established for the product type, use UL or ETL approved electrical equipment and provide with the UL or ETL label.

1.3 DEFINITIONS

A. For the purposes of providing materials and installing electrical work the following definitions shall be used.
   1. Outdoor area: Exterior locations where the equipment is normally exposed to the weather and including below grade structures, such as vaults, manholes, handholes and in-ground pump stations.
   2. Hazardous areas: Class I, II or III areas as defined in NFPA 70.
   3. Shop fabricated: Manufactured or assembled equipment for which a UL test procedure has not been established.

1.4 SUBMITTALS

A. Shop Drawings:
   1. See Specification Section 01340 for requirements for the mechanics and administration of submittal process.
   2. General requirements:
      a. Provide manufacturer's technical information on products to be used, including product descriptive bulletin.
      b. Include data sheets that include manufacturer's name and product model number.
         1) Clearly identify all optional accessories.
      c. Acknowledgement that products are UL or ETL listed or are constructed utilizing UL or ETL recognized components.

d. Manufacturer's delivery, storage, handling and installation instructions.
e. Product installation details.
f. See individual specification sections for any additional requirements.

B. Operation and Maintenance Manuals:
1. See Specification Section 01342 for requirements for:
a. The mechanics and administration of the submittal process.
b. The content process of Operation and Maintenance Manuals.

C. When a Specification Section includes products specified in another Specification Section, each Specification Section shall have the required Shop Drawing transmittal form per Specification Section 01340 and all Specification Sections shall be submitted simultaneously.

1.5 DELIVERY, STORAGE, AND HANDLING

A. See Specification Section 01600.

B. Protect nameplates on electrical equipment to prevent defacing.

1.6 AREA DESIGNATIONS

A. Designation of an area will determine the NEMA rating of the electrical equipment enclosures, types of conduits and installation methods to be used in that area.
1. Outdoor areas:
a. Wet.
b. Also, corrosive and/or hazardous when specifically designated on the Drawings or in the Specifications.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, refer to specific Division 16 Specification Sections and specific material paragraphs below for acceptable manufacturers.

B. Provide all components of a similar type by one (1) manufacturer.

2.2 MATERIALS

A. Electrical Equipment Support Pedestals and/or Racks:
1. Approved manufacturers:
a. Modular strut:
1) Unistrut Building Systems.
2) B-Line.
3) Globe Strut.
4) Or approved equal.
2. Material requirements:
a. Modular strut:
1) Stainless steel: AISI Type 316.
b. Mounting hardware:
1) Stainless steel.
c. Anchorage per manufacturer’s recommendations.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install and wire all equipment, including prepurchased equipment, and perform all tests necessary to assure conformance to the Drawings and Specification Sections and ensure that equipment is ready and safe for energization.

B. Install equipment in accordance with the requirements of:
   1. NFPA 70.
   2. IEEE C2.
   3. The manufacturer's instructions.

C. In general, conduit routing is not shown on the Drawings.
   1. The Contractor is responsible for routing all conduits including those shown on one-line and control block diagrams and home runs shown on floor plans.
   2. Conduit routings and stub-up locations that are shown are approximate; exact routing to be as required for equipment furnished and field conditions.

D. When complete branch circuiting is not shown on the Drawings:
   1. A homerun indicating panelboard name and circuit number will be shown and the circuit number will be shown adjacent to the additional devices (e.g., light fixture and receptacles) on the same circuit.
   2. The Contractor is to furnish and install all conduit and conductors required for proper operation of the circuit.
   3. The indicated home run conduit and conductor size shall be used for the entire branch circuit.
   4. See Specification Section 16120 for combining multiple branch circuits in a common conduit.

E. Do not use equipment that exceed dimensions or reduce clearances indicated on the Drawings or as required by the NFPA 70.

F. Install equipment plumb, square and true with construction features and securely fastened.

G. Install electrical equipment, including pull and junction boxes, minimum of 6 IN from process, gas, air and water piping and equipment.

H. Install equipment so it is readily accessible for operation and maintenance, is not blocked or concealed and does not interfere with normal operation and maintenance requirements of other equipment.

I. Provide electrical equipment support system per the following area designations:
   1. Wet areas: Stainless steel.

J. Provide all necessary anchoring devices and supports rated for the equipment load based on dimensions and weights verified from approved submittals, or as recommended by the manufacturer.
   1. Do not cut, or weld to, building structural members.
   2. Do not mount safety switches or other equipment to equipment enclosures, unless enclosure mounting surface is properly braced to accept mounting of external equipment.

K. Provide corrosion resistant spacers to maintain 1/4 IN separation between metallic equipment and/or metallic equipment supports and mounting surface in wet areas.

L. Do not place equipment fabricated from aluminum in direct contact with earth or concrete.

M. Screen or seal all openings into equipment mounted outdoors to prevent the entrance of rodents and insects.

N. Identify electrical equipment and components in accordance with Specification Section 10400.

3.2 FIELD QUALITY CONTROL

A. Verify exact rough-in location and dimensions for connection to electrified equipment, provided by others.

B. Replace equipment and systems found inoperative or defective and re-test.

C. Cleaning:
   1. Clean equipment per manufacturer's recommendations.

D. The protective coating integrity of support structures and equipment enclosures shall be maintained.
   1. Repair galvanized components utilizing a zinc rich paint.
   2. Repair painted components utilizing touch up paint provided by or approved by the manufacturer.
   3. Repair PVC coated components utilizing a patching compound, of the same material as the coating, provided by the manufacturer of the component.
   4. Repair surfaces which will be inaccessible after installation prior to installation.
   5. See Specification Section 16130 for requirements for conduits and associated accessories.

E. Replace nameplates damaged during installation.

3.3 DEMONSTRATION

A. Demonstrate equipment in accordance with Specification Section 01650.

END OF SECTION

SECTION 16060
GROUNDING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Material and installation requirements for grounding system(s).

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. ASTM International (ASTM):
      a. B8, Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.
   2. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
      a. 837, Standard for Qualifying Permanent Connections Used in Substation Grounding.
   3. National Fire Protection Association (NFPA):
      a. 70, National Electrical Code (NEC).
         1) Article 250, Grounding and Bonding.
   4. Underwriters Laboratories, Inc. (UL):
      a. 467, Grounding and Bonding Equipment.

B. Assure ground continuity is continuous throughout the entire Project.

1.3 SUBMITTALS

A. Shop Drawings:
   1. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.
   2. Product technical data.
      a. Provide submittal data for all products specified in PART 2 of this Specification Section except:
         1) Grounding clamps, terminals and connectors.
         2) Exothermic welding system.
      b. See Specification Section 16010 for additional requirements.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
   1. Ground rods and bars and grounding clamps, connectors and terminals:
      a. Burndy.
      b. Harger Lightning Protection.
      c. Heary Brothers.
      d. Joslyn.
      e. Robbins Lightning Protection.
      f. Thomas & Betts (Blackburn).
      g. Thompson.
      h. Or approved equal.

2. Exothermic weld connections:
    a. Erico Products Inc., Cadweld.
    b. Harger Lightning Protection.
    c. Thermoweld.
    d. Or approved equal.

2.2 COMPONENTS

A. Wire and Cable:
    1. Bare conductors: Soft drawn stranded copper meeting ASTM B8.
    2. Insulated conductors: Color coded green, per Specification Section 16120.

B. Conduit: As specified in Specification Section 16130.

C. Ground Bars:
    1. Solid copper:
        a. 1/4 IN thick.
        b. 2 or 4 IN wide.
        c. 24 IN long minimum in main service entrance electrical rooms, 12 IN long elsewhere.
    2. Predrilled grounding lug mounting holes.
    3. Stainless steel or galvanized steel mounting brackets.
    4. Insulated standoffs.

D. Ground Rods:
    1. 3/4 IN x 10 FT.
    2. Copperclad:
        a. Heavy uniform coating of electrolytic copper molecularly bonded to a rigid steel core.
        b. Corrosion resistant bond between the copper and steel.
        c. Hard drawn for a scar-resistant surface.

E. Grounding Clamps, Connectors and Terminals:
    1. Mechanical type:
        a. Standards: UL 467.
        b. High copper alloy content.
    2. Compression type for interior locations:
        a. Standards: UL 467.
        b. High copper alloy content.
        c. Non-reversible.
        d. Terminals for connection to bus bars shall have two bolt holes.
    3. Compression type suitable for direct burial in earth or concrete:
        a. Standards: UL 467, IEEE 837.
        b. High copper alloy content.
        c. Non-reversible.

F. Exothermic Weld Connections:
    1. Copper oxide reduction by aluminum process.
    2. Molds properly sized for each application.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:
    1. Install products in accordance with manufacturer's instructions.
    2. Size grounding conductors and bonding jumpers in accordance with NFPA 70, Article 250, except where larger sizes are indicated on the Drawings.
    3. Remove paint, rust, or other nonconducting material from contact surfaces before making ground connections.

4. Where ground conductors pass through floor slabs or building walls provide nonmetallic sleeves.
5. Do not splice grounding conductors except at ground rods.
6. Install ground rods and grounding conductors in undisturbed, firm soil.
    a. Provide excavation required for installation of ground rods and ground conductors.
    b. Use driving studs or other suitable means to prevent damage to threaded ends of sectional rods.
    c. Unless otherwise specified, connect conductors to ground rods with compressor type connectors or exothermic weld.
    d. Provide sufficient slack in grounding conductor to prevent conductor breakage during backfill or due to ground movement.
    e. Backfill excavation completely, thoroughly tamping to provide good contact between backfill materials and ground rods and conductors.
7. Do not use exothermic welding if it will damage the structure the grounding conductor is being welded to.

B. Grounding Electrode System:
1. Provide a grounding electrode system in accordance with NFPA 70, Article 250 and as indicated on the Drawings.
2. Grounding conductor terminations:
    a. Ground bars in electrical equipment, use compression type terminal and bolt it to the ground bar.
    b. Piping systems use mechanical type connections.
    c. At all above grade terminations, the conductors shall be labeled.

C. Supplemental Grounding Electrode:
1. Provide the following grounding in addition to the equipment ground conductor supplied with the feeder conductors whether or not shown on the Drawings.
2. Metal light poles:
    a. Connect metal pole to a butt ground.
    b. Grounding conductor: Bare #6 AWG minimum.
3. Equipment support rack and pedestals mounted outdoors:
    a. Connect metallic structure to a ground rod.
    b. Grounding conductor: #6 AWG minimum.

D. Low Voltage Transformer Separately Derived Grounding System:
1. Ground separately mounted step-down transformers XO terminal.

E. Raceway Bonding/Grounding:
1. All metallic conduit shall be installed so that it is electrically continuous.
2. All conduits to contain a grounding conductor with insulation identical to the phase conductors, unless otherwise indicated on the Drawings.
3. NFPA 70 required grounding bushings shall be of the insulating type.
4. Provide double locknuts at all panels.
5. Bond all conduit, at entrance and exit of equipment, to the equipment ground bus or lug.
6. Provide bonding jumpers if conduits are installed in concentric knockouts.
7. Make all metallic raceway fittings and grounding clamps tight to ensure equipment grounding system will operate continuously at ground potential to provide low impedance current path for proper operation of overcurrent devices during possible ground fault conditions.

F. Equipment Grounding:
1. All utilization equipment shall be grounded with an equipment ground conductor.

3.2 FIELD QUALITY CONTROL

A. Leave grounding system uncovered until observed by Owner.

B. Acceptance testing:

1. See Specification Section 16080.

END OF SECTION

SECTION 16080
ACCEPTANCE TESTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Basic requirements for acceptance testing.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. InterNational Electrical Testing Association (NETA):
      a. ATS, Standard for Acceptance Testing Specifications for Electric Power Equipment and Systems.
   2. Nationally Recognized Testing Laboratory (NRTL).
   3. Telecommunications Industry Association/Electronic Industries Alliance/American National Standards Institute (TIA/EIA/ANSI):
      a. 455-78-B, Optical Fibres - PART 1-40: Measurement Methods and Test Procedures - Attenuation.

B. Phasing Diagram:
   1. Coordinate with Utility Company for phase rotations and Phase A, B and C markings.
      a. Create a phasing diagram showing the coordinated phase rotations with generators and motors through the transformers.

1.3 SUBMITTALS

A. Shop Drawings:
   1. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.
   2. See Specification Section 11005 for electrical equipment and connection testing plan submittal requirements.

B. Informational Submittals:
   1. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.
   2. Prior to energizing equipment:
      a. Coordinated phasing diagram.
      b. Copy of conductor test report.
      c. Grounding test.
   3. Within two (2) weeks after successful completion of Demonstration Period (Commissioning Period):
      a. Single report containing information including:
         1) Summary of Project.
         2) Information from pre-energization testing.
         3) See testing and monitoring reporting requirements in Specification Section 11005.

PART 2 - PRODUCTS

2.1 FACTORY QUALITY CONTROL

A. Provide Division 16 equipment with all routing factory tests required by the applicable industry standards or NRTL.

B. Factory testing will not be accepted in lieu of field acceptance testing requirements specified in this Specification Section and Specification Section 11005.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

A. General:
   1. See Specification Section 11005.
   2. Complete electrical testing in three (3) phases:
      a. Pre-energization testing phase.
      b. Equipment energized with no load.
      c. Equipment energized under load.
   3. Perform testing in accordance with this Specification Section and NETA ATS.

B. Equipment Monitoring and Testing Plan: See Specification Section 11005.

C. Instruments Used in Equipment and Connections Quality Control Testing: See Specification Section 11005.

D. Testing and Monitoring Program Documentation: See Specification Section 11005.

E. Electrical Equipment and Connections Testing Program:
   1. See Specification Section 11005.
   2. See individual Division 16 Specification Sections for equipment specific testing requirements.
   3. Test all electrical equipment.
      a. Perform all required NETA testing.
      b. Perform all required NETA testing plus the optional testing identified with each specific type of equipment in Article 3.2 of this Specification Section.

3.2 SPECIFIC EQUIPMENT TESTING REQUIREMENTS

A. Cable - Low Voltage:
   1. Perform inspections and tests per NETA ATS 7.3.2.
   2. Megger test each conductor after pulling.
   3. Prepare report of test results.

B. Low Voltage Molded Case Circuit Breakers:
   1. Perform inspections and tests per NETA ATS 7.6.1.1.
   2. Test each breaker for proper operation.

C. Grounding:
   1. Perform inspections and tests per NETA ATS 7.13.
   2. Provide 3 point ground resistance test.
   3. Prepare test report.

D. Motors:
   1. Perform inspections and tests per NETA ATS 7.15.
   2. Check rotation.

E. Control System Functional Test:
   1. Perform test upon completion of equipment acceptance tests.

2. The test is to prove the correct interaction of all sensing, processing and action devices.
3. Develop a test plan and parameters for the purpose of evaluating the performance of the system.
4. Perform the following tests:
    a. Verify the correct operation of all interlock safety devices for fail-safe functions in addition to design function.
    b. Verify the correct operation of all sensing devices, alarms and indicating devices.

END OF SECTION

SECTION 16120
WIRE AND CABLE: 600 VOLT AND BELOW

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Material and installation requirements for:
      a. Building wire.
      b. Power cable.
      c. Control cable.
      d. Instrumentation cable.
      e. Wire connectors.
      f. Insulating tape.
      g. Pulling lubricant.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. Insulated Cable Engineers Association (ICEA):
      a. S-58-679, Standard for Control Cable Conductor Identification.
   2. National Electrical Manufacturers Association (NEMA):
      a. ICS 4, Industrial Control and Systems: Terminal Blocks.
   3. National Electrical Manufacturers Association/Insulated Cable Engineers Association (NEMA/ICEA):
      a. WC 57/S-73-532, Standard for Control Cables.
      b. WC 70/S-95-658, Non-Shielded Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy.
   4. National Fire Protection Association (NFPA):
      a. 70, National Electrical Code (NEC).
   5. Telecommunications Industry Association/Electronic Industries Alliance/American National Standards Institute (TIA/EIA/ANSI):
      a. 568, Commercial Building Telecommunications Cabling Standard.
   6. Underwriters Laboratories, Inc. (UL):
      a. 44, Standard for Safety Thermoset-Insulated Wires and Cables.
      b. 83, Standard for Safety Thermoplastic-Insulated Wires and Cables.
      c. 467, Standard for Safety Grounding and Bonding Equipment.
      d. 486A, Standard for Safety Wire Connectors and Soldering Lugs for use with Copper Conductors.
      e. 486C, Standard for Safety Splicing Wire Connections.
      f. 510, Standard for Safety Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape.
      g. 1277, Standard for Safety Electrical Power and Control Tray Cables with Optional Optical-Fiber Members.
      h. 1581, Standard for Safety Reference Standard for Electrical Wires, Cables, and Flexible Cords.
      i. 2250, Standard for Safety Instrumentation Tray Cable.

1.3 DEFINITIONS

A. Cable: Multi-conductor, insulated, with outer sheath containing either building wire or instrumentation wire.

B. Instrumentation Cable:
   1. Multiple conductor, insulated, twisted or untwisted, with outer sheath.
   2. The following are specific types of instrumentation cables:
      a. Analog signal cable:
         1) Used for the transmission of low current (e.g., 4-20mA DC) or low voltage (e.g., 0-10 Vdc) signals, using No. 16 AWG and smaller conductors.
         2) Commonly used types are defined in the following:
            a) TSP: Twisted shielded pair.
            b) TST: Twisted shielded triad.
      b. Digital signal cable: Used for the transmission of digital signals between computers, PLC's, RTU's, etc.

C. Power Cable: Multi-conductor, insulated, with outer sheath containing building wire, No. 8 AWG and larger.

D. Control Cable: Multi-conductor, insulated, with outer sheath containing building wires, No. 14, No. 12 or No. 10 AWG.

E. Building Wire: Single conductor, insulated, with or without outer jacket depending upon type.

1.4 SUBMITTALS

A. Shop Drawings:
   1. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.
   2. Product technical data:
      a. Provide submittal data for all products specified in PART 2 of this Specification Section except:
         1) Wire connectors.
         2) Insulating tape.
         3) Cable lubricant.
      b. See Specification Section 16010 for additional requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

A. See Specification Section 16010.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
   1. Building wire, power and control cable:
      a. Aetna Insulated Wire.
      b. Alphawire.
      c. Cerrowire.
      d. Encore Wire Corporation.
      e. General Cable.
      f. Okonite Company.
      g. Southwire Company.
      h. Or approved equal.
   2. Instrumentation cable:
      a. Analog cable:
         1) Alphawire.
         2) Belden Inc.
         3) General Cable.

4) Or approved equal.

3. Wire connectors:
   a. Burndy Corporation.
   b. Buchanan.
   c. Ideal.
   d. Ilsco.
   e. 3M Co.
   f. Teledyne Penn Union.
   g. Thomas and Betts.
   h. Phoenix Contact.
   i. Or approved equal.
4. Insulating and color coding tape:
   a. 3M Co.
   b. Plymouth Bishop Tapes.
   c. Red Seal Electric Co.
   d. Or approved equal.

2.2 MANUFACTURED UNITS

A. Building Wire:
   1. Conductor shall be copper with 600 V rated insulation.
   2. Conductors shall be stranded, except for conductors used in lighting and receptacle circuits which may be stranded or solid.
   3. Surface mark with manufacturer's name or trademark, conductor size, insulation type and UL label.
   4. Conform to NEMA/ICEA WC 70/S-95-658 and UL 83 for type THHN/THWN and THHN/THWN-2 insulation.
   5. Conform to NEMA/ICEA WC 70/S-95-658 and UL 44 for type XHHW-2 insulation.

B. Power Cable:
   1. Conductor shall be copper with 600 V rated insulation.
   2. Surface mark with manufacturer's name or trademark, conductor size, insulation type and UL label.
   3. Conform to NEMA/ICEA WC 70/S-95-658 and UL 83 and UL 1277 for type THHN/THWN insulation with an overall PVC jacket.
   4. Number of conductors as required, including a bare ground conductor.
   5. Individual conductor color coding:
      a. ICEA S-58-679, Method 4.
      b. See PART 3 of this Specification Section for additional requirements.
   6. Conform to NFPA 70 Type TC {and IEEE 1202 or CSA FT-4}.

C. Control Cable:
   1. Conductor shall be copper with 600 V rated insulation.
   2. Surface mark with manufacturer's name or trademark, conductor size, insulation type and UL label.
   3. Conform to NEMA/ICEA WC 57/S-73-532 and UL 83 and UL 1277 for type THHN/THWN insulation with an overall PVC jacket.
   4. Number of conductors as required, provided with or without bare ground conductor of the same AWG size.
      a. When a bare ground conductor is not provided, an additional insulated conductor shall be provided and used as the ground conductor (e.g., 6/c No. 14 w/g and 7/c No. 14 are equal).
   5. Individual conductor color coding:
      a. ICEA S-58-679, Method 1, Table E-2.
      b. See PART 3 of this Specification Section for additional requirements.
   6. Conform to NFPA 70 Type TC {and IEEE 1202, CSA FT-4 or NFPA 262}.

D. Electrical Equipment Control Wire:
   1. Conductor shall be copper with 600 V rated insulation.
   2. Conductors shall be stranded.
   3. Surface mark with manufacturer's name or trademark, conductor size, insulation type and UL label.
   4. Conform to UL 44 for Type SIS insulation.
   5. Conform to UL 83 for Type MTW insulation.

E. Instrumentation Cable:
   1. Surface mark with manufacturer's name or trademark, conductor size, insulation type and UL label.
   2. Analog cable:
      a. Tinned copper conductors.
      b. 600 V PVC insulation with PVC jacket.
      c. Twisted with 100 percent foil shield coverage with drain wire.
      d. Six (6) twists per foot minimum.
      e. Individual conductor color coding: ICEA S-58-679, Method 1, Table E-2.
      f. Conform to UL 2250, UL 1581 and NFPA 70 Type ITC.
   3. Digital cable:
      a. As recommended by equipment (e.g., PLC, RTU) manufacturer.
      b. Horizontal voice and data cable:
         1) Category 6 per TIA/EIA/ANSI 568.
         2) Cable shall be label-verified.
         3) Cable jacket shall be factory marked at regular intervals indicating verifying organization and performance level.
         4) Conductors: No. 24 AWG solid untinned copper.
         5) Rated CMP per NFPA 70.
      c. Conform to NFPA 262 and NFPA 70 Type ITC.

F. Wire Connectors:
   1. Twist/screw on type:
      a. Insulated pressure or spring type solderless connector.
      b. 600 V rated.
      c. Ground conductors: Conform to UL 486C and/or UL 467 when required by local codes.
      d. Phase and neutral conductors: Conform to UL 486C.
   2. Compression and mechanical screw type:
      a. 600 V rated.
      b. Ground conductors: Conform to UL 467.
      c. Phase and neutral conductors: Conform to UL 486A.
   3. Terminal block type:
      a. High density, screw-post barrier-type with white center marker strip.
      b. 600 V and ampere rating as required, for power circuits.
      c. 600 V, 20 ampere rated for control circuits.
      d. 300 V, 15 ampere rated for instrumentation circuits.
      e. Conform to NEMA ICS 4 and UL 486A.

G. Insulating and Color Coding Tape:
   1. Pressure sensitive vinyl.
   2. Premium grade.
   3. Heat, cold, moisture, and sunlight resistant.
   4. Thickness, depending on use conditions: 7, 8.5, or 10 mil.
   5. For cold weather or outdoor location, tape must also be all-weather.
   6. Color:
      a. Insulating tape: Black.
      b. Color coding tape: Fade-resistant color as specified herein.

7. Comply with UL 510.

H. Pulling Lubricant: Cable manufacturer's standard containing no petroleum or other products which will deteriorate insulation.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Permitted Usage of Insulation Types: Type XHHW-2 or Type THHN/THWN and THHN/THWN-2.
   1. Type SIS and MTW:
      a. For the wiring of control equipment within control panels and field wiring of control equipment within switchgear, switchboards, motor control centers.

B. Conductor Size Limitations:
   1. Feeder and branch power conductors shall not be smaller than No. 12 AWG unless otherwise indicated on the Drawings.
   2. Control conductors shall not be smaller than No. 14 AWG unless otherwise indicated on the Drawings.
   3. Instrumentation conductors shall not be smaller than No. 18 AWG unless otherwise indicated on the Drawings.

C. Color Code All Wiring as Follows:
   1. Building wire:

	240 V, 208 V, 240/120 V, 208/120 V
Phase 1	Black
Phase 2	Red
Phase 3	Blue
Neutral	White
Ground	Green

      a. Conductors No. 6 AWG and smaller: Insulated phase, neutral and ground conductors shall be identified by a continuous colored outer finish along its entire length.
      b. Conductors larger than No. 6 AWG:
         1) Insulated phase and neutral conductors shall be identified by one (1) of the following methods:
            a) Continuous colored outer finish along its entire length.
            b) 3 IN of colored tape applied at the termination.
         2) Insulated grounding conductor shall be identified by one (1) of the following methods:
            a) Continuous green outer finish along its entire length.
            b) Stripping the insulation from the entire exposed length.
            c) Using green tape to cover the entire exposed length.
         3) The color coding shall be applied at all accessible locations, including but not limited to: Junction and pull boxes, wireways, manholes and handholes.
   2. Power cables ICEA S-58-679, Method 4 with:
      a. Phase and neutral conductors identified with 3 IN of colored tape, per the Table herein, applied at the terminations.
      b. Ground conductor: Bare.
   3. Control cables ICEA S-58-679, Method 1, Table E-2:
      a. When a bare ground is not provided, one (1) of the colored insulated conductors shall be re-identified by stripping the insulation from the entire exposed length or using green tape to cover the entire exposed length.

b. When used in power applications the colored insulated conductors used as phase and neutral conductors may have to be re-identified with 3 IN of colored tape, per the Table herein, applied at the terminations.

D. Install all wiring in raceway unless otherwise indicated on the Drawings.

E. Feeder, branch, control and instrumentation circuits shall not be combined in a raceway, cable tray, junction or pull box, except as permitted in the following:
   1. Where specifically indicated on the Drawings.
   2. Where field conditions dictate and written permission is obtained from the Engineer.
   3. Control circuits shall be isolated from feeder and branch power and instrumentation circuits but combining of control circuits is permitted.
      a. The combinations shall comply with the following:
         1) 12 Vdc, 24 Vdc and 48 Vdc may be combined.
         2) 125 Vdc shall be isolated from all other AC and DC circuits.
         3) AC control circuits shall be isolated from all DC circuits.
   4. Instrumentation circuits shall be isolated from feeder and branch power and control circuits but combining of instrumentation circuits is permitted.
      a. The combinations shall comply with the following:
         1) Analog signal circuits may be combined.
         2) Digital signal circuits may be combined but isolated from analog signal circuits.
   5. Multiple branch circuits for lighting, receptacle and other 120 Vac circuits are allowed to be combined into a common raceway.
      a. Contractor is responsible for making the required adjustments in conductor and raceway size, in accordance with all requirements of the NFPA 70, including but not limited to:
         1) Up sizing conductor size for required ampacity de-ratings for the number of current carrying conductors in the raceway.
         2) The neutral conductor may be shared on sequential circuits (e.g., circuit numbers 1,3,5) if multiple circuit breakers are provided.
         3) Up sizing raceway size for the size and quantity of conductors.

F. Ground the drain wire of shielded instrumentation cables at one (1) end only.
   1. The preferred grounding location is at the load (e.g., control panel), not at the source (e.g., field mounted instrument).

G. Splices and terminations for the following circuit types shall be made in the indicated enclosure type using the indicated method.
   1. Feeder and branch power circuits:
      a. Device outlet boxes:
         1) Twist/screw on type connectors.
      b. Junction and pull boxes and wireways:
         1) Twist/screw on type connectors for use on No. 8 and smaller wire.
         2) Compression, mechanical screw or terminal block or terminal strip type connectors for use on No. 6 AWG and larger wire.
   2. Control circuits:
      a. Junction and pull boxes: Terminal block type connector.
      b. Control panels and motor control centers: Terminal block or strips provided within the equipment or field installed within the equipment by the Contractor.
   3. Non-insulated compression and mechanical screw type connectors shall be insulated with tape or hot or cold shrink type insulation to the insulation level of the conductors.

H. Insulating Tape Usage:
   1. For insulating connections of No. 8 AWG wire and smaller: 7 mil vinyl tape.
   2. For insulating splices and taps of No. 6 AWG wire or larger: 10 mil vinyl tape.
   3. For insulating connections made in cold weather or in outdoor locations: 8.5 mil, all weather vinyl tape.

I. Color Coding Tape Usage: For color coding of conductors.

3.2 FIELD QUALITY CONTROL

A. Acceptance Testing:
   1. See Specification Section 16080.

END OF SECTION

SECTION 16130
RACEWAYS AND BOXES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Material and installation requirements for:
      a. Conduits.
      b. Conduit fittings.
      c. Conduit supports.
      d. Outlet boxes.
      e. Pull and junction boxes.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. American Iron and Steel Institute (AISI).
   2. ASTM International (ASTM):
      a. A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
      b. A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
      c. D2564, Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.
   3. National Electrical Manufacturers Association (NEMA):
      a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
      b. RN 1, Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit (IMC).
      c. TC 2, Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
      d. TC 3, Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing.
   4. National Electrical Manufacturers Association/American National Standards Institute (NEMA/ANSI):
      a. C80.1, Electric Rigid Steel Conduit (ERSC).
   5. National Fire Protection Association (NFPA):
      a. 70, National Electrical Code (NEC).
   6. Underwriters Laboratories, Inc. (UL):
      a. 6, Standard for Electrical Rigid Metal Conduit - Steel.
      b. 50, Enclosures for Electrical Equipment, Non-Environmental Considerations.
      c. 360, Standard for Liquid-Tight Flexible Steel Conduit.
      d. 467, Grounding and Bonding Equipment.
      e. 514A, Metallic Outlet Boxes.
      f. 514B, Conduit, Tubing, and Cable Fittings.
      g. 651, Standard for Schedule 40 and 80 Rigid PVC Conduit and Fittings.
      h. 870, Standard for Wireways, Auxiliary Gutters, and Associated Fittings.
      i. 886, Standard for Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations.

1.3 SUBMITTALS

A. Shop Drawings:
   1. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.

2. Product technical data:
    a. Provide submittal data for all products specified in PART 2 of this Specification Section except:
        1) Conduit fittings.
        2) Support systems.
    b. See Specification Section 16010 for additional requirements.
3. Fabrication and/or layout drawings:
    a. Identify dimensional size of pull and junction boxes to be used.

1.4 DELIVERY, STORAGE, AND HANDLING

A. See Specification Section 16010.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
1. Rigid metallic conduits:
    a. Allied Tube and Conduit Corporation.
    b. Triangle PWC Inc.
    c. Western Tube and Conduit Corporation.
    d. Wheatland Tube Company.
    e. LTV Steel Company.
    f. Or approved equal.
2. PVC coated rigid metallic conduits and repair kits:
    a. Occidental Coating Company.
    b. Perma-Cote.
    c. Rob-Roy Ind.
    d. Raychem "GelTek" tape.
    e. Or approved equal.
3. Rigid nonmetallic conduit:
    a. Carlon.
    b. Cantex.
    c. Osburn Associates.
    d. Or approved equal.
4. Flexible conduit:
    a. AFC Cable Systems.
    b. Anamet, Inc.
    c. Electri-Flex.
    d. Flexible Metal Hose Company.
    e. International Metal Hose Company.
    f. Triangle PWC Inc.
    g. LTV Steel Company.
    h. Or approved equal.
5. Conduit fittings and accessories:
    a. Appleton.
    b. Carlon.
    c. Cantex.
    d. Crouse-Hinds.
    e. Killark.
    f. Osburn Associates.
    g. OZ Gedney Company.
    h. RACO.
    i. Steel City.

j. Thomas and Betts.
k. Or approved equal.

6. Support systems:
   a. Unistrut Building Systems.
   b. B-Line Systems Inc.
   c. Kindorf.
   d. Minerallac Fastening Systems.
   e. Caddy.
   f. Or approved equal.
7. Outlet, pull and junction boxes:
   a. Appleton Electric Co.
   b. Crouse-Hinds.
   c. Killark.
   d. O-Z/Gedney.
   e. Steel City.
   f. Raco.
   g. Bell.
   h. Hoffman Engineering Co.
   i. Wiegmann.
   j. B-Line Circle AW.
   k. Adalet.
   l. Rittal.
   m. Or approved equal.

2.2 RIGID METALLIC CONDUITS

A. Rigid Galvanized Steel Conduit (RGS):
   1. Mild steel with continuous welded seam.
   2. Metallic zinc applied by hot-dip galvanizing or electro-galvanizing.
   3. Threads galvanized after cutting.
   4. Internal coating: Baked lacquer, varnish or enamel for a smooth surface.
   5. Standards: NEMA/ANSI C80.1, UL 6.

B. PVC-Coated Rigid Steel Conduit (PVC-RGS):
   1. Nominal 40 mil Polyvinyl Chloride Exterior Coating:
      a. Coating: Bonded to hot-dipped galvanized rigid steel conduit conforming to NEMA/ANSI C80.1.
      b. The bond between the PVC coating and the conduit surface: Greater than the tensile strength of the coating.
   2. Nominal 2 mil, minimum, urethane interior coating.
   3. Urethane coating on threads.
   4. Conduit: Epoxy prime coated prior to application of PVC and urethane coatings.
   5. Female Ends:
      a. Have a plastic sleeve extending a minimum of 1 pipe diameter or 2 IN, whichever is less beyond the opening.
      b. The inside diameter of the sleeve shall be the same as the outside diameter of the conduit to be used with it.
   6. Standards: NEMA/ANSI C80.1, UL 6, NEMA RN 1.

2.3 RIGID NONMETALLIC CONDUIT

A. Schedules 40 (PVC-40) and 80 (PVC-80):
   1. Polyvinyl-chloride (PVC) plastic compound which includes inert modifiers to improve weatherability and heat distribution.
   2. Rated for direct sunlight exposure.
   3. Fire retardant and low smoke emission.
   4. Shall be suitable for use with 90 DegC wire and shall be marked "maximum 90 DegC".

5. Standards: NEMA TC 2, UL 651.

2.4 FLEXIBLE CONDUIT

A. PVC-Coated Flexible Galvanized Steel (liquid-tight) Conduit (FLEX-LT):
   1. Core formed of continuous, spiral wound, hot-dip galvanized steel strip with successive convolutions securely interlocked.
   2. Extruded PVC outer jacket positively locked to the steel core.
   3. Liquid and vaportight.
   4. Standard: UL 360.

2.5 CONDUIT FITTINGS AND ACCESSORIES

A. Fittings for Use with RGS:
   1. General:
      a. In hazardous locations listed for use in Class I, Groups C and D locations.
   2. Locknuts:
      a. Threaded steel or malleable iron.
      b. Gasketed or non-gasketed.
      c. Grounding or non-grounding type.
   3. Bushings:
      a. Threaded, insulated metallic.
      b. Grounding or non-grounding type.
   4. Hubs: Threaded, insulated and gasketed metallic for raintight connection.
   5. Couplings:
      a. Threaded straight type: Same material and finish as the conduit with which they are used on.
      b. Threadless type: Gland compression or self-threading type, concrete tight.
   6. Unions: Threaded galvanized steel or zinc plated malleable iron.
   7. Conduit bodies (ells and tees):
      a. Body: Zinc plated cast iron or cast copper free aluminum with threaded hubs.
      b. Standard and mogul size.
      c. Cover:
         1) Clip-on type with stainless steel screws.
         2) Gasketed or non-gasketed galvanized steel, zinc plated cast iron or cast copper free aluminum.
   8. Conduit bodies (round):
      a. Body: Zinc plated cast iron or cast copper free aluminum with threaded hubs.
      b. Cover: Threaded screw on type, gasketed, galvanized steel, zinc plated cast iron or cast copper free aluminum.
   9. Sealing fittings:
      a. Body: Zinc plated cast iron or cast copper free aluminum with threaded hubs.
      b. Standard and mogul size.
      c. With or without drain and breather.
      d. Fiber and sealing compound: UL listed for use with the sealing fitting.
   10. Service entrance head:
      a. Malleable iron, galvanized steel or copper free aluminum.
      b. Insulated knockout cover for use with a variety of sizes and number of conductors.
   11. Expansion couplings:
      a. 2 IN nominal straight-line conduit movement in either direction.
      b. Galvanized steel with insulated bushing.
      c. Gasketed for wet locations.
      d. Internally or externally grounded.
   12. Expansion/deflection couplings:
      a. 3/4 IN nominal straight-line conduit movement in either direction.
      b. 30-degree nominal deflection from the normal in all directions.
      c. Metallic hubs, neoprene outer jacket and stainless steel jacket clamps.

d. Internally or externally grounded.
e. Watertight, raintight and concrete tight.

13. Standards: UL 467, UL 514B, UL 886.

B. Fittings for Use with PVC-RGS:
1. The same material and construction as those fittings listed under paragraph "Fittings for Use with RGS" and coated as defined under paragraph "PVC Coated Rigid Steel Conduit (PVC-RGS)."

C. Fittings for Use with FLEX-LT:
1. Connector:
a. Straight or angle type.
b. Metal construction, insulated and gasketed.
c. Composed of locknut, grounding ferrule and gland compression nut.
d. Liquid tight.
2. Standards: UL 467, UL 514B.

D. Fittings for Use with Rigid Nonmetallic PVC Conduit:
1. Coupling, adapters and conduit bodies:
a. Same material, thickness, and construction as the conduits with which they are used.
b. Homogeneous plastic free from visible cracks, holes or foreign inclusions.
c. Bore smooth and free of blisters, nicks or other imperfections which could damage the conductor.
2. Solvent cement for welding fittings shall be supplied by the same manufacturer as the conduit and fittings.
3. Standards: ASTM D2564, NEMA TC 3, UL 651, UL 514B.

E. Weather and Corrosion Protection Tape:
1. PVC based tape, 10 mils thick.
2. Protection against moisture, acids, alkalis, salts and sewage and suitable for direct bury.
3. Used with appropriate pipe primer.

2.6 ALL RACEWAY AND FITTINGS

A. Mark Products:
1. Identify the nominal trade size on the product.
2. Stamp with the name or trademark of the manufacturer.

2.7 OUTLET BOXES

A. Cast Outlet Boxes:
1. Zinc plated cast iron or die-cast copper free aluminum with manufacturers standard finish.
2. Threaded hubs and grounding screw.
3. Styles:
a. "FS" or "FD".
b. "Bell".
c. Single or multiple gang and tandem.
d. "EDS" or "EFS" for hazardous locations.
4. Accessories: 40 mil PVC exterior coating and 2 mil urethane interior coating.
5. Standards: UL 514A, UL 886.

B. See Specification Section 16140 for wiring devices, wallplates and coverplates.

2.8 PULL AND JUNCTION BOXES

A. NEMA 4X Rated (metallic):
1. Body and cover: 14 GA Type 304 or 316 stainless steel.
2. Seams continuously welded and ground smooth.
3. No knockouts.
4. External mounting flanges.

5. Hinged door and stainless steel screws and clamps.
6. Door with oil-resistant gasket.

B. Miscellaneous Accessories:
1. Rigid handles for covers larger than 9 SF or heavier than 25 LBS.
2. Split covers when heavier than 25 LBS.
3. Weldnuts for mounting optional panels and terminal kits.
4. Terminal blocks: Screw-post barrier-type, rated 600 volt and 20 ampere minimum.

C. Standards: NEMA 250, UL 50.

2.9 SUPPORT SYSTEMS

A. Multi-conduit Surface or Trapeze Type Support and Pull or Junction Box Supports:
1. Material requirements.
a. Stainless steel: AISI Type 316.

B. Single Conduit and Outlet Box Support Fasteners:
1. Material requirements:
a. Stainless steel: AISI Type 316.

PART 3 - EXECUTION

3.1 RACEWAY INSTALLATION - GENERAL

A. Shall be in accordance with the requirements of:
1. NFPA 70.
2. Manufacturer instructions.

B. Size of Raceways:
1. Raceway sizes are shown on the Drawings, if not shown on the Drawings, then size in accordance with NFPA 70.
2. Unless specifically indicated otherwise, the minimum raceway size shall be:
a. Conduit: 3/4 IN.
b. Wireway: 2-1/2 IN x 2-1/2 IN.

C. Field Bending and Cutting of Conduits:
1. Utilize tools and equipment recommended by the manufacturer of the conduit, designed for the purpose and the conduit material to make all field bends and cuts.
2. Do not reduce the internal diameter of the conduit when making conduit bends.
3. Prepare tools and equipment to prevent damage to the PVC coating.
4. Degrease threads after threading and apply a zinc rich paint.
5. Debur interior and exterior after cutting.

D. Male threads of conduit systems shall be coated with an electrically conductive anti-seize compound.

E. The protective coating integrity of conduits, fittings, outlet, pull and junction boxes and accessories shall be maintained.
1. Repair galvanized components utilizing a zinc rich paint.
2. Repair painted components utilizing touch up paint provided by or approved by the manufacturer.
3. Repair PVC coated components utilizing a patching compound, of the same material as the coating, provided by the manufacturer of the conduit; or a self-adhesive, highly conformable, cross-linked silicone composition strip, followed by a protective coating of vinyl tape.
a. Total nominal thickness: 40 mil.
4. Repair surfaces which will be inaccessible after installation prior to installation.

F. Remove moisture and debris from conduit before wire is pulled into place.
   1. Pull mandrel with diameter nominally 1/4 IN smaller than the interior of the conduit, to remove obstructions.
   2. Swab conduit by pulling a clean, tight-fitting rag through the conduit.
   3. Tightly plug ends of conduit with tapered wood plugs or plastic inserts until wire is pulled.

G. Only nylon or polyethylene rope shall be used to pull wire and cable in conduit systems.

H. Where portions of a raceway are subject to different temperatures and where condensation is known to be a problem, as in cold storage areas of buildings or where passing from the interior to the exterior of a building, the raceway shall be sealed to prevent circulation of warm air to colder section of the raceway.

3.2 RACEWAY ROUTING

A. Raceways shall be routed in the field unless otherwise indicated.
   1. Conduit and fittings shall be installed, as required, for a complete system that has a neat appearance and is in compliance with all applicable codes.
   2. Run in straight lines parallel to or at right angles to structure.
   3. Conduit shall not interfere with, or prevent access to, piping, valves, ductwork, or other equipment for operation, maintenance and repair.
   4. Provide pull boxes or conduit bodies as needed so that there is a maximum of 360 degrees of bends in the conduit run or in long straight runs to limit pulling tensions.

B. Conduits shall be installed exposed except underground.

C. Conduits shall be installed to eliminate moisture pockets.
   1. Where water cannot drain to openings, provide drain fittings in the low spots of the conduit run.

3.3 RACEWAY APPLICATIONS

A. Permitted Raceway Types Per Wire or Cable Types:
   1. Power wire or cables: All raceway types.
   2. Control wire or cables: All raceway types.
   3. Instrumentation cables: Metallic raceway except nonmetallic may be used underground.
   4. Telecommunication cables: All raceway types.

B. Permitted Raceway Types Per Area Designations:
   1. Wet areas:
      a. PVC-RGS.

C. Permitted Raceway Types Per Routing Locations:
   1. Embedded in poured concrete walls and floors:
      a. PVC-40.
      b. PVC-RGS when emerging from concrete.
   2. Concrete encased ductbanks:
      a. PVC-40.
      b. 90 degree elbows for transitions to above grade:
         1) PVC-RGS.

D. Underground Conduit: See Specification Section 16135.

3.4 CONDUIT FITTINGS AND ACCESSORIES

A. Conduit Seals:
   1. Installed in conduit systems located in hazardous areas as required by the NFPA 70.

B. Rigid nonmetallic conduit and fittings shall be joined utilizing solvent cement.
   1. Immediately after installation of conduit and fitting, the fitting or conduit shall be rotated 1/4 turn to provide uniform contact.

C. Threaded connections shall be made wrench-tight.

D. Conduit joints shall be watertight:
   1. Where subjected to possible submersion.
   2. In areas classified as wet.
   3. Underground.

E. Terminate Conduits:
   1. In NEMA 4 and NEMA 4X rated enclosures:
      a. Watertight, insulated and gasketed hub and locknut.
   2. When stubbed up through the floor into floor mount equipment:
      a. With an insulated grounding bushing on metallic conduits.
      b. With end bells on nonmetallic conduits.

F. Threadless couplings shall only be used to join new conduit to existing conduit when the existing conduit end is not threaded and it is not practical or possible to cut threads on the existing conduit with a pipe threader.

3.5 CONDUIT SUPPORT

A. Permitted multi-conduit surface or trapeze type support system: 316 stainless steel.

B. Permitted single conduit support fasteners: 316 stainless steel.

3.6 OUTLET, PULL AND JUNCTION BOX INSTALLATION

A. General:
   1. Install products in accordance with manufacturer's instructions.
   2. See Specification Section 16010 and the Drawings for area classifications.
   3. Fill unused punched-out, tapped, or threaded hub openings with insert plugs.
   4. Size boxes to accommodate quantity of conductors enclosed and quantity of conduits connected to the box.

B. Outlet Boxes: Cast type except for stainless steel.
   1. Mount device outlet boxes where indicated on the Drawings and at heights as scheduled in Specification Section 16010.
   2. Set device outlet boxes plumb and vertical to structure.
   3. When an outlet box is connected to a PVC coated conduit, the box shall also be PVC coated.

C. Pull and Junction Boxes:
   1. Install pull or junction boxes in conduit runs where indicated or required to facilitate pulling of wires or making connections.
      a. Make covers of boxes accessible.
   2. Permitted uses of NEMA 4X metallic enclosure:
      a. Pull or junction box surface mounted in areas designated as wet and/or corrosive.

END OF SECTION

SECTION 16135
ELECTRICAL: EXTERIOR UNDERGROUND

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Material and installation requirements for:
      a. Underground conduits and ductbanks.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. American Association of State Highway and Transportation Officials (AASHTO):
      a. HB, Standard Specifications for Highway Bridges.
   2. ASTM International (ASTM):
      a. A536, Standard Specification for Ductile Iron Castings.
   3. National Fire Protection Association (NFPA):
      a. 70, National Electrical Code (NEC).
   4. Society of Cable Telecommunications Engineers (SCTE):
      a. 77, Specification for Underground Enclosure Integrity.

1.3 DEFINITIONS

A. Concrete encased ductbank: An individual (single) or multiple conduit(s), arranged in one or more planes, encased in a common concrete envelope.

1.4 SUBMITTALS

A. Shop Drawings:
   1. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.
   2. Product technical data:
      a. Provide submittal data for all products specified in PART 2 of this Specification Section.
   3. Fabrication and/or layout drawings:
      a. Provide dimensional drawings of each manhole indicating all specified accessories and conduit entry locations.

PART 2 - PRODUCTS

2.1 UNDERGROUND CONDUIT AND ACCESSORIES

A. Concrete: Comply with Division 03 Specifications.

B. Conduit: See Specification Section 16130.

C. Duct Spacers/Supports:
   1. High density polyethylene or high impact polystyrene.
   2. Interlocking.
   3. Provide 2 IN minimum spacing between conduits.
   4. Accessories, as required:
      a. Hold down bars.
      b. Ductbank strapping.

PART 3 - EXECUTION

3.1 GENERAL

A. Drawings indicate the intended routing of ductbanks.
   1. Field conditions may affect actual routing.

B. Install products in accordance with manufacturer's instructions.

C. Comply with Specification Section 02221 for trenching, backfilling and compacting.

3.2 UNDERGROUND CONDUITS

A. General Installation Requirements:
   1. Ductbank types per location:
      a. Concrete encased ductbank.
   2. Do not place concrete until conduits have been observed by the Engineer.
   3. Ductbanks shall be sloped a minimum of 4 IN per 100 FT or as detailed on the Drawings.
   4. During construction and after conduit installation is complete, plug the ends of all conduits.
   5. Provide conduit supports and spacers.
      a. Place supports and spacers for rigid nonmetallic conduit on maximum centers as indicated for the following trade sizes:
         1) 1 IN and less: 3 FT.
         2) 1-1/4 to 3 IN: 5 FT.
         3) 3-1/2 to 6 IN: 7 FT.
      b. Place supports and spacers for rigid steel conduit on maximum centers as indicated for the following trade sizes:
         1) 1 IN and less: 10 FT.
         2) 1-1/4 to 2-1/2 IN: 14 FT.
         3) 3 IN and larger: 20 FT.
      c. Securely anchor conduits to supports and spacers to prevent movement during placement of concrete or soil.
   6. Stagger conduit joints at intervals of 6 IN vertically.
   7. Make conduit joints watertight and in accordance with manufacturer's recommendations.
   8. Accomplish changes in direction of runs exceeding a total of 15 degrees by long sweep bends having a minimum radius of 25 FT.
      a. Sweep bends may be made up of one or more curved or straight sections or combinations thereof.
   9. Furnish manufactured bends at end of runs.
      a. Minimum radius of 18 IN for conduits less than 3 IN trade size and 36 IN for conduits 3 IN trade size and larger.
   10. Field cuts requiring tapers shall be made with the proper tools and shall match factory tapers.
   11. After the conduit run has been completed:
      a. Prove joint integrity and test for out-of-round duct by pulling a test mandrel through each conduit.
         1) Test mandrel:
            a) Length: Not less than 12 IN
            b) Diameter: Approximately 1/4 IN less than the inside diameter of the conduit.
      b. Clean the conduit by pulling a heavy duty wire brush mandrel followed by a rubber duct swab through each conduit.
   12. Pneumatic rodding may be used to draw in lead wire.
      a. Install a heavy nylon cord free of kinks and splices in all unused new ducts.
      b. Extend cord 3 FT beyond ends of conduit.

13. Transition from rigid nonmetallic conduit to rigid metallic conduit, per Specification Section 16130, prior to going above ground.
    a. Except rigid nonmetallic conduit may be extended directly to panels where the conduit is concealed within the enclosure.
    b. Terminate rigid PVC conduits with end bells.
    c. Terminate steel conduits with insulated bushings.
14. Place warning tape in trench directly over ductbanks in accordance with Specification Section 10400.
15. Ducts and conduits for electric utility shall conform to the utility requirements.

B. Concrete Encased Ductbank:
1. Ductbank system consists of conduits completely encased in minimum 2 IN of concrete and with separations between different cabling types as required in Specification Section 16130 or as detailed on the Drawings.
2. Install so that top of concrete encased duct, at any point:
    a. Is not less than 24 IN below grade.
    b. Is below pavement sub-grading.
3. Conduit supports shall provide a uniform minimum clearance of 2 IN between the bottom of the trench and the bottom row of conduit.
4. Conduit separators shall provide a uniform minimum clearance of 2 IN between conduits or as required in Specification Section 16130 for different cabling types.

END OF SECTION

SECTION 16140
WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Material and installation requirements for:
      a. Light switches.
      b. Receptacles.
      c. Device wallplates and coverplates.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. National Electrical Manufacturers Association (NEMA):
      a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
      b. WD 1, General Color Requirements for Wiring Devices.
      c. WD 6, Wiring Devices - Dimensional Requirements.
   2. Underwriters Laboratories, Inc. (UL):
      a. 20, General-Use Snap Switches.
      b. 498, Standard for Attachment Plugs and Receptacles.
      c. 514A, Metallic Outlet Boxes.
      d. 894, Standard for Switches for Use in Hazardous (Classified) Locations.
      e. 943, Ground-Fault Circuit-Interrupters.
      f. 1010, Standard for Receptacle-Plug Combinations for Use in Hazardous (Classified) Locations.

1.3 SUBMITTALS

A. Shop Drawings:
   1. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.
   2. Product technical data:
      a. Provide submittal data for all products specified in PART 2 of this Specification Section.
      b. See Specification Section 16010 for additional requirements.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
   1. Light switches and receptacles:
      a. Bryant.
      b. Cooper Wiring Devices.
      c. Hubbell.
      d. Leviton.
      e. Pass & Seymour.
      f. Crouse-Hinds.
      g. Appleton Electric Co.

h. Killark.
i. Or approved equal.

2.2 LIGHT SWITCHES

A. General requirements unless modified in specific requirements paragraph of switches per designated areas or types:
   1. Toggle type, quiet action, Industrial heavy duty Specification Grade.
   2. Self grounding with grounding terminal.
   3. Back and side wired.
   4. Solid silver cadmium oxide contacts.
   5. Rugged urea housing and one-piece switch arm.
   6. Rated 20 A, 120/277 Vac.
   7. Switch handle color: Ivory.
   8. Types as indicated on the Drawings.
   9. Standards: UL 20, UL 514A, NEMA WD 6.

B. Wallplate: Stainless steel.

2.3 RECEPTACLES

A. General requirements unless modified in specific requirements paragraph of receptacles per designated areas:
   1. Straight blade, Industrial heavy duty Specification Grade, GFCI type.
   2. Brass triple wipe line contacts.
   3. One-piece grounding system with double wipe brass grounding contacts and self grounding strap.
   4. Back and side wired.
   5. Rated 20 A, 125 Vac.
   6. High impact nylon body.
   7. Receptacle body color: Ivory.
   8. Configuration: NEMA 5-20R.
   9. Standards: UL 498, UL 514A, UL 943, NEMA WD 1, NEMA WD 6.

B. Wallplate: Stainless steel.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Mount devices where indicated on the Drawings and as scheduled in Specification Section 16010.

C. See Specification Section 16130 for device outlet box requirements.

D. Provide blank plates for empty outlets.

END OF SECTION

SECTION 16410
SAFETY SWITCHES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Safety switches.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. National Electrical Manufacturers Association (NEMA):
      a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
      b. KS 1, Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).
   2. Underwriters Laboratories, Inc. (UL):
      a. 98, Enclosed and Dead-Front Switches.

1.3 SUBMITTALS

A. Shop Drawings:
   1. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.
   2. Product technical data:
      a. Provide submittal data for all products specified in PART 2 of this Specification Section.
      b. Provide a table that associates safety switch model number with connected equipment tag number.
      c. See Specification Section 16010 for additional requirements.

B. Operation and Maintenance Manuals:
   1. See Specification Section 01342 for requirements for:
      a. The mechanics and administration of the submittal process.
      b. The content of Operation and Maintenance Manuals.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following safety switch manufacturers are acceptable:
   1. Eaton.
   2. General Electric Company.
   3. Square D Company.
   4. Siemens.
   5. Or approved equal.

2.2 SAFETY SWITCHES

A. General:
   1. Non-fusible or fusible as indicated on the Drawings.
   2. Suitable for service entrance.

3. NEMA Type HD heavy-duty construction.
4. Switch blades will be fully visible in the OFF position with the enclosure door open.
5. Quick-make/quick-break operating mechanism.
6. Deionizating arc chutes.
7. Manufacture double-break rotary action shaft and switchblade as one (1) common component.
8. Clear line shields to prevent accidental contact with line terminals.
9. Operating handle:
    a. Red and easily recognizable.
    b. Padlockable in the OFF position
    c. Interlocked to prevent door from opening when the switch is in the ON position with a defeater mechanism.
10. Single or double throw as shown.

B. Ratings:
1. Horsepower rated of connected motor.
2. Voltage and amperage: As indicated on the Drawings.
3. Short circuit withstand:
    a. Non-fused: 10,000A.
    b. Fused: 200,000A.

C. Accessories, when indicated in PART 3 of this Specification Section or on the Drawings:
1. Neutral kits.
2. Ground lug kits.
3. Auxiliary contact kits with 1 N.O. and 1 N.C. contact.

D. Enclosures:
1. NEMA 3R rated:
    a. Body and cover: Sheet steel finished with rust inhibiting primer and manufacturers standard paint inside and out.
    b. With or without knockouts, hinged and lockable door.
2. NEMA 4 rated:
    a. Body and cover: Sheet steel finished with rust inhibiting primer and manufacturers standard paint inside and out.
    b. No knockouts, external mounting flanges, hinged, gasketed and lockable door.
3. NEMA 4X rated (metallic):
    a. Body and cover: Type 304 or 316 stainless steel.
    b. No knockouts, external mounting flanges, hinged and gasketed door.

E. Overcurrent and short circuit protective devices:
1. Fuses.
2. See Specification Section 16490 for overcurrent and short circuit protective device requirements.

F. Standards: NEMA KS 1, UL 98.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install as indicated and in accordance with manufacturer's instructions and recommendations.

B. Install switches adjacent to the equipment they are intended to serve unless otherwise indicated on the Drawings.

END OF SECTION

SECTION 16440
SWITCHBOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Low voltage service panel.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. National Electrical Manufacturers Association (NEMA):
      a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
      b. PB 2, Deadfront Distribution Switchboards.
   2. Underwriters Laboratories, Inc. (UL):
      a. 891, Standard for Safety Dead-Front Switchboards.

B. Verify the space required for the switchboard is equal to or less than the space allocated.

1.3 SUBMITTALS

A. Shop Drawings:
   1. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.
   2. Product technical data.
      a. Provide submittal data for all products specified in PART 2 of this Specification Section.
   3. See Specification Section 16010 for additional requirements.
   4. Fabrication and/or layout drawings:
      a. Switchboard layout with alphanumeric designation, protective devices size and type, as indicated in the one-line diagram or switchboard schedule.
      b. Front elevation and plan drawing of the assembly.
      c. Three-line or single line and schematic diagrams.
      d. Conduit space locations within the assembly.

B. Operation and Maintenance Manuals:
   1. See Specification Section 01342 for requirements for:
      a. The mechanics and administration of the submittal process.
      b. The content of Operation and Maintenance Manuals.
   2. Fabrication and/or layout drawings updated with as-build conditions

C. Informational Submittals:
   1. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
   1. Eaton.
   2. General Electric Company.

3. Square D Company.
4. Siemens.
5. Or approved equal.

2.2 SWITCHBOARDS

A. Ratings:
1. Voltage, number of phases, number of wires, and main bus current rating as indicated on the Drawings.
2. Assembly short circuit current and interrupting device rating as indicated on the Drawings.
3. Service Entrance Equipment rated.
4. 100 percent rated when 100 percent rated breakers are installed.

B. Construction:
1. Standards: NEMA PB 2, UL 891.
2. Completely enclosed, dead-front, self-supporting metal structure.
3. NEMA 3R rated enclosure.
4. Interior and exterior steel surfaces cleaned and painted with rust inhibiting primer and manufacturers standard paint.

C. Buses:
1. Material: Tin-plated aluminum or silver-plated copper.
2. Neutral bus: Fully rated insulated from structure.
3. Ground bus: 100 amp bonded to structure.

D. Overcurrent and Short Circuit Protective Devices:
1. Main overcurrent protective device:
a. Individually mounted molded case circuit breaker.
2. Factory installed.
3. Means to padlock in the open position.

E. Metering:
1. Utility:
a. Separate barriered-off compartment with hinged sealable door.
b. Shall meet requirements of serving utility which is Nevada Energy.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install switchboard in accordance with manufacturer's instructions.

B. Arrange switchboard as shown on the Drawings.

C. NEMA 3R enclosure.

D. Install on strut rack as shown.

E. Miscellaneous:
1. Provide circuit protective devices and other associated equipment as indicated on the Drawings.
2. All control wiring shall be neatly laced and have flexibility at hinge locations.

3.2 FIELD QUALITY CONTROL

A. Test the circuit breaker for proper operation.

END OF SECTION

SECTION 16490
OVERCURRENT AND SHORT CIRCUIT PROTECTIVE DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Low voltage circuit breakers.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. National Electrical Manufacturers Association (NEMA):
      a. AB 1, Molded-Case Circuit Breakers, Molded Case Switches, and Circuit-Breaker Enclosures. (Equivalent to UL 489)
   2. National Fire Protection Association (NFPA):
      a. 70, National Electrical Code (NEC).
   3. Underwriters Laboratories, Inc. (UL):
      a. 489, Standard for Safety Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures.

1.3 SUBMITTALS

A. Shop Drawings:
   1. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.
   2. Product technical data including:
      a. Provide submittal data for all products specified in PART 2 of this Specification Section.
      b. See Specification Section 16010 for additional requirements.

B. Operation and Maintenance Manuals:
   1. See Specification Section 01342 for requirements for:
      a. The mechanics and administration of the submittal process.
      b. The content of Operation and Maintenance Manuals.

C. Informational Submittals:
   1. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.
   2. Reports:
      a. As-left condition of all circuit breakers that have adjustable settings.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
   1. Circuit breakers:
      a. Eaton.
      b. General Electric Company.
      c. Square D Company.
      d. Siemens.

e. Or approved equal.

2.2 CIRCUIT BREAKERS

A. Molded Case Type:
1. General:
   a. Standards: NEMA AB 1, UL 489.
   b. Unit construction.
   c. Over-center, toggle handle operated.
   d. Quick-make, quick-break, independent of toggle handle operation.
   e. Manual and automatic operation.
   f. All poles open and close simultaneously.
   g. Three (3) position handle: On, off and tripped.
   h. Molded-in ON and OFF markings on breaker cover.
   i. One-, two- or three-pole as indicated on the Drawings.
   j. Current and interrupting ratings as indicated on the Drawings.
   k. Bolt on type.
2. Thermal magnetic type:
   a. Inverse time overload and instantaneous short circuit protection by means of a thermal magnetic element.
   b. Frame size 150 amp and below:
      1) Non-interchangeable, non-adjustable thermal magnetic trip units.
   c. Frame sizes 225 to 400 amp (trip settings less than 400A):
      1) Interchangeable and adjustable instantaneous thermal magnetic trip units.
   d. Ground Fault Circuit Interrupter (GFCI) Listed:
      1) Standard: UL 943.
      2) One- or two-pole as indicated on the Drawings.
      3) Class A ground fault circuit.
      4) Trip on 5 mA ground fault (4-6 mA range).

PART 3 - EXECUTION

3.1 INSTALLATION

A. Current and interrupting ratings as indicated on the Drawings.

B. Series rated systems not acceptable.

C. Devices shall be ambient temperature compensated.

D. Circuit Breakers:
1. Molded case circuit breakers shall incorporate the following, unless indicated otherwise on the Drawings:
   a. Frame sizes 400 amp and less with trip setting less than 400A shall be thermal magnetic type.
   b. Motor circuit protectors sized for the connected motor.

3.2 FIELD QUALITY CONTROL

A. Testing:
1. Test each breaker for proper operation.

END OF SECTION

SECTION 16500
LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Material and installation requirements for:
      a. Site lighting fixtures.
      b. Lamps.
      c. Ballasts.
      d. Light poles.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. American National Standards Institute (ANSI).
   2. Certified Ballast Manufacturers (CBM).
   3. Federal Communications Commission (FCC):
      a. Code of Federal Regulations (CFR), 47 CFR 18, Industrial, Scientific and Medical Equipment.
   4. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
      a. C62.41, Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.
   5. National Electrical Manufacturers Association (NEMA):
      a. 250, Enclosures for Electrical Equipment (1000Volts Maximum).
   6. National Electrical Manufacturers Association/American National Standards Institute (NEMA/ANSI):
      a. C82.4, Ballasts for High-Intensity Discharge and Low-Pressure Sodium (LPS) Lamps (Multiple-Supply Type).
   7. National Fire Protection Association (NFPA):
      a. 70, National Electrical Code (NEC).
      b. 101, Life Safety Code.
   8. Underwriters Laboratories, Inc. (UL):
      a. 248-4, Low-Voltage Fuses - Part 4: Class CC Fuses.
      b. 1029, Standard for High-Intensity-Discharge Lamp Ballasts.
      c. 1598, Luminaires.
   9. United States Department of Energy (USDOE):
      a. EPAct, the National Energy Policy Act.

1.3 SUBMITTALS

A. Shop Drawings:
   1. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.
   2. Product technical data:
      a. Provide submittal data for all products specified in PART 2 of this Specification Section.
      b. Identify fixtures by Fixture Schedule number.
      c. Fixture data sheet including:
         1) Photometric performance data including candlepower distribution and coefficient of utilization (CU) table.
         2) Fixture effective projected areas for pole mounted fixtures.

d. Pole data shall include:
   1) Pole wind loading.
   2) Anchor bolt template.
e. UL nameplate data for fixtures used in Class 1, Division 1 and 2 areas.
f. See Specification Section 16010 for additional requirements.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
   1. Lighting fixtures: See Drawings.
   2. Lamps:
      a. Osram/Sylvania.
      b. General Electric.
      c. Philips.
      d. Venture.
      e. Or approved equal.
   3. Ballasts: Fixture manufacturer's standard.
   4. Poles: Fixture manufacturer's standard.

2.2 GENERAL REQUIREMENTS

A. All lighting fixtures and electrical components:
   1. UL labeled.
   2. Fixtures complete with lamps and ballasts.
   3. Rated for area classification as indicated on the Drawings.

B. No live parts normally exposed to contact.

C. When intended for use in wet areas: Mark fixtures "Suitable for wet locations."

D. When intended for use in damp areas: Mark fixtures "Suitable for damp locations" or "Suitable for wet locations."

2.3 LIGHT FIXTURES

A. High Intensity Discharge:
   1. UL 1598.
   2. Finish:
      a. Manufacturer's standard polyester, acrylic enamel or epoxy powder coating applied after fabrication.
      b. Manufacturer's standard color or special color specified in Fixture Schedule.
   3. Prewired and provided with lamps that are properly mated to the ballast operating characteristics.
   4. Provided with safety chain.

2.4 LAMPS

A. High Intensity Discharge (HID) Lamps:
   1. High pressure sodium lamps:
      a. Correlated color temperature of 2100 degrees Kelvin.
      b. Minimum color rendering index (CRI) of 21.
      c. High pressure sodium lamps are designated on the lighting Fixture Schedule by the prefix HPS.
   2. Uncoated (clear) unless identified as coated in the fixture schedule.
   3. The specified fixture in the fixture schedule shall dictate the required lamp operating position and base type.

4. Provide lamps that have the correct bulb shape for the fixture specified.

2.5 BALLASTS

A. High Intensity Discharge Ballasts:
   1. NEMA/ANSI C82.4, UL 1029.
   2. High pressure sodium:
      a. Input voltage variation: +10 percent.
      b. Maximum lamp regulation spread: 30 percent.
      c. Minimum power factor: 90 percent.
      d. Starting current: Not greater than operating current.
      e. Maximum input voltage dip: 20 percent.
      f. Crest factor: 1.6 to 1.8.
      g. The Volts-Watts trace shall be within the lamp manufacturer's trapezoid.
      h. Types:
         1) Lead-type regulators: Constant wattage autotransformer (CWA).
         2) Lag-type regulators: Magnetic regulator and regulated lag.
      i. Ballast shall not contain Polychlorinated Biphenyls (PCB's).
   3. Ballasts for exterior use:
      a. Starting temperature: -20 DegF.

2.6 POLES

A. As scheduled or noted on the Drawings.

2.7 MAINTENANCE MATERIALS

A. Furnish a minimum of 2 or 10 percent of total of each type and wattage of lamps, whichever is greater.

B. Furnish a minimum of 10 percent of total of each type and amperage of fuses for fixtures indicated to be fused.

C. Spare parts are to be stored in a box clearly labeled as to its contents.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install exterior fixtures so that water can not enter or accumulate in the wiring compartment.

B. Ground fixtures and ballasts.

3.2 POLE INSTALLATION

A. Drawings indicate the intended location of light pole.
   1. Field conditions may affect actual location.
   2. Coordinate location with all existing or new utilities and pavement.

B. Steel and Aluminum Poles:
   1. Mounted on cast-in-place foundations, as detailed on the Drawings.
      a. Concrete and reinforcing steel, in accordance with Division 03 Specification Sections.
   2. Protect pole finish during installation.
      a. Repair damage to pole finish with manufacturer approved repair kit.

C. Ground poles as indicated on the Drawings.

D. Conductors:
   1. See Specification Section 16120 for required underground conductors.
   2. Use interior building wire, as specified in Specification Section 16120, from pole base to fixture, #12 AWG minimum.

E. Overcurrent and Short Circuit Protection:
   1. Protect each phase with a UL Class CC fuse:
      a. Size: Three (3) times load current.
      b. Standard: UL 248-4.
   2. Fuseholder:
      a. Watertight, in-line and break-a-way style.
      b. Accept up to a 30 A, 600 V fuse.
      c. Neutral conductor shall utilize a fuseholder with a solid copper rod.
      d. Conductor terminal: Adequate size for the installed conductors.

3.3 ADJUST AND CLEAN

A. Clean lamp lenses and adjust cutoffs prior to acceptance testing.

B. Replace all inoperable lamps with new lamps prior to final acceptance.

END OF SECTION

Forms

(to be used following award of bid)

1) Contract Form
2) Performance Bond
3) Payment Bond

CONTRACT
CITY OF SPARKS, NEVADA
BID # _____
PWP# _____

THIS CONTRACT made and entered into on this ___ day of _____, 20____, by and between the City of Sparks, Nevada, a municipal corporation, existing under and by virtue of the laws of the State of Nevada, hereinafter called "City", and _____, a qualified Contractor in the class of work required, hereinafter called "Contractor".

W I T N E S E T H

WHEREAS, the City has awarded a contract to Contractor for providing material and/or performing the work hereinafter mentioned in accordance with the proposal of said Contractor;

WHEREAS, the Contractor will provide the material and/or perform the work for the compensation stated in said proposal, an amount which has been arrived at between the parties;

WHEREAS, each party is willing to and does assume joint liability for the contents of this Contract, and each party accordingly agrees that it shall not be construed against any party as a drafting party;

NOW, THEREFORE, IT IS AGREED as follows:

1. **Scope of Work:**
The scope of work for this contract is generally defined as **(TITLE**). The City's Contract Documents and Contractor's Entire Proposal are on file with the City of Sparks. All terms, conditions and requirements contained within these Documents, including any and all bid documents, addenda and specifications issued by the City, are hereby incorporated by reference into this Contract.

The Contractor shall perform within the time stipulated, the Contract as herein defined and shall provide and furnish any and all of the labor, materials, methods or processes, equipment implements, tools, machinery and equipment, and all utility, transportation and other services required to construct, install and put in complete order for use in a good and workmanlike manner all of the work covered by the Contract in connection with strict accordance with the plans and specifications therein, which were approved by said City and are on file with the City, including any and all addenda issued by the City, and with the other contract documents hereinafter enumerated.

2. **Payment for Project Services**
As full consideration for the Services to be performed by Contractor, City agrees to pay Contractor as set forth in accordance with the bid and not to exceed fee of _____for the project.

A monthly progress payment in the amount of ninety-five percent (95%) of the value of the work completed may be made every thirty (30) days upon application by the Contractor and certification by the Project Manager that such work has been completed.

Partial payments will be made once each month as the work satisfactorily progresses and after acceptance by the authorized City representative. The progress estimates shall be based upon materials in place, or on the job site and invoiced, and labor expended thereon. From the total of the amount ascertained will be deducted an amount equivalent to five percent (5%) of the whole, which five percent (5%) will be retained by the City until after completion of the entire Contract in an acceptable manner. Any time after fifty percent (50%) of the value of the work has been completed, the City will make any of the remaining partial payments in full.

No such estimates or payments shall be required to be made, when, in the judgment of the City Project Manager, the work is not proceeding in accordance with the provision of the Contract, or when in his judgment the total value of the work done since last estimate amounts to less than Five Hundred Dollars ($500.00).

The cost of materials conforming to the plans and specifications (materials being those which are required to be contained and incorporated in a finished contract bid item) delivered to the project and not at the time incorporated in the work, may also be included in the estimate for payment. No such estimate or payment shall be construed to be an acceptance of any defective work or improper material. The Contractor shall be responsible for, and shall not remove from the project any material that has been included in the estimate for payment.

Final payment shall be made upon the Project Manager certifying that the Contractor has satisfactorily completed the work in conformity with the Contract Documents.

3. Time for Completion:

The Contractor shall deliver the material and/or services called for in the specifications/proposal and within the delivery time specified and in accordance with the terms of the contract. Work shall be completed within _____ days from the Notice to Proceed issued by the City of Sparks Purchasing Division. The Contractor shall not alter or vary any terms or conditions contained or incorporated herein, including but not limited to, the quantity, price, delivery date or date designated as After Receipt of Order (ARO) or date for commencement or completion of services as mutually agreed upon, unless such alteration or variation is consented to in writing by a duly authorized representative of the City.

The City reserves the right to cancel resultant Contract upon ten days written notice in the event the type and quality of the product or work performance is unsatisfactory or in default, subject to Contractor's right to cure as outlined in termination clause.

This is a non-exclusive Contract and the City reserves the right to acquire the material and/or services at its discretion, from other sources during the term of this Contract.

4. No Unlawful Discrimination:

In connection with the performance of work under this Agreement, Contractor agrees not to discriminate against any employee or applicant because of race, creed, color, national origin, disability, sex, sexual orientation or age. Such agreement shall include, but not be limited to, the following: recruitment or recruitment advertising, rates or pay or other forms of compensation, and selection. Any violation of these

provisions by Contractor shall constitute a material breach of contract.

In all cases where persons are employed in the construction of public works, preference must be given when the qualifications of the applicants are equal:

A) First: To honorably discharged soldiers, sailors and marines of the United States who are citizens of the State of Nevada.
B) Second: To other citizens of the State of Nevada

If the provisions of this section are not complied with by the contractor engaged on the public work, the contract is void, and any failure or refusal to comply with any of the provisions of this section renders any such contract void and subject to the exceptions contained in this section, no money may be paid out of the State Treasury or out of the treasury of any political subdivision of the State to any person employed on any work mentioned in this section unless there has been compliance with the provisions of this section. Any contractor engaged on a public work or any other person who violates any of the provisions of this section is guilty of a misdemeanor. The penalties provided for in this section do not apply where violations thereof are due to misrepresentations made by the employee or employees.

5. No Illegal Harassment:
Violation of the City's harassment policy, which is incorporated by reference and available from the Human Resource Division, by the Contractor, its officers, employees, agents, vendors, consultants, subcontractors and anyone from whom it is legally liable, while performing or failing to perform Contractor's duties under this Contract shall be considered a material breach of contract.

6. Lawful Performance:
Vendor shall abide by all Federal, State and Local Laws, Ordinances, Regulations, and Statutes as may be related to the performance of duties under this agreement. In addition, all applicable permits and licenses required shall be obtained by the vendor, at vendor's sole expense.

7. Preferences (This Section ☐ IS ☐ IS NOT Applicable to this contract):
To the extent Contractor has sought and qualified for a bidding preference and this project has a value of over $250,000 pursuant to Nevada Revised Statutes Chapter 338, Contractor acknowledges and agrees that the following requirements will be adhered to, documented and attained for the duration of the Project:

1. At least 50 percent of the workers employed on the Project (including subcontractors) hold a valid driver's license or identification card issued by the Nevada Department of Motor Vehicles;

2. All vehicles used primarily for the public work will be (a) registered and (where applicable) partially apportioned to Nevada; or (b) registered in Nevada; and

3. The Contractor shall maintain and make available for inspection within Nevada all payroll records related to the Project.

Contractor recognizes and accepts that failure to comply with any requirements herein shall be a

material breach of the contract and entitle the City of Sparks to liquidated damages in the amount set by statute. In addition, the Contractor recognizes and accepts that failure to comply with any requirements herein may lose its certification for a preference in bidding and/or its ability to bid on any contracts for public works pursuant to NRS Chapter 338.

To the extent Contractor has sought and qualified for a bidding preference and this project has a value of over $250,000 pursuant to Nevada Revised Statutes Chapter 338, each contract between the contractor, applicant or design-build team and a subcontractor must provide for the apportionment of liquidated damages assessed pursuant to this section if a person other than the Contractor was responsible for the breach of a contract for a public work caused by a failure to comply with a requirement of Items 1-5 within this section. The apportionment of liquidated damages must be in proportion to the responsibility of each party for the breach.

8. Prevailing Wages

A. The Contractor and subcontractors shall be bound by and comply with all federal, state and local laws with regard to minimum wages, overtime work, hiring and discrimination, including Chapter 338 of the NRS, which is entitled, "Public Works Projects." The Contractor shall ensure that all employees on the work site are paid in accordance with the CURRENT PREVAILING WAGE RATES AS APPROVED BY THE STATE LABOR COMMISSIONER, whenever the actual value of the Contract totals One Hundred Thousand Dollars ($100,000) or more, or when required by the Supplementary Conditions. A copy of the rates are attached hereto and included herein. If a Change Order causes a Contract to exceed One Hundred Thousand Dollars ($100,000), the State Labor Commissioner may audit the entire Contract period.

When federal money is associated with the project making the Contract subject to both state and federal wage rates, the Contractor shall not pay less than the higher rate when the two rates differ for similar kinds of labor.

Questions involving the Prevailing Wage Rates for the City of Sparks should be referred to the Labor Commissioner, State of Nevada, at (775) 687-4850.

B. Posting of Minimum Wage Rates - In accordance with NRS, Chapter 338, Section 338.020, the Contractor shall post the hourly and daily rate of wages to be paid to each of the classes of mechanics and workers on the site of Work of this Contract in a place generally visible to the workers.

C. Pursuant to NRS 338.060 and 338.070, the Contractor hereby agrees to forfeit, as a penalty to the City of Sparks, not less than Twenty Dollars ($20) nor more than Fifty Dollars ($50) for each calendar day or portion thereof that each worker employed on the Contract is paid less than the designated rate for any work done under the Contract, by the Contractor or any subcontractor under him, or is not reported to the City of Sparks as required by NRS 338.070.

D. The contractor and each subcontractor shall keep or cause to be kept an accurate record showing, for each worker employed by the contractor or subcontractor:

(1) The name of the worker;

(2) The occupation of the worker;
(3) If the worker has a driver's license or identification card, an indication of the state or other jurisdiction that issued the license or card; and
(4) The actual per diem, wages and benefits paid to the worker.

In addition, the contractor and each subcontractor shall keep or cause to be kept an accurate record showing, for each worker employed by the contractor or subcontractor who has a driver's license or identification card:
(1) The name of the worker;
(2) The driver's license number or identification card number of the worker; and
(3) The state or other jurisdiction that issued the license or card.

E. The records in Section D above must be open at all reasonable hours to the inspection of the City of Sparks, and its officers and agents. A copy of the each record for each calendar Month for the General Contractor and all Sub-Contractors must be submitted to the City of Sparks no later than 15 days after the end of each month for the previous months' wages.

9. Acceptance by the City:
It is expressly understood and agreed that all materials provided and/or work done by the Contractor shall be subject to inspection and acceptance by the City at its discretion, and that any progress inspections and approval by the City of any item or work shall not forfeit the right of the City to require the correction of faulty workmanship or material at any time during the course of the work, although previously approved by oversight. Nothing herein contained shall relieve the Contractor of the responsibility for proper construction and maintenance of the work, materials and equipment required under the terms of this Contract until all work has been completed and accepted by the City.

10. Waiver:
No waiver of any term, provision or condition of this Contract, whether by conduct or otherwise, in any one or more instances, shall be deemed to be nor shall it be construed as a further or continuing waiver of any such term, provision or condition of this Contract. No waiver shall be effective unless it is in writing and signed by the party making it.

11. Notices:
All notices required to be given in writing by this Contract shall be deemed to be received (i) upon delivery if personally delivered, or (ii) when receipt is signed for if mailed by certified or registered mail, postage prepaid, or by express delivery service or courier, when addressed as follows (or sent to such other address as a Party may specify in a notice to the others):

PURCHASING MANAGER	CONTRACTOR:
CITY OF SPARKS	_____
431 PRATER WAY	_____
PO BOX 857	_____
SPARKS, NV 89432-0857	_____

12. Arbitration:

Any and all disputes, controversies or claims arising under or in connection with this Contract, including without limitation, fraud in the inducement of this Contract, or the general validity or enforceability of this Contract, shall be governed by the laws of the State of Nevada without giving effect to conflicts of law principles, may be submitted to binding arbitration before one arbitrator, and shall be conducted in accordance with the Commercial Arbitration Rules of the American Arbitration Association in a private manner in Washoe County, Nevada. This award shall be final and judgment may be entered upon it in any court having jurisdiction thereof. In reaching this final award, the arbitrator shall have no authority to change or modify any provision of this Contract. All other expenses of arbitration shall be borne equally by the parties. All fees, including legal fees, shall be borne by the party who incurred them. All costs of enforcement shall be borne by the losing party. Each party shall have the right to discovery in accordance with the Nevada Rules of Civil Procedure.

13. Jurisdiction and Venue:

In the event the arbitration award is challenged, any action or proceeding seeking to do so must be brought in the courts of the State of Nevada, County of Washoe, or if the party can acquire subject-matter jurisdiction, in the United States District Court for the District of Nevada in the City of Reno. Each of the parties consents to the personal jurisdiction of such courts (and of the appropriate appellate courts) in any such action or proceeding and waives any objection to venue laid therein. Process in any action or proceeding referred to in the preceding sentence may be served on either party by sending it certified mail to the respective addresses designated for notice.

14. Indemnity:

Contractor agrees to hold harmless, indemnify, and defend City, its officers, agents, employees, and volunteers from any loss or liability, financial or otherwise resulting from any and all claims, demands, suits, actions, or causes of action, caused by any action, either direct or passive, the omission, failure to act, or negligence on the part of Contractor, its employees, agents, representatives, or Subcontractors arising out of the performance of work under this Agreement by Contractor, or by others under the direction or supervision of Contractor.

If City's personnel are involved in defending such actions, Contractor shall reimburse City for the time and costs spent by such personnel at the rate charged City for such services by private professionals.

In determining the nature of the claim against City, the incident underlying the claim shall determine the nature of the claim, notwithstanding the form of the allegations against City.

Nothing in this contract shall be interpreted to waive nor does the City, by entering into this contract, waive any of the provisions found in Chapter 41 of the Nevada Revised Statutes.

15. Licenses and Permits:

The Contractor shall procure at his own expense all necessary licenses and permits and shall adhere to all the laws, regulations and ordinances applicable to the performance of this Contract.

All Contractors, Sub-Contractors and Suppliers doing business within the City of Sparks are required to obtain a current business license from the City of Sparks prior to commencement of this contract. Per

Sparks Municipal Code Section 5.08.020A: "It is unlawful for any person to transact business in the City without first having obtained a license from the City to do so and without complying with all applicable provisions of this title and paying the fee therefore."

16. Insurance:

Contractor shall provide proof of Commercial General Liability Insurance and Automobile Liability, Professional Liability and Workers' Compensation if applicable. prior to initiation of any services under Bid, Proposal or Contract. Coverage shall be from a company authorized to transact business in the State of Nevada and the City of Sparks and shall meet the following minimum specifications:

CONTRACTOR'S ATTENTION IS DIRECTED TO THE INSURANCE REQUIREMENTS BELOW. IT IS HIGHLY RECOMMENDED THAT CONTRACTORS CONFER WITH THEIR RESPECTIVE INSURANCE CARRIERS OR BROKERS TO DETERMINE IN ADVANCE OF BID SUBMISSION THE AVAILABILITY OF INSURANCE CERTIFICATES AND ENDORSEMENTS AS PRESCRIBED AND PROVIDED HEREIN. IF ANY CONTRACTOR FAILS TO COMPLY STRICTLY WITH THE INSURANCE REQUIREMENTS, THAT CONTRACTOR MAY BE DISQUALIFIED FROM AWARD OF THE CONTRACT.

INDUSTRIAL INSURANCE

It is understood and agreed that there shall be no Industrial Insurance coverage provided for Contractor or any Sub-Contractor of the Contractor by the City. Contractor agrees, as a precondition to the performance of any work under this Agreement and as a precondition to any obligation of the City to make any payment under this Agreement to provide City with a certificate issued by an insurer in accordance with NRS 616B.627 and with a certificate of an insurer showing coverage pursuant to NRS 617.210.

It is further understood and agreed by and between City and Contractor that Contractor shall procure, pay for, and maintain the above mentioned industrial insurance coverage at Contractor's sole cost and expense.

Should Contractor be self-funded for Industrial Insurance, Contractor shall so notify City in writing prior to the signing of this Contract. City reserves the right to approve said retentions, and may request additional documentation, financial or otherwise, for review prior to the signing of this Contract.

MINIMUM LIMITS OF INSURANCE

CONTRACTOR shall maintain coverages and limits no less than:

1. General Liability: $1,000,000 (or amount customarily carried by Contractor, whichever is greater) combined single limit per occurrence for bodily injury, personal injury and property damage. If Commercial General Liability Insurance or other form with a general aggregate limit is used, the general aggregate limit shall be increased to equal twice the required occurrence limit or revised to apply separately to this project or location.

2. Automobile Liability: $1,000,000 combined single limit per accident for bodily injury and property damage. No aggregate limit may apply.

3. Contractor Errors and Omissions Liability: $1,000,000 per claim and as an annual aggregate. Premium costs incurred to increase Contractor's insurance levels to meet minimum contract limits shall be borne by the Contractor at no cost to the City.

4. Workers' Compensation: Contractor shall provide proof of worker's compensation insurance as required by NRS 616B.627 or proof that compliance with the provisions of Nevada Revised Statutes, Chapters 616A-D and all other related chapters is not required.

Contractor will maintain Contractor liability insurance during the term of this Agreement and for a period of three (3) years from the date of substantial completion of the project. In the event that Contractor goes out of business during the term of this Agreement or the three (3) year period described above, Contractor shall purchase Extended Reporting Coverage for claims arising out of Contractor's negligent acts, errors and omissions committed during the term of the Contractor Liability Policy.

Should City and Contractor agree that higher Contractor Coverage limits are needed warranting a project policy, project coverage shall be purchased and the premium for limits exceeding the above amount shall be borne by City. City retains the option to purchase project insurance through Contractor's insurer or its own source.

OTHER INSURANCE PROVISIONS

The policies are to contain, or be endorsed to contain, the following provisions:

1. General Liability and Automobile Liability Coverages
    a. City, its officers, agents, employees, and volunteers are to be included as insureds as respects damages and defense arising from: activities performed by or on behalf of Contractor, including the insured's general supervision of Contractor; products and completed operations of Contractor; premises owned, occupied, or used by Contractor; or automobiles owned, leased, hired, or borrowed by the Contractor. The coverage shall contain no special limitations on the scope of protection afforded to City, its officers, employees, or volunteers.
    b. Contractor's insurance coverage shall be Primary insurance with respect to the City, its officers, agents, employees, and volunteers. Any insurance or self-insurance maintained by City, its officers, employees, or volunteers shall be excess of Contractor's insurance and shall not contribute with it in any way.
    c. Any failure to comply with reporting provisions of the policies shall not affect coverage provided to City, its officers, agents, employees, or volunteers.
    d. Contractor's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.

2. Property Coverages (If Applicable)
    Contractor shall provide builders risk insurance on an "All Risk" basis on a policy form satisfactory to City. The limit of coverage will be the amount necessary to cover the bid value of any structures in the Contract or other value determined by

City. City reserves the right to require Contractor to provide boiler and machinery insurance coverage or other forms of property insurance. If the project is in a flood plain, City reserves the right to require flood coverage at Contractor's expense. Losses paid under the property insurance policy or policies shall be paid directly to City by the insurer(s).

3. All Coverages

Each insurance policy required by this clause shall be endorsed to state that coverage shall not be suspended, voided, canceled, or non-renewed by either Contractor or by the insurer, reduced in coverage or in limits except after thirty (30) days' prior written notice by certified mail, return receipt requested, has been given to City except for nonpayment of premium.

ACCEPTABILITY OF INSURERS

Insurance is to be placed with insurers with a Best's rating of no less than A-: VII. City, with the approval of the Risk Manager, may accept coverage with carriers having lower Best's ratings upon review of financial information concerning Contractor and insurance carrier. City reserves the right to require that Contractor's insurer be a licensed and admitted insurer in the State of Nevada, or on the Insurance Commissioner's approved but not admitted list.

VERIFICATION OF COVERAGE

Contractor shall furnish City with certificates of insurance and with original endorsements affecting coverage required by this contract. The certificates and endorsements for each insurance policy are to be signed by a person authorized by that insurer to bind coverage on its behalf.

Prior to the start of any Work, Contractor must provide the following documents to City of Sparks, Attention: Purchasing Division, P.O. Box 857, Sparks, NV 89432-0857:

A. Certificate of Insurance. Contractor must provide a Certificate of Insurance form to the City of Sparks to evidence the insurance policies and coverage required of Contractor.

B. Additional Insured Endorsements. An original Additional Insured Endorsement, signed by an authorized insurance company representative, must be submitted to the City of Sparks, by attachment to the Certificate of Insurance, to evidence the endorsement of the City of Sparks as additional insured.

C. Policy Cancellation Endorsement. Except for ten days notice for non-payment of premium, each insurance policy shall be endorsed to specify that without thirty (30) days prior written notice to the City of Sparks, the policy shall not be cancelled, non-renewal or coverage and/or limits reduced or materially altered, and shall provide that notices required by this paragraph shall be sent by certified mailed to the address specified above. A copy of this signed endorsement must be attached to the Certificate of Insurance.

D. Bonds (as Applicable). Bonds as required and/or defined in the original bid documents.

All certificates and endorsements are to be addressed to the City of Sparks, Purchasing Division and be received and approved by City before work commences. The City reserves the right to require complete certified copies of all required insurance policies at any time.

SUBCONTRACTORS

Contractor shall include all Subcontractors as insureds under its policies or shall furnish separate certificates and endorsements for each Subcontractor. All coverages for Subcontractors shall be subject to all of the requirements stated herein.

MISCELLANEOUS CONDITIONS

1. Contractor shall be responsible for and remedy all damage or loss to any property, including property of City, caused in whole or in part by Contractor, any Subcontractor, or anyone employed, directed, or supervised by Contractor.
2. Nothing herein contained shall be construed as limiting in any way the extent to which Contractor may be held responsible for payment of damages to persons or property resulting from its operations or the operations of any Subcontractors under it.
3. In addition to any other remedies City may have if Contractor fails to provide or maintain any insurance policies or policy endorsements to the extent and within the time herein required, City may, at its sole option:
    a. Purchase such insurance to cover any risk for which City may be liable through the operations of Contractor under this Agreement and deduct or retain the amount of the premiums for such insurance from any sums due under the Agreement;
    b. Order Contractor to stop work under this Agreement and/or withhold any payments which become due Contractor here under until Contractor demonstrates compliance with the requirements hereof; or,
    c. Terminate the Agreement.

17. Liquidated Damages:

If the Product is not delivered/Project is not completed within the time stipulated in the bid, the Contractor shall pay to the City of Sparks as fixed, agreed and liquidated damages for delay and not as a penalty (it being impossible to determine the actual damages occasioned by the delay) $_____ for each _____ day of delay until delivery is completed; the Contractor shall be liable to the City of Sparks for the amount herein. This amount may be deducted from money due or to become due to the Contractor as compensation under this proposal in the event the Contractor fails to meet delivery schedules or product specifications.

18. Material Breach of Contract:

In the event Contractor fails to deliver the product and services as contracted for herein, to the satisfaction of the City of Sparks or otherwise fails to perform any provisions of this Contract, the City, after providing five (5) days written notice and Contractor's failure to cure such breach within the time specified in the notice, may without waiving any other remedy, make good the deficiencies and deduct the actual cost of providing alternative products and/or services from payment due the Contractor. Non-performance after the first notice of non-performance shall be considered a material breach of contract.

19. Force Majeure:
Neither party to the Contract shall be held responsible for delay or default caused by fire, riot, acts of God, and/or war which is beyond that party's reasonable control. City may terminate the Contract upon written notice after determining such delay or default will reasonably prevent successful performance of the Contract.

20. Termination:
The City may terminate the Contract for material breach of contract upon ten (10) days written notice and recover all damages, deducting any amount still due the Contractor from damages owed to the City, or seek other remedy including action against all bonds. The Contractor may terminate the Contract for material breach of contract upon thirty (30) days written notice to the City.

21. Assignment:
All of the terms, conditions and provisions of this Contract, and any amendments thereto, shall inure to the benefit of and be binding upon the parties hereto, and their respective successors and assigns. The Contractor shall not assign this Contract without the written consent of the City which will not be unreasonably withheld.

22. Entire Contract:
This Contract constitutes the entire agreement of the parties and shall supersede all prior offers, negotiations, agreements and contracts whether written or oral. Any modifications to the terms and conditions of this Contract must be in writing and signed by both parties.

23. Severability:
If any part of this Contract is found to be void it will not affect the validity of the remaining terms of this Contract which will remain in full force and effect.

24. Headings:
Paragraph titles or captions contained in this Contract are inserted only as a matter of convenience and for reference only, and in no way define, limit, extend, or describe the scope of this Contract or the intent of any provision herein.

25. Singular Includes the Plural; Gender; Title Reference:
Whenever the singular number is used in this Contract and when required by the context, the same shall include the plural, and the use of any gender, be it masculine, feminine or neuter, shall include all of the genders, and the word “person” or “entity” shall include corporation, firm, partnership, or any other combination or association.

The use of the title “Bidder”, “Vendor”, “Contractor” or “Consultant” within this contract or associated bid documents shall be deemed interchangeable and shall refer to the person or entity with whom the City of Sparks is contracting for the service or product referenced within this contract.

26. Execution:

The parties agree to execute such additional documents and to take such additional actions as are reasonably necessary or desirable to carry out the purposes hereof. They also agree, acknowledge and represent that all corporate authorizations have been obtained for the execution of this Contract and for the compliance with each and every term hereof. Each undersigned officer, representative or employee represents that he or she has the authority to execute this Contract on behalf of the party for whom he or she is signing.

IN WITNESS WHEREOF, the City of Sparks has caused this Contract to be executed by its officers thereunto duly authorized and the Consultant has subscribed same, all on the day and year first above written.

_____	CITY OF SPARKS, NEVADA
(Vendor)	A Municipal Corporation
By: _____	By:_____
	Geno R. Martini, Mayor
_____	
(Title)	
APPROVED AS TO FORM	ATTEST:
_____	_____
City Attorney	Teresa Gardner, City Clerk

CITY OF SPARKS, NEVADA - BOND OF FAITHFUL PERFORMANCE

Bid #: _____
Bond #: _____
Surety Rating: _____
NV License #: _____
Appt. Agent Countersigning - List below with address

KNOW ALL MEN BY THESE PRESENTS: That WHEREAS, the City of Sparks in the State of Nevada has awarded to (**CONTRACTOR NAME)** hereinafter designated as the "Principal" a contract for Bid # **BID NUMBER**, PWP # **PWP NUMBER**, for the **PROJECT TITLE** and

WHEREAS, said Principal is required under the terms of said contract to furnish a bond for the faithful and proper performance of the Contract and the Bonding Company has an "A" or better rating with Moody's or A.M. Best and T-Listed with the U.S. Treasury Department;

NOW, THEREFORE, we the Principal and _____ as Surety, are held and firmly bound unto the City of Sparks in the State of Nevada, in the penal sum of (**WRITTEN COST)** dollars ($_____), lawful money of the United States, being not less than one hundred percent (100%) of the estimated contract cost of the work, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that if the above bound Principal, his or its heirs, executors, administrators, successors or assigns, shall in all things stand to and abide by, and well and truly keep and faithfully perform the covenants, conditions and agreements in the said contract and any alterations made as therein provided on his or their part to be kept and performed at the time and in the manner therein specified, and in all respects according to their true intent and meaning, and shall indemnify and save harmless the City of Sparks in the State of Nevada, its officers and agents as therein stipulated, then this obligation shall become null and void; otherwise, it shall be and remain in full force and virtue.

As a condition precedent to the satisfactory completion of the said contract, the above obligation shall hold good for a period of one (1) year after the completion and acceptance of the said work, during which time, if the above bounden principal, his or its heirs, executors, administrators, successors or assigns shall fail to make full, complete and satisfactory repair and replacements or totally protect the said City of Sparks in the State of Nevada from loss or damage made evident during said period of one (1) year from the date of acceptance of said works, and resulting from or caused by defective materials or faulty workmanship in the prosecution of the work done, the obligation in the said sum of (**WRITTEN COST)** dollars ($_____) shall remain in full force and virtue; otherwise the above obligation shall be void.

And the said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of the contract or to the work to be performed thereunder or the specifications accompanying the same shall in anyway effect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration, or addition to the terms of the contract, to the work or to the specifications.

IN WITNESS WHEREOF, the above bound parties have executed this instrument under their seals this _____ day of _____, 20___, the name and corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

_____
_____
_____
Principal

By _____
_____
_____
_____
Surety
By _____

CITY OF SPARKS, NEVADA – Payment Bond – Labor & Materials

Bid #: _____
Bond #: _____
Surety Rating: _____
NV License #: _____
Appt. Agent Countersigning - List below with address

KNOW ALL MEN BY THESE PRESENTS: That WHEREAS, the City of Sparks in the State of Nevada, has awarded to **CONTRACTOR**, hereinafter designated as the "Principal" a Contract for Bid # **BID NUMBER**, PWP # **PWP NUMBER**, for the **PROJECT TITLE** and

WHEREAS, said Principal is required under the terms of said contract to furnish a Bond for the faithful and proper performance of the Contract and the Bonding Company has an "A" or better rating with Moody's or A.M. Best and T-Listed with the U.S. Treasury Department;

NOW, THEREFORE, we, the Principal, and _____ as Surety, are held and firmly bound unto the City of Sparks in the State of Nevada, in the penal sum of **WRITTEN AMOUNT** dollars ($_____), lawful money of the United States, being not less than one hundred percent (100%) of the estimated contract cost of the work for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally firmly by these presents.

NOW, THEREFORE, THE CONDITION OF THIS OBLICATION IS SUCH that if the above bounden principal, his or its heirs, executors, administrators, successors, or assigns, shall fail to pay for any materials, provisions, provender or other supplies, implements, or machinery used in, upon, for, or about the performance of the work contracted to be done or for any work or labor thereon of any kind, or for amounts due under the Unemployment Compensation Law with respect to such work or labor as required by the provisions of NRS 612, and provided that the claimant shall have complied with the provisions of said law, the Surety hereon will pay for the same within thirty (30) calendar days an amount not exceeding the sum specified in this bond, then the above obligation shall be null and void; otherwise to remain in full force and account. In case suit is brought upon this bond, the said Surety agrees to pay a reasonable attorney's fees to be fixed by the Court.

The Bond shall insure to the benefit of any and all persons, companies and corporations entitled to file claims under NRS 339 as to give a right of action to them or their assigns in any suit brought upon this Bond.

IN WITNESS WHEREOF, the above bound parties have executed this instrument under their seals this _____ day of _____, 20___, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

_____
_____
_____
Principal

By _____

_____
_____
_____
Surety

By _____