



**ADDENDUM NO. 3  
TO THE**

**4S Ranch Neighborhood 1 Sewer Pump Station Replacement Project  
For Olivenhain Municipal Water District**

January 11, 2022

The following addendum shall be made part of the Bidding Opportunity. **The deadline for submitting proposals REMAINS UNCHANGED at 2:00 p.m. Thursday, January 13, 2022 at 1966 Olivenhain Road, Encinitas, CA 92024.**

**The public bid open will occur via Zoom. The bid reading will begin at 2:05 p.m. to allow time to sign on to Zoom. Please see Project at a Glance – Amended attachment for Zoom Meeting information.**

**ADDENDUM SECTION 1 – BIDDING QUESTIONS**

1. Q: Specification Section 17150 3.2 states “The PLC software program will be fully configured and tested by the District’s Programmer...”, “The communications shall be fully configured and installed by District Programmer”, and “The District’s Programmer will modify the District’s SCADA software”. The amended Bid Schedule Item No. 20 states “System Programming and Integration.” Specification Section 17100 1.1 states “The Contractor shall...provide additional programming of the human-machine interface (HMI) software at the WWTP...” Is the programming of the PLC, Communications equipment, and SCADA HMI the responsibility of the Contractor through an approved System Integrator per the qualifications listed in Specification Section 17000 1.3 or the responsibility of the District outside of this contract?

**A: This is the responsibility of the contractor. Refer to the amended Section 17150 Programmable Logic Controller, Part 3.2.**

2. Q: Is there any new Communication Equipment required to be supplied by the Contractor on this project? If so, please provide technical specifications for the equipment.

**A: No.**

3. Q: Is a radio path study to be provided by the Contractor as part of this bid between the 4S-1 Reservoir and Neighborhood 1 Lift Station to determine antenna heights and directions?

**A: No.**

4. Q: Section 14630 - Bridge Cranes: 2.5 Trolley Is requesting “articulating type” bridge crane system. 2.7 Crane Drives is requesting motorized trolley drives. Articulating type bridge cranes do not come in with a motorized system per the manufacture (TC American). If a true motorized system is required then we

will need to change to a standard underhung bridge crane system without the ability to articulate. This will be a question to the end user. Drawing # M-4 shows an enclosed track for the runways and the bridge crane. The bridge shows a tractor drive system. Drawing S12 shows the same enclosed track system but the runways have a W16X31 I beam superimposed over the runways. Please confirm what type of runway system will be used. This will determine what type of crane system the end user will ultimately end up having. Specht Industries recommends that we use a Spanmaster Articulating Bridge Crane with manual push/pull bridge and an electric chain hoist with a manual push/pull hoist trolley. Both manual systems are very easy to move by the operator from the ground even under load. This system will utilize the W16X31 runway system in drawing #S12.

**A: Motorization of the bridge and trolley are required. A standard underhung bridge crane system would be acceptable given that it meets the specifications, mounting, space, and clearance requirements shown on the plans. As 'or equals', subject to OMWD approval are allowed per Specification Section 14630.2.14, please submit an 'or equal' through the contractor via the standard submittal procedure. Refer to the amended Section 14630 Bridge Crane.**

5. Q: Specification Section 15860 FRP DUCTWORK – Can a Duct schedule be added for the Fiberglass ductwork? It is not called out on any of the drawings or in the specification. Please provide a description on what duct is FRP. As a reminder FRP is inexpensive and is highly corrosion resistant.

**A: All ducting is FRP. The District's Engineer has determined there is adequate information provided to prepare a cost for this item.**

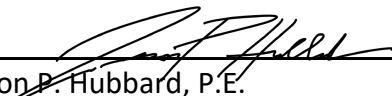
## **ADDENDUM SECTION 2 – REVISIONS**

1. Project at a Glance – **REMOVE** Project at a Glance  
**REPLACE** with Project at a Glance – Amended
2. Section 17150 Programmable Logic Controllers – **REMOVE** Programmable Logic Controllers  
**REPLACE** with Section 17150 Programmable Logic Controllers – Amended
3. Section 14630 Bridge Crane – **REMOVE** Bridge Crane  
**REPLACE** with Section 14630 Bridge Crane – Amended

## **END OF ADDENDUM NO. 3**

Attachments: Project at a Glance – Amended  
Section 17150 Programmable Logic Controllers – Amended  
Section 14630 Bridge Crane – Amended

APPROVED:  
**OLIVENHAIN MUNICIPAL WATER DISTRICT**

  
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Jason P. Hubbard, P.E.  
Engineering Manager



## PROJECT INFORMATION AT A GLANCE

<b>Project Name</b>	4S Ranch Neighborhood 1 Sewer Pump Station Replacement
<b>Project Number</b>	D700004
<b>Estimated Const. Cost</b>	\$3.9 Million
<b>Pre-Bid Meeting Date</b>	Thursday, December 2 <sup>nd</sup> , 2021 at 10:00 a.m. 4S Ranch Neighborhood 1 Sewer Pump Station: 16106 4S Ranch Parkway, San Diego, CA 92127
<b>Pre-Bid Questions Due</b>	No later than Friday, January 7 <sup>th</sup> , 2022 at 5:00 p.m. <a href="mailto:prebid@olivenhain.com">prebid@olivenhain.com</a>
<b>Bid Due Date</b>	Thursday, January 13 <sup>th</sup> , 2022 at 2:00 p.m.  Bids due to OMWD Headquarters: 1966 Olivenhain Road, Encinitas, CA 92024  Bid Open will occur via Zoom Meeting: <a href="https://us02web.zoom.us/j/85989567187">https://us02web.zoom.us/j/85989567187</a>  <b>Meeting ID: 859 8956 7187</b> <b>Passcode: 915832</b>  Dial by your location +1 669 900 9128 US (San Jose) +1 346 248 7799 US (Houston) +1 253 215 8782 US (Tacoma)  *Public bid reading to begin a 2:05 p.m. to allow time to sign on to Zoom Meeting.

Please note, this sheet is meant for informational purposes only. Please be sure to carefully read and review the contract documents prior to submitting your bid. The District reserves the rights to reject a bid if any information is found to be incomplete.

## **SECTION 17150 – PROGRAMMABLE LOGIC CONTROLLERS – AMENDED**

### **PART 1 – GENERAL**

#### **1.1 SCOPE**

- A. This section covers Programmable Logic Controllers (PLCs), and Operator Interface Terminals (OIT), including associated input/output hardware to control process equipment and serve as the interface to field devices.

#### **1.2 GENERAL**

- A. Equipment furnished and installed under this section shall be fabricated, assembled, erected, and placed in proper operating condition in full conformity with the Drawings, Specifications, engineering data, instructions, and recommendations of the equipment manufacturer, unless exceptions are noted by Engineer.
- B. General Equipment Stipulations.
  - 1. The General Equipment Stipulations shall apply to all equipment and materials furnished under this section. If requirements in this specification differ from those in the General Equipment Stipulations, the requirements specified herein shall take precedence.

### **PART 2 – PRODUCTS**

#### **2.1 GENERAL**

- A. General: Each PLC shall be of solid-state design. All central processor (CPU) operating logic shall be contained on plug-in modules for quick replacement. Chassis-wired logic is not acceptable. The controller shall be capable of operating in a hostile industrial environment and designed to provide high reliability specifically in this process application. The internal wiring of the controller is to be fixed, with the logic functions it must perform in a given application to be programmed into its memory. The controller shall be supplied with the CPU, input/output scanner, inputs, outputs, memory, power supply, and all power and interface cables necessary to function as a complete and operable PLC system.
- B. Design: Each PLC shall have all of the facilities required to implement the control schemes and database indicated. Instrumentation and control system shall have the following functions and features:
  - 1. Modular, field-expandable design allowing the system to be tailored to this process control application. The capability shall exist to allow for expansion of the system by the addition of hardware and/or user software.
  - 2. The processor plus input and output circuitry shall be of a modular design

## SECTION 17150 – PROGRAMMABLE LOGIC CONTROLLERS – AMENDED

with interchangeability provided for all similar modules. Modules are defined herein as devices that plug together to form an interlocking modular chassis. The design must prohibit upside-down insertion of the modules.

3. The PLC shall have downward compatibility whereby all new module designs can be interchanged with all similar modules in an effort to reduce obsolescence.
  4. All hardware shall operate at an ambient temperature of 0 to 60 degrees C (32 to 140 degrees F), with an ambient temperature rating for storage of - 40 to + 85 degrees C (- 40 to + 185 degrees F), and shall function continuously in the relative humidity range of 5 percent to 95 percent with no condensation. The PLC system shall be designed and tested to operate in the high electrical noise environment of an industrial plant.
  5. The PLC shall provide a means for mounting the chassis in a standard cabinet.
- C. Central Processors: The CPU shall contain all the relays, timers, counters, number storage registers, shift registers, sequencer, arithmetic capability, and comparators necessary to perform the indicated control functions. It shall be capable of interfacing sufficient discrete inputs, analog inputs, discrete outputs, and analog outputs as shown on the drawings. The Processor shall be an Allen Bradley ControlLogix 1756-L61, as shown on the Drawing, no exceptions. The CPU shall be supplied with a 64 MB Compactflash card Allen-Bradley 1784-CF-64, or equal. The instrumentation and control system shall have the following features and capabilities:
1. Modular, field-expandable design allowing the system to be tailored to this process control application. The capability shall exist to allow for expansion of the system by the addition of hardware and/or user software.
  2. The CPU shall be a self-contained unit, and shall provide control program execution and support remote or local programming. This device shall also supply I/O scanning and inter-processor and peripheral communication functions.
  3. The operating system shall be contained in removable programmable devices which allow for easy field replacement.
  4. The CPU within the system shall perform internal diagnostic checking and give visual indication to the user by illuminating a "green" indicator when no fault is detected and a "red" indicator when a fault is detected.
  5. Non-volatile memory shall store the operating system information to protect against loss in the case of power loss or system shut-down. Only at the time of a hardware change shall this configuration status be altered or re-entered.

## SECTION 17150 – PROGRAMMABLE LOGIC CONTROLLERS – AMENDED

6. Storage (Memory).
  - a. The program storage medium shall be of a static RAM type.
  - b. The PLC system shall be capable of addressing up to 768 kilobytes, where each word is comprised of 8 data bits.
  - c. Memory capacity shall be configurable to allow for the most economical match to the intended application. It shall be possible to upgrade to a processor with a larger memory size simply by saving a program, replacing the processor, and downloading the program to the new system without having to make any program changes.
  - d. Memory shall contain battery back-up capable of retaining all stored program data through a continuous power outage for 4 months under worst case conditions. The capability shall exist to remove all batteries from the system without removing system power. A low battery condition must be detectable in ladder logic, but shall not automatically generate a major fault.
  - e. The operator shall be able to backup volatile memory, including data and program logic, onto external hard disk, at their option.
  - f. All user memory in the processor not used for program storage shall be allocatable from main memory for the purpose of data storage. The PLC system shall be capable of storing the following data types:
    - i. External Output Status
    - ii. External Input Status
    - iii. Timer Values
    - iv. Counter Values
    - v. Signed Integer Numbers (16-bit)
    - vi. Floating Point Numbers
    - vii. Decimal Numbers
    - viii. Binary Numbers
    - ix. BCD Numbers
    - x. Direct and Indexed Addressing

## SECTION 17150 – PROGRAMMABLE LOGIC CONTROLLERS – AMENDED

- xi. Internal Processor Status Information
  - xii. ASCII Character Data
  - xiii. ASCII String Data
  - xiv. Block Transfer Control Structures
  - xv. Floating Point PID Control Structures
  - xvi. File Instruction Control Structures
  - xvii. Message Control Structures
7. Control logic programs shall have immediate access to the sub-elements of control structures by address and sub-element mnemonic, such as timer accumulator value, timer done bit, or PID Process Variable value.
8. Each unit shall be supplied with memory to implement the indicated control functions. The memory shall be programmed in a multi-mode configuration with multiple series or parallel contacts, counters, timers, and arithmetic functions.
- D. Ethernet Interface and Network.
1. The PLC system shall offer industry standard Ethernet TCP/IP communication capabilities. The controller shall be able to connect to industry standard 10baseT media types by implementing a standard RJ-45 transceiver port that can connect to different transceivers. The PLC shall have a selectable option of using 802.32 as the interface to the network as well as DIX Ethernet II. There shall be a software protocol layer that uses TCP/IP as the transport mechanism to deliver packets of data to other instrumentation and control system devices that use the same protocol. This protocol handles the addressing and transfer of all the specific data file types in the PLC to allow for peer-to-peer messaging.
- a. Token passing system
  - b. Peer-to-peer communication
  - c. Message error checking
  - d. Retries of unacknowledged messages
  - e. Diagnostic checks on other stations
  - f. Interface to more than one network

## **SECTION 17150 – PROGRAMMABLE LOGIC CONTROLLERS – AMENDED**

- g. A user-oriented command language for manipulation of data structures of variable size and organization, such as setting or resetting bits, word and file transfers in a peer processor
    - h. The ability to perform PLC memory uploads and downloads
    - i. The ability to communicate with all other models of PLC manufactured by said manufacturer
    - j. The ability to monitor the status of any processor remotely via the network
    - k. The ability to automatically broadcast data to (and receive data from) all compatible stations on the link. Once configured, this operation shall be continuous without operator intervention
    - l. A gateway interface to the Ethernet TCP/IP network for connectivity to host computers as well as other instrumentation and control system devices that have direct Ethernet connectivity
  - 2. The PLC system shall allow industry standard repeaters, bridges, routers, and gateways on the network in order to access other instrumentation and control system devices and host computers. The controller shall be able to name a specific gateway/router IP address in order to direct data to other networks.
  - 3. On-line programming and upload/downloads of control programs shall be able to occur over the Ethernet network.
- E. PLC Power Supply
- 1. The PLC shall operate in compliance with an electrical service of 24 VDC. The power supply shall be mounted in the PLC housing and be sized to power all modules mounted in that housing and an "average module load" for any empty housing slots plus 25 percent above that total. Power supply shall be by the same manufacturer as the PLC and shall be of the same product line. A single main power supply shall have the capability of supplying power to the CPU and local input/output modules. Auxiliary power supplies shall provide power to remotely located racks.
  - 2. The power supply shall be Allen-Bradley 1756-PB75.
- F. PLC Input/Output (I/O) Modules
- 1. I/O Modules General: All I/O housings and modules shall be suitable for hostile industrial environments. The I/O's shall be 4-20 mA DC for all analog inputs and outputs and shall be 24VDC for discrete inputs and dry relay contacts for safe discrete outputs. Each PLC I/O location shall contain the I/O module quantity and type as shown on the Drawings.



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2. Discrete Input Modules: Defined as contact closure inputs from devices external to the programmable controller module. Input modules shall be Allen-Bradley 1756-IB16.
3. Discrete Output Modules: Defined as contact closure outputs for ON/OFF operation of devices external to the programmable controller module. Discrete output contacts shall be provided with interposing relays in the control panel. Output modules shall be Allen-Bradley 1756-OX8I.
4. Analog Input Modules: Defined as 4 to 20 mA DC signals, where an analog to digital conversion is performed with 14-bit precision and the digital result is entered into the processor. The analog to digital conversion shall be updated with each scan of the processor. Input modules shall be source or sink to handle 2-wire or 4-wire transmitters, respectively. Input modules shall be Allen-Bradley 1756-IF8.
5. Analog Output Module: Defined as 4 to 20 mA DC signals, where an analog to digital conversion is performed with 13-bit precision and the digital result is entered into the processor. Output modules shall be Allen-Bradley 1756-OF6CI.

### **2.2 NOT USED**

### **2.3 PROGRAMMING SOFTWARE**

- A. System Supplier shall furnish one licensed copy of PLC programming software for the District.
- B. The software shall be suitable for running on a laptop computer running Windows XP operating system software. A full legal set of programming software documentation shall accompany each copy of the software. Each copy of the programming software shall include all necessary device drivers and add-on software packages.
- C. The PLC programming software shall be RSLogix 5000 Professional by Rockwell Automation.

### **2.4 SYSTEM ENCLOSURES**

- A. Programmable logic controllers and input/output hardware shall be housed in shop-assembled panels as described in the Panels section.

### **2.5 OPERATOR INTERFACE TERMINALS**

- A. Operator interface terminals (OIT) shall be microprocessor-based flat panel type. The unit shall have data entry capabilities and shall include a password security function. The unit shall be connected to the PLC and shall display status, alarm, and diagnostic information. The unit shall provide a nominal diagonal display area dimension of 5. The operator interface unit shall be provided with an

## **SECTION 17150 – PROGRAMMABLE LOGIC CONTROLLERS – AMENDED**

Ethernet port for communications, and one serial RS-232 or RS-485 port for programming. The OIT shall be rated NEMA 4X, suitable for panel face.

- B. Terminals shall be powered from 24 VDC. Terminals shall be suitable for ambient temperatures of +32 to +130°F and a relative humidity of 5 to 95 percent.
- C. One licensed copy of the OIT software used to create the screens shall be turned over to the District upon successful startup and commissioning of the system.
- D. The operator interface unit shall be an Allen Bradley Panelview 7 with color touch screen.
- E. The OIT shall provide graphic screens that shall be used by the operators to access all functions and setpoints necessary for comprehensive control. The supplier shall be responsible for developing and configuring the custom graphic displays. Each piece of major process equipment that is monitored and controlled by the control system shall be displayed on the graphic screens. Graphic screens shall be representations of the equipment and piping. The screens must accurately show all devices and equipment that is part of the control loops. The supplier shall use the software configuration standards and conventions to be established by direct coordination with the District that shall describe and define such items as proposed graphic display process line colors/representations; color standards for “on”, “off”, “opened”, “closed”, and “alarm” conditions; alarm handling conventions; how items will be selected for control; methods for navigation between displays; address usage/naming conventions; and security setup. Displays will be designed and programmed by the District’s System Integrator. The System Integrator will load the displays into the OIT and test them at Factory Test and during startup with Contractor’s support.

### **PART 3 – EXECUTION**

#### **3.1 INSTALLATION REQUIREMENTS**

- A. Field check, testing, and training shall be as specified in the Instrumentation and Control System section.

#### **3.2 SOFTWARE CONFIGURATION**

- A. PLC Programming and Configuration (by District)
  - 1. The PLC software program will be fully configured and tested by the Contractor’s System Integrator with full support of the Contractor.
- B. Communications Configuration

## **SECTION 17150 – PROGRAMMABLE LOGIC CONTROLLERS – AMENDED**

1. The communications shall be fully configured and installed by the Contractor's Systems Integrator. Communication requirements, such as IP addressing shall be coordinated with the District.
- C. District SCADA HMI
1. The Contractor's System Integrator will modify the District's SCADA software at Central to add the new pump station PLC and will test the changes with Contractor's support.

**\*\*END OF SECTION\*\***

## **SECTION 14630 – BRIDGE CRANE – AMENDED**

### **PART 1 – GENERAL**

#### **1.1 DESCRIPTION**

- A. The Contractor shall furnish all labor, materials and services to design, fabricate, install, and test the underhung crane system as specified herein and in accordance with the Contract Documents. The Contractor shall coordinate all disciplines required to perform the crane system installation.
- B. Installation, 125% field load test, and Cal-OSHA certification and operator training.

#### **1.2 RELATED WORK SPECIFIED ELSEWHERE**

- A. Section 01300 – Record Drawings and Submittals
- B. Section 11000 – Equipment General Provisions
- C. Section 16010 – Basic Electrical Requirements

#### **1.3 REFERENCE SPECIFICATIONS, CODE AND STANDARDS**

- A. Definitions of terms used in this Section shall be as used in the Glossary of ANSI MH27.1 as prepared by the Monorail Manufacturers Association (MMA). The latest editions of the following specifications and codes shall be conformed to the extent applicable for the application under consideration:
  - 1. For all equipment: NFPA-70 National Electric Code (N.E.C)
  - 2. For underhung bridge cranes and monorail systems: ANSI B30.11 Safety Standard for Monorails and Underhung Cranes, ANSI MH27.1 Specifications for Underhung Cranes and Monorail Systems
  - 3. For hoists: ANSI B30.16 Safety Standard for Overhead Hoists, HMI Standard (Underhung), ANSI/ASME HST-1 Performance Standards for Electric Chain Hoists
  - 4. Specifications for Design, Fabrication and Erection of Steel for Buildings of the American Institute of Steel Construction (AISC)
  - 5. American Welding Society (AWS) D14.1 Specifications for Welding Industrial and Mill Cranes and D1.1 Code for Welding in Building Construction
  - 6. Occupational Safety and Health Act (OSHA)

#### **1.4 SUBMITTALS**

- A. The following shall be submitted in compliance with Section 01300.
  - 1. Replacement parts lists and maintenance manuals for equipment after shipment. These manuals shall include key component breakaway

## SECTION 14630 – BRIDGE CRANE – AMENDED

pictures for ease of parts ordering, catalog cut pages, part numbers, sub-assembly details, and periodic inspection and maintenance requirements recommendations.

2. Drawings showing plan, elevation and sectional views of the bridge crane system.
3. Complete wiring diagrams, showing all electrical devices, numbered terminal strips and wiring.
4. Actual wire rope breaking strength certification and magnetic particle inspection report for hood and nut.

### 1.5 QUALITY ASSURANCE

All materials shall be new and the completed overhead handling system shall be the product of one crane manufacturer regularly engaged in the production of such equipment.

## PART 2 – MATERIALS

### 2.1 GENERAL

- A. The bridge crane system shall be controlled from a pendant pushbutton station and be furnished complete with all required safety devices and overload protection. The power supply shall be from enclosed, UL-listed conductor bar systems. The rails shall be specially fabricated steel sections, firmly anchored to the structure as indicated and as required by the UBC for seismic loads and in accordance with AISC design manual recommendations. The track deflection shall not exceed 1/800 of the span or 1-1/4", whichever is least. The completed crane system shall be the product of one crane manufacturer regularly engaged in the manufacture of such equipment.
- B. All equipment shall be designed for minimum "Class C" (Moderate Service) as specified in the ANSI MH27.1 Specifications and operate in normal ambient temperatures (0 to 40 degrees Celsius) and normal indoor conditions, free from excessive dust, moisture and corrosive fumes.
- C. All material shall be cleaned of loose rust, mill scale and foreign matter per SP2/SP3. Crane bridges, hoists, trolleys, runways and suspension fittings shall be shop painted with one coat of primer and manufacturer's standard machinery enamel finish. Equipment must be adequately protected against damage and runs in shipment.
- D. Where powered hoists are used, an impact allowance shall be included in design calculations for carriers (trolleys), cranes and runway monorail tracks. The impact allowance shall be 1/2% of the rated load for each foot per minute (1.6% of the rated load for each meter per minute) of hoisting speed, with a minimum allowance of 15% and maximum of 50%.

## SECTION 14630 – BRIDGE CRANE – AMENDED

### 2.2 TRACK AND FITTINGS

- A. The track shall be a specially fabricated section with a special rolled bottom section having a raised flat tread with a minimum bottom flange width of 3 1/4". Bottom flange shall have a minimum ultimate tensile strength of 125,00 p.s.i. with a minimum Brinell hardness of 225. Track shall be straight, with factory prepared ends. No rough-cut ends will be permitted. Holes shall be factory punched or drilled.
- B. The track size shall be computed based on the load positioned on the track system to produce the most severe conditions of stress and deflection.
- C. The total track deflection shall not exceed 1/800th of the span or 1 1/4", whichever is the least.
- D. Track end stops shall be of the bolted type and shall be capable of withstanding the impact of a fully loaded crane or carrier traveling at 50% of the full load speed.
- E. Standard structural shapes or modifications of structural shapes will not be accepted for the track.

### 2.3 TRACK SUSPENSIONS

- A. All necessary bolt and other fittings from which the track system is suspended, shall be provided as part of the overhead track system. Track hanger supports shall be spaced as per the drawings or as specified.
- B. Means shall be provided to allow for minimum 1" vertical adjustment of the track both before and after the system has been put in operation so that the track can be erected and maintained level.
- C. All suspension fittings shall be furnished with ASTM A-325 mounting bolts.

### 2.4 TRACK ELECTRIFICATION

- A. Conductor bar shall be roll formed electro-galvanized steel sections, rated 110 amps continuous. Insulation cover shall be rigid, bright orange PVC, self-extinguishing, with an operating temperature of 150° F.
- B. Conductors are to be complete with mounting clips, end caps, splices with covers and power feeds.
- C. Current collectors shall be the sliding double shoe type, spring-loaded and so designed that sparking and loss of contact will be minimized.
- D. Separate conductors shall be provided for each phase. More than one conductor in a single enclosure will not be permitted.

## SECTION 14630 – BRIDGE CRANE – AMENDED

### 2.5 TROLLEYS

- A. Crane and truck trolley assemblies shall be articulating type, such that the articulated connection shall permit rotational movement in all three axes. Load bars shall be cradled in yokes in such a manner to assure that all wheels are in contact with the operating flange at all times.
- B. Yokes shall be ductile castings, forgings or steel and shall be fixture machined.
- C. Design shall be such as to facilitate easy installation or removal of wheels at any point along the track system without removing the carrier assembly from the track.
- D. Trolley wheels shall be made from high strength forged or machined steel, 5" minimum tread diameter. The wheel tread shall be accurately machined to assure concentricity of axle and tread, and hardened to 425 Brinell. Wheels are to be furnished with electroplate finish, black oxide, or equal treatment, in lieu of paint.
- E. Wheel bearings shall be double row precision ball or taper roller bearings, lubricated and sealed at assembly, and fitted with external grease fittings. Bearings must have a minimum B-10 life of 5,000 hours.
- F. Flangeless wheels with side guide rollers may be provided in lieu of flanged wheels.

### 2.6 CRANE END TRUCKS

- A. End trucks shall consist of steel weldments bolted direct to the crane bridge member, providing a rigid and square connection.
- B. The ratio of crane span to wheelbase shall be a minimum of 10:1.
- C. Restraining lugs shall be provided to limit drop of end truck to not more than 1" in the event of wheel, yoke, axle, or load bar failures. Restraining lugs shall be placed on both sides of the rail so that if failure occurs, the rail is centrally loaded about the vertical axis.
- D. End trucks shall be provided with energy absorbing bumpers at all outboard ends.
- E. End trucks wheelbase shall be 60" with an overall length of 72".

### 2.7 CRANE DRIVES

- A. The following type of crane drive shall be used on the crane as a means of power to propel the crane:
  - 1. Crane shall be driven by individual motorized trolley drives mounted on two or more end trucks, which provide traction dependent upon wheel loads. Both motorized trolley wheels shall be driven simultaneously through a specially machined drive pinion. Drive wheels shall have hardened treads and employ side guide rollers.

## **SECTION 14630 – BRIDGE CRANE – AMENDED**

2. Motors shall be squirrel cage inverter duty type, totally enclosed. Motor shall be provided with lifetime lubricated anti-friction bearings, unless otherwise specified.
3. Drive motors shall be provided with a magnetic disc type electric motor brake.

### **2.8 CROSS BRIDGE ELECTRIFICATION**

- A. The following type of electrical power system shall be employed as a means of supplying power and control for hoist and crane travel motions.
  1. Festooned system consisting of multiconductor flat cables suspended from trolleys operating on a rigid trolley track mounted parallel to the bridge girder. Trolleys are to be equipped with cable saddles and clamps. The ends of each wire are to be prepared and tagged for field connection to the hoist and shall include a flat cable connector for adapting to the control panel.
  2. Factory mounting and wiring of festooned systems is required.

### **2.9 CRANE CONTROLS**

- A. Controls for the crane are to include the following features:
  1. Controls shall be housed in a NEMA 12 enclosure for protection against dust and moisture.
  2. A fused manual disconnect switch, housed in the bridge enclosure with a lockable handle shall be provided and wired into the incoming circuit from the runway power collectors.
  3. A magnetic mainline contactor is to be provided and operated from the pushbutton station.
  4. All motor starters shall be adequately sized for crane duty consistent with horsepower requirements and shall be of the reversing type, fully magnetic, with mechanical and electrical interlocks.
  5. Each motor shall be provided with thermal overload protection.
  6. Fusing shall be provided on the secondary side of the control circuit transformer.
  7. Electromotive Systems Impulse adjustable frequency crane control with dynamic braking shall be provided for controlling acceleration and deceleration. Across the line starting is not acceptable.
  8. The complete control panel is to be factory mounted and wired. All wires within the panel are to be marked and terminated on numbered terminal strips.



## SECTION 14630 – BRIDGE CRANE – AMENDED

9. All wiring shall be in rigid conduit with threaded fittings wherever possible. Flexible cable may be used on short runs where rigid conduit is not practical.
10. Control panel is to be assembled and wired in a UL approved shop and shall be UL labeled accordingly.
11. A compass placard shall be mounted at crane mid-span, visible from the floor, and correspond to the pushbutton control station markings.

### 2.10 HOISTS

- A. Crane supplier shall furnish as part of their contract a hoist of the type most suitable for the particular application under consideration. Such hoist shall comply with ANSI/ASME HST-1 and ANSI B30.16. Hoist capacities, speeds and lift shall be as shown on the drawings.
- B. Hoists and appurtenances shall be designed to withstand all stresses imposed under safe operating conditions while handling loads within the rated capacity. Load bearing parts shall be designed such that the static stress, calculated for rated load, shall not exceed 20% of the ultimate strength of the material.
- C. Hoist shall be electric chain type.
- D. Hoist is to be furnished complete with a suitable pushbutton control station. Pushbutton arrangement is to be supplied with strain relief protection. Control actuators shall be dead-man type with speed adjustment of multispeed control obtainable by progressive depression of the push button elements to increase motor speed and spring return to off position.
- E. The hoist braking system shall include a weight overload device and an electric motor brake capable under normal operating conditions with rated load to stop and hold the load when controls are released. In the event of complete power failure, the load shall be stopped and held.
- F. All bearing shall be heavy duty, antifriction type with a minimum B10 life of 5,000 hours. Motor bearings shall be lifetime lubricated, sealed ball bearings.
- G. All gearing shall be forged heat-treated alloy steel machined for smooth, quiet operation. All gearing must meet AGMA quality specifications.
- H. Bottom block shall be completely shrouded for safety and fabricated from steel. Sheaves must be forged or rolled steel, running on antifriction bearings. Hooks are to be forged steel supported by antifriction thrust bearings and permit 360° rotation. Hooks shall be equipped with latches unless the application makes the use of the latch impractical. When required, a latch shall be provided to bridge the opening of the hook for the purpose of retaining slings, chains, etc., under slack conditions.

## SECTION 14630 – BRIDGE CRANE – AMENDED

- I. Motors shall be totally enclosed, specifically designed for hoist service, capable of starting and operating under any condition within the designed capacity, provided with Class F insulation and thermal overload protection.
- J. Hoist shall incorporate an adjustable upper and lower limit switch to stop hoist motion when the block reaches its highest position.
- K. Electric hoist controls shall comply with N.E.C. requirements for the application being considered and shall include control circuit fusing and contactors mechanically and electrically interlocked.
- L. Hoist trolley shall be hoist manufacturer's standard motor-gearred trolley with trolley drop lugs, energy absorbing bumpers and wheels with a minimum hardness of 320 BHN.
- M. Trolley control shall be single speed.

### 2.11 CRANE ASSEMBLY AND TEST

Cranes shall be factory assembled and a no load running test of controls and drive machinery to ensure proper operation shall be performed. The cranes will be disassembled only as necessary for shipment.

### 2.12 SYSTEM MARKING

All major components of the system shall be marked at the factory to assure prompt and proper field identification.

### 2.13 PAINTING

- A. All material shall be cleaned of loose rust, mill scale and foreign matter per SP2/SP3.
- B. Crane bridges, hoist, trolleys, runways and suspension fittings shall be shop painted with one coat of primer and manufacturer's standard machinery enamel finish.
- C. Equipment must be adequately protected against damage and rust in shipment.

### 2.14 MANUFACTURERS

- A. Manufacturers, or approved equal:
  - 1. TC American
  - 2. Spanco
  - 3. Gorbelt

## SECTION 14630 – BRIDGE CRANE – AMENDED

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. All bridge crane equipment shall be installed in conformance with the manufacturer's published or written instructions. All bridge crane equipment shall comply with the requirements of State of California, Division of Occupational Safety and Health (DOSH). Cranes shall be factory-assembled and given a no-load test. All major components of the system shall be marked at the factory to assure prompt and correct field identification.
- B. After completion of the Work, the Contractor shall test all hoist and crane equipment in the presence of the manufacturer's field representative, who shall certify, in writing, that the equipment meets all applicable standards and specifications and verify their rated load-carrying capacity.
- C. The Contractor shall have the bridge cranes examined by an authorized certifying agent and obtain the necessary certificate complying with the requirements of DOSH.

**\*\*END OF SECTION\*\***