

PART 1 - GENERAL

1.01 SUMMARY

- A. Provide design and all material, labor, equipment and service necessary for furnishing and installation of prefabricated steel bridge for installation of potable water pipeline. The work includes, but is not limited to:
1. Design of a prefabricated steel bridge for 36" water pipeline.
 2. Fabrication, delivery and installation of the prefabricated bridge structure.
 3. Installation of potable water pipeline and pipe supports.
 4. Installation of Lifeline Safety system. Installation of security fencing.
 5. Painting
 - a. All exposed steel, including pipeline.
- B. Related Sections
1. 01300 – Submittals
 2. 02565 – Ductile Iron Pipe
 3. 03100 – Concrete Formwork
 4. 03200 – Concrete Reinforcement
 5. 03300 – Cast-in-place Concrete
 6. 05500 – Miscellaneous Metals

1.02 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only. Where a date is given for reference standards, that edition shall be used. Where no date is given for reference standards, the latest edition available on the date of Notice Inviting Bids shall be used.
- B. American Institute of Steel Construction (AISC):
1. AISC 14th Edition: Steel Construction Manual.
- C. American Association of State and Highway Transportation Officials (AASHTO):
1. AASHTO LRFD Bridge Design Specifications, 6th Edition with California Amendments (January 2014)
- D. California Department of Transportation (CALTRANS):
1. Seismic Design Criteria (SDC) dated April 2013.
-

- E. American Concrete Institute (ACI):
1. ACI 301: Specifications for Structural Concrete for Buildings.
 2. ACI 318: Building Code Requirements for Reinforced Concrete.
 3. ACI SP-66: Detailing Manual, (including ACI 315 and ACI 315R).
- F. American with Disabilities Act (ADA):
1. ADA Standards for Accessible Design.
- G. American Society for Testing and Materials (ASTM):
1. ASTM A36: Standard Specification for Carbon Structural Steel.
 2. ASTM A325: Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
 3. ASTM A490 - 09 Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength.
 4. ASTM A500: Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
 5. ASTM A653 / A653M - 09a Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 6. ASTM A847: Standard Specification for Cold-Formed Welded and Seamless High-Strength, Low-Alloy Structural Tubing with Improved Atmospheric Corrosion Resistance.
 7. ASTM A992: Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
- H. American Welding Society (AWS):
1. ANSI/AWS D1.1/D1.1M Structural Welding Code – Steel.
- I. The Society for Protective Coatings (SSPC)
1. SSPC-PA2 Paint Application Specification No. 2

1.03 SUBMITTALS

- A. Submit in accordance with Section 01300, “Submittals” at least 60 days in advance of the relevant work commencing or materials being ordered, unless noted otherwise.
1. Prefabricated Bridge
 - a. Shop Drawings:
 - 1) Include specific design information such as member sizes, connection details, metal deck connections, saddle, and general

- notes on Shop Drawings. A California-licensed Professional Engineer shall sign and seal all Shop Drawings.
- 2) Provide support connection details.
- b. Calculations:
 - 1) Include all design assumptions necessary to determine the structural adequacy of the bridge superstructure.
 - 2) Include the reaction forces on top of the substructure at every supporting point (i.e. abutments and intermediate pier).
 - 3) A California-licensed Professional Engineer shall sign and seal all calculations.
 - c. Manufacturer's certification, prior to start of fabrication, that the prefabricated steel bridge meets the requirements of this Section and the Drawings.
 - d. Manufacturer's installation instructions. Provide manufacturer's detailed, written instructions on proper lifting and splicing procedures.
2. Paint and Coatings
 - a. Manufacturer's data sheets shall show the following information:
 - 1) Percent solids by volume.
 - 2) Minimums and maximum recommended DFT per coat for prime, intermediate, and finish coats.
 - 3) Recommended surface preparation.
 - 4) Recommended thinners
 - 5) Statement verifying that the specified prime coat is recommended by the manufacturer for use with the specific intermediate and finish coats.
 - 6) Application instructions, including recommended equipment and temperature limitations.
 - 7) Curing requirements and instructions.
 - 8) Life expectancy/frequency and methods of recoating or repairing.
 - 9) Material Safety Data Sheet.
 3. Security fencing
 - a. Product Data:
 - 1) Submit manufacturer's technical data, and installation instructions for metal fencing, fabric, posts, rails, and accessories.
 - b. Shop Drawings:
 - 1) Submit shop drawings indicating thicknesses, dimensions, fastenings, hinges, and post anchoring method to Engineer for review and approval. Provide separate drawing for each of the following:

- (1) Post layout and fence material.
- (2) Post anchoring system.
- (3) Fence layout, include the connection system of the fabric to the top and bottom rail.
- (4) Gates, including all hardware and appurtenances.

1.04 GENERAL DESIGN REQUIREMENTS

A. Loads:

1. Dead load: Dead loads are associated with the weight of all members, weight of concrete decking, weight of pipe and its encasement, weight of water inside the pipe (fully filled), weight of railing, miscellaneous steel and weight of concrete saddles placed over the transverse beams at the truss bridge at maximum 10ft spacing.
2. Live load: Include 500lbs concurrent concentrated load at the most critical location on the walkway to account for maintenance.
3. Seismic load: Unless otherwise stated by Geotechnical Engineer; the site-specific probabilistic seismic hazard analysis results to be developed with the California Department of Transportation (Caltrans) Acceleration Response Spectrum (ARS) online web-based design tool (v2.3.06) (http://dap3.dot.ca.gov/ARS_Online/index.php) based on the geographic location (Latitude: 36.59391, Longitude: -121.86712). The envelope data to be considered as the expected earthquake in the region for this bridge which results in design accelerations equal to $S_{D1} = 0.965g$ and $S_{DS} = 1.046g$. This structure is considered essential and therefore an importance factor of 1.50 shall be used for seismic.
4. Wind load: The exposure category for this site shall be considered as category D with a wind speed of 115mph.

B. Load Combination – The seismic load combination will follow the requirements specified in Caltrans SDC.

C. Span – Measured from each end of the bridge structure. The total span length will be approximately 300 feet with a single bent located at approximately the midway point.

D. Width – The clear width of the bridge will be approximately 12'-4" to provide a 3 feet wide platform each side of the 54 inches encasement between the edge of concrete saddle and the handrail.

E. Bridge System Type – Bridge shall be a Truss System with square end vertical members. Interior vertical members shall be perpendicular to the chord faces. The top of the top chord shall not be less than 54 inches above the deck (measured from the high point of the deck). Provide for unbraced length of top chord in the design of the truss.

- F. Member Components – All members of the vertical trusses (top and bottom chords, verticals, and diagonals) shall be fabricated from square and/or rectangular structural steel tubing. Other structural members and bracing shall be fabricated from structural steel shapes or square and rectangular structural steel tubing. All the exposed ends of tubing shall be sealed.
- G. Camber – Vertical camber dimension at midspan equal to 100% of the full dead load deflection plus 1% of the full length of the bridge.
- H. Toe Plate – Mount a 4-inch high steel toe plate to the inside face of both trusses. Weld toe plating to the truss members at a height adequate to provide a 1" gap between plate bottom and top of deck or top of bottom chord, whichever is higher. The span of unstiffened flat toe plating (from center to center of supports) shall not exceed 4'-0".
- I. Handrail – The truss bridge shall be equipped with handrails in accordance with Cal OSHA for maintenance crew. A 3 foot clearance between the edge of concrete saddle and the handrail shall be provided at each side of the pipe.
- J. Abutment – Design of the abutments will be provided by the Engineer upon receiving the reactions from the superstructure at the abutments. Vendor shall review and accept the abutment design and attachments as compatible with the truss design.
- K. Intermediate pier – Design of the pier will be provided by the Engineer upon receiving the reactions from the superstructure at the intermediate pier. Vendor shall coordinate the exact location of the intermediate support and support bearing interface determined by Engineer.
- L. Applicable Cal OSHA requirements shall be provided for the maintenance crew on the bridge.
- M. Concrete Saddles – Concrete saddles design shall be performed by the Bridge manufacturer to be able to withstand the pipe vertical and lateral load.

1.05 QUALITY CONTROL

- A. Quality Certification – Bridge fabricator shall be currently certified by the American Institute of Steel Construction to have the personnel, organization, experience, capability, and commitment to produce fabricated structural steel for the category “Major Steel Bridges” as set forth in the AISC Certification Program.
 - 1. Quality control shall be in accordance with procedures outlined for AISC certification.
 - 2. Contractor shall hold a pre-construction field visit to the bridge site. The bridge layout shall be checked and verified to be in agreement with the proposed pre-fabricated bridge structure. The site layout shall be reviewed
-

and approved by the Engineer prior to delivery and installation of the pre-fabricated bridge superstructure.

- B. Manufacturer Qualifications – Firms regularly engaged in the manufacture of paints and coatings, whose products have been in satisfactory use in similar service for not less than five years.
- C. Certification, Paint and Coatings Performance – The Contractor shall provide Paint and Coatings whose performances, under specified operating conditions, are certified by the manufacturer.
- D. Workforce Qualifications – Submit verification that the workforce is qualified to complete the work of this Section (license, certifications, etc.) and that the work has been effectively supervised (manager, foreman, etc.)

1.06 QUALITY ASSURANCE

- A. Perform structural design of the bridge structure by or under the direct supervision of a California-licensed Professional Engineer and in accordance with recognized engineering practices and principles. Design structure to meet Caltrans Seismic Design Criteria and AASHTO requirements.
- B. Governing Design Codes:
 - 1. Structural Steel – designed in accordance with the American Association of State Highway and Transportation Officials (AASHTO): Standard Specifications for Highway Bridges, latest edition
 - 2. American National Standards Institute / American Welding Society (ANSI/AWS) Specifications.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

CONTECH Construction Products Inc.
9025 Centre Pointe Drive, suite 400
West Chester, OH 45069
800.338.1122
info@conteches.com

2.02 SUBSTITUTIONS

- A. Suppliers other than those listed above may be used provided the Engineer evaluates the proposed supplier and approves the supplier 15 days prior to bid. For any proposed

supplier who is not pre-approved, Contractor shall provide the following documentation at least 15 days prior to bid:

1. Documentation to ensure the proposed substitution will be in compliance with these specifications, including:
 - a. Representative design calculations
 - b. Representative drawings
 - c. Splicing and erection procedures
 - d. Warranty information
 - e. Inspection and maintenance procedures
 - f. AISC shop certification
 - g. Welder qualifications
 2. Proposed suppliers shall have at least seven years experience designing and fabricating these types of structures and a minimum of ten successful bridge projects, of similar construction, each of which has been in service at least five years. Provide location, bridge size, owner, and a reference contact for each project. The Engineer will evaluate and verify accuracy of the submittal prior to bid. If the Engineer determines that the qualifying criteria have not been met, the Contractor's proposed supplier will be rejected.
- B. Contractor shall furnish satisfactory documentation from the manufacturer of proposed substitute or "or-equal" product that the material meets the indicated requirements and is equivalent or better in the following properties for paints and coatings:
1. Quality
 2. Durability
 3. Resistance to abrasion and physical damage
 4. Life expectancy
 5. Ability to recoat in future
 6. Solids content by volume
 7. DFT per coat
 8. Compatibility with other coatings
 9. Suitability for intended service
 10. Resistance to chemical attack
 11. Temperature limitations during application and in service
 12. Type and quality of recommended undercoats and topcoats
 13. Ease of application
 14. Ease of repairing damaged areas

15. Stability of colors

- C. Protective coating materials shall be standard products produced by recognized manufacturers who are regularly engaged in production of such materials for essentially identical service conditions. When requested, the Contractor shall provide the Engineer with the names of not less than 10 successful applications of the proposed manufacturer's products that comply with these requirements.

2.03 MATERIALS

- A. Steel – Fabricate bridge using:
1. ASTM A500 Gr. B square and rectangular tubing ($F_y = 46\text{ksi}$), galvanized
 2. Kick plates and splice plates, if required, shall be ASTM A36 ($F_y = 36\text{ksi}$), galvanized.
- B. Bolts – Bolt field splices with ASTM A325 steel high strength bolts in accordance with the “Specifications for Structural Joints Using ASTM A325 Bolts”. Bolts shall be pre-tensioned to be slip-critical. All bolts shall be hot dip galvanized in accordance with ASTM A153.
- C. Decking – Furnish the bridge with a galvanized steel deck suitable for pouring a reinforced lightweight concrete slab. The form deck shall be designed to carry the lateral loading due to seismic/wind and dead load of the wet concrete, weight of form decking, weight of concrete saddles, weight of the pipe and water inside, and a 500lbs concentrated load for maintenance. When edge supports are used, deflection is limited to $1/180$ of the span or $3/4$ ”, whichever is less. Without edge supports, deflection shall be limited to the smallest of $1/180$ of the span and $3/8$ ”. Concrete deck design shall be performed by the Bridge manufacturer. The deck shall not be included as the lateral load resisting system for the bridge.
- D. Vendor shall provide stud reinforcing by using Nelson D2L deformed bar anchors or equivalent to connect the concrete saddle to the bridge transverse beams and designed to withstand lateral load induced by the pipe.
- E. Welding
1. Conform to the provisions of ANSI/AWS D1.1 “Structural Welding Code” for welding and weld procedure qualification tests. Filler metal shall be in accordance with the applicable AWS Filler Metal Specification (i.e. AWS A 5.28 for the GMAW Process). For exposed, bare, unpainted applications of corrosion resistant steels (i.e. ASTM A588 and A847), the filler metal shall be in accordance with AWS D1.1, Section 3.7.3.
 2. Welders shall be properly accredited operators, each of whom shall submit certification of satisfactorily passing AWS standard qualification tests for all positions with unlimited thickness of base metal, have a minimum 6 months
-

experience in welding tubular structures and have demonstrated the ability to make uniform sound welds of the type required.

F. Paints and Coatings

1. Suitability – The Contractor shall use suitable coating materials as recommended by the manufacturer. Materials shall comply with Volatile Organic Compound (VOC) limits applicable at the Site. In some cases, galvanized material will require painted coatings over the galvanized surface. Coatings and preparation shall be compatible and good performing for this application.
2. Material Sources – Where manufacturers and product numbers are listed, it is to show in written the type and quality of coatings that are required. If a named product does not comply with VOC limits in effect at the time of Bid opening, that product will not be accepted, and the Contractor shall propose a substitution product of equal quality that does comply. Coating materials shall be materials that have a record of satisfactory performance in industrial plants, manufacturing facilities, and water and wastewater treatment plants.
3. Compatibility: In any coating system only compatible materials from a single manufacturer shall be used in the Work. Particular attention shall be directed to the compatibility of primers and finish coats. If necessary, a barrier coat shall be applied between existing prime coat and subsequent field coats to ensure compatibility.
4. Containers – Coating materials shall be sealed in containers that plainly show the designated name, formula, or specification number; batch number, color, date of manufacture, and name of manufacturer; all of which shall be plainly legible at the time of use.
5. Colors – Colors and shades of colors of coatings shall be indicated or selected by the Engineer. Each coat shall be of a slightly different shade to facilitate inspection of surface coverage of each coat.

2.04 PAINTING AND COATING SYSTEMS

- A. For each painting and coating system, the required surface preparation, prime coat, intermediate coat (if required), topcoat, and coating thicknesses are described below. Mil thicknesses shown are minimum DFT.
- B. Provide materials for specified painting system, including primer, intermediate, and finish coats by the same manufacturer. Thinners, cleaners, driers, and other additives shall be as recommended by the paint manufacturer for the particular coating system.

- C. Deliver paints to the jobsite in the original, unopened containers.

2.05 FLUOROPOLYMER SYSTEM

A. Materials

Primer	Polyamidoamine Epoxy
Finish Coat	Advanced Thermoset Solution Fluoropolymer
Type	High-Quality, Low VOC Fluoropolymer
Demonstrated suitable for	Ferrous, galvanized, and nonferrous surfaces in industrial exposure, producing high gloss surface that is resistant to mild corrosion and chemical fumes, has good color and gloss retention, good weathering, and sunlight resistance
VOC Content, max	340 grams per liter

- 1. Application and manufacturers:

Surface Preparation	PRIME COAT (DFT = 2 TO 4 MILS)	FINISH COAT (DFT = 2 TO 3 MILS)	TOTAL SYSTEM DFT
SSPC SP-16	Tnemec Series L69 or approved equal	Tnemec Series 1071V or approved equal	4 to 7 mils

2.06 FENCE FABRIC

- A. Chain link fence fabric for perimeter security fences shall be Polyvinyl Chloride (PVC) Coated ASTM F668 Class 2b over zinc-coated steel wire with minimum coating weight of 2.0 ounces of zinc per square foot of coated surface. Fabric shall be fabricated of 9-gauge wire woven in 1-inch mesh.
- B. Fence fabric shall conform to the following: PVC-coat fabric color shall be selected by the Engineer complying with ASTM F 934. Fabric shall be twisted and barbed on the top selvage and knuckled on the bottom selvage. The fence panels shall have anti-intruder panels on the top to prevent climbing over the top and onto the outside face of the bridge at each end.

2.07 GATES

- A. All gates shall conform to the ASTM F 900 standards per detail. Gate frames shall conform to strength and coating requirements of ASTM F 1083 for Group IA, steel pipe, with external coating Type A, nominal pipe size shall be (NPS) 1.9 inch and coated with PVC per 2.01B. Gate post diameters shall be as shown on the drawings.
- B. Aluminum sliding gate frame material to be in accordance with ASTM F 1184 Type II Class 2. Grade shall be structural aluminum: 6063-T52 unless otherwise specified. Color shall match with fabric.
- C. Gate fabric shall be PVC-coat fabric color shall comply with ASTM F 934. Fabric shall be twisted and barbed on the top selvage and knuckled on the bottom selvage.
- D. Gate leaves shall have truss rods or intermediate braces. Gate fabric shall be attached to the gate frame by method approved by manufacturer. Welding is prohibited.
- E. Latches, hinges, stops, keepers, rollers, post caps, and other hardware items shall be furnished as required for operation of the gate and painted to match fence (2 coats). Latches shall be commercial grade and arranged for padlocking so the padlock will be accessible from both sides of the gate.

2.08 POSTS

- A. Metal posts for Chain Link Fence:
 - 1. All metal posts for chain link fence shall conform to standard ASTM F 1083, zinc-coated with external coating Type A or Type B, shall meet the strength and coating requirements of ASTM F 1043. Sizes shall be as shown on the drawings. Line posts and terminal (corner, gate, and pull) posts selected shall be of same designation throughout the fence. Gatepost shall be for the gate type specified subject to the limitation specified in ASTM F 900. All posts shall be capped and shall have PVC coating per 2.01B.

2.09 BRACES AND RAILS

- A. ASTM F 1083, zinc-coated, Group IA, steel pipe, size NPS 1-1/4. Group IC steel pipe, zinc-coated, shall meet the strength and coating requirements of ASTM F 1043 and shall have PVC coating per 2.01B.

2.10 ACCESSORIES

- A. All posts shall be capped to prevent rainwater from filling the posts and shall have PVC coating per 2.01B.

- B. Miscellaneous hardware coatings shall conform to ASTM A 153A/153M unless modified.
- C. Truss rods shall be provided with turnbuckles or other equivalent provisions for adjustment.

2.11 CONCRETE

ASTM C 94, using 3/4-inch maximum size aggregate, and having minimum compressive strength of 4,000 psi at 28 days. Bridge deck concrete shall be light weight concrete weighing not more than 115 PCF. Abutment and foundation concrete shall be normal weight concrete.

2.12 SIGNS

- A. Provide up to ten (10) safety and security signs as directed by Owner. Metal signs, traffic rated, 2' x 2' with printed information and logo.

PART 3 - EXECUTION

3.01 STEEL BRIDGE

A. Fabrication

1. Drain Holes – When the collection of water inside a structural tube is a possibility, provide a drain hole at the lowest point of the tube to let water out.
2. Welds – Give special attention to developing sufficient weld throats on tubular members. Fillet weld details shall be in accordance with AWS D1.1/D1.1M, Section 3.9 (See AWS Figure 3.2). Field welding shall not be allowed without prior approval of the Engineer.

B. Foundations

1. Bridge manufacturer shall determine the location, number, diameter, embedment, minimum grade and finish of all anchor bolts. Design anchor bolts to resist all horizontal and uplift forces transferred by the superstructure to the supporting foundations.

C. Delivery

1. Arrange delivery to the site with the Owner's representative.

D. Erection

1. Erection shall be accomplished by a trained, competent erector having experience in erecting prefabricated steel bridges.
 2. Install all metal bridge system components in strict compliance with manufacturer's instructions.
-

3. Handle and store all materials to avoid damage; replace any damaged materials.
4. Erector shall observe and follow recommendations of the American Institute of Steel Construction (AISC), and the Occupational Safety and Health Administration (OSHA) practices, procedures and safety standards where applicable.
5. Do not field cut or alter structural members without approval in writing from manufacturer.
6. Tolerances: All framing members shall be erected plumb, level or aligned not to exceed a deviation 1:300.
7. Concrete Deck: Upon completion of framing members, place concrete deck per Section 2.03.C of this document and provide with broom finish.

E. Bearings

1. Bridge bearings shall consist of a steel setting or slide plate placed on the abutment or grout pad. The bridge bearing plate, which is welded to the bridge structure, shall bear on this setting plate, per manufacturers detail. Fix one end of the bridge by fully tightening the nuts on the anchor bolts at that end. The opposite end will have finger tight only nuts to allow movement under thermal expansion or contraction. Lock nuts shall be provided to resist loosening under vibration and torque.
2. Anchor Bolts – The total number, location, diameter, projection, embedment and length of anchor bolts for the bridge bearings shall be per the manufacturer's requirements and as designed by the Engineer. Provide bridge bearings as part of the prefabricated bridge.

3.02 PAINT AND COATING

A. Preparation

1. General
 - a. Do not sandblast or prepare more surface area in one day than can be coated in one day; prepare surfaces and apply coatings the same day. Remove all sharp edges, burrs, and weld spatter. Do not sandblast epoxy- or enamel-coated pipe that has already been factory coated, except to repair scratched or damaged coatings.
 2. Surface preparation and cleaning shall conform to manufacturer's recommendations.
-

B. Shop-Applied Prime Coats

1. After application of primer to surfaces, allow coating to cure for a minimum of two hours before handling to minimize damage.
2. When loading for shipment to the Project Site, use spacers and other protective devices to separate items to prevent damaging the shop-primed surfaces during transit and unloading. If wood spacers are used, remove wood splinters and particles from the shop-primed surfaces after separation. Use padded chains or ribbon binders to secure the loaded items and minimize damage to the shop-primed surfaces.
3. Cover shop-primed items 100 percent with protective coverings or tarpaulins to prevent deposition of road salts, fuel residue, and other contaminants in transit.
4. Handle shop-primed items with care during unloading, installation, and erection operations to minimize damage. Do not place or store shop-primed items on the ground or on top of other work unless ground or work is covered with a protective covering or tarpaulin. Place shop primed items above the ground upon platforms, skids, or other supports.

C. Field Touch-ups of Shop-Applied Prime Coats

1. Remove oil and grease surface contaminants on metal surfaces in accordance with SSPC-SP-1. Use clean rags wetted with a degreasing solution, rinse with clean water, and wipe dry.
2. Remove dust, dirt, salts, moisture, chalking primers, or other surface contaminants that will affect the adhesion or durability of the coating system. Use a high-pressure water blaster or scrub surfaces with a broom or brush wetted with a solution of trisodium phosphate, detergent, and water. Before applying intermediate or finish coats to inorganic zinc primers, remove any soluble zinc salts that have formed by means of scrubbing with a stiff bristle brush. Rinse scrubbed surfaces with clean water.
3. Remove loose or peeling primer and other surface contaminants not easily removed by the previous cleaning methods in accordance with SSPC-SP-7. Take care that remaining primers are not damaged by the blast cleaning operation. Remaining primers shall be firmly bonded to the steel surfaces with blast cleaned edges feathered.
4. Remove rust, scaling, or primer damaged by welding or during shipment, storage, and erection in accordance with SSPC-SP-10. Take care that remaining primers are not damaged by the blast cleaning operation. Remaining

primers shall be firmly bonded to the steel surfaces with blast cleaned edges feathered.

5. Use repair procedures on damaged primer which protects adjacent primer. Blast cleaning shall require the use of lower air pressure, smaller nozzles, and abrasive particle sizes, short blast nozzle distance from surface, shielding, and/or masking.
6. Remove dust, blast particles, and other debris after abrasive blast cleaning of damaged and defective areas by dusting, sweeping, and vacuuming; then apply the specified touch-up coating.
7. Field touch-up surfaces that are shop primed with inorganic zinc primers with organic zinc primer to cover all scratches or abraded areas.
8. Field touch-up other surfaces that are shop primed with the same primer used in the original prime coat.

D. Application of Coatings

1. Conform to the requirements of SSPC-PA-1. Follow the recommendations of the coating manufacturer including the selection of spray equipment, brushes, rollers, cleaners, thinners, mixing, drying time, temperature and humidity of application, and safety precautions.
2. Do not use thinners unless recommended by the coating manufacturer. If thinning is allowed, do not exceed the maximum allowable amount of thinner per gallon of coating material. Stir coating materials at all times when adding thinner. Do not flood the coating material surface with thinner prior to mixing. Do not reduce coating materials more than is absolutely necessary to obtain the proper application characteristics and to obtain the specified DFT.
3. Apply coating systems to the specified minimum DFT as measured from above the peaks of the surface profile.
4. Apply primer immediately after blast cleaning and before any surface rusting occurs, or any dust, dirt, or any foreign matter has accumulated. Re-clean surfaces by blast cleaning that have surface colored or become moist prior to coating application.
5. Apply a brush coat of primer on welds, sharp edges, nuts, bolts, and irregular surfaces prior to the application of the primer and finish coat. Do the brush coat prior to and in conjunction with the spray coat application. Apply the spray coat over the brush coat.

- E. Protection of Surfaces not to be Painted
1. Remove, mask, or otherwise protect hardware, lighting fixtures, switchplates, aluminum surfaces, machined surfaces, couplings, shafts, bearings, nameplates on machinery, and other surfaces not intended to be painted. Provide drop cloths to prevent paint materials from falling on or marring adjacent surfaces. Protect working parts of mechanical and electrical equipment from damage during surface preparation and painting process. Mask openings in motors to prevent paint and other materials from entering the motors.
- F. Field Quality Control
1. Quality control will be performed under the provisions of Section 01400.
 2. Products: Submit verification that the installed products are authentic (delivery receipts, bill of lading, etc.).
 3. Execution: Submit verification that the work was installed correctly (inspection records, as-built drawings, etc.).
 4. Testing and Inspection
 - a. The Contractor's QC program shall be responsible for the performance of all inspections and testing.
 - b. The Contractor shall provide access to the Engineer or Testing Agency for additional inspection and testing.
- G. Repair of Improperly Coated Surfaces
1. If the item has an improper finish color or insufficient film thickness, clean and recoat the surface with the specified paint material to obtain the specified color and coverage. Sandblast or power-sand visible areas of chipped, peeled, or abraded paint, feathering the edges. Then prime and finish coat in accordance with the specifications. Work shall be free of runs, bridges, shiners, laps, or other imperfections.

3.03 ENGINEERED HORIZONTAL LIFELINE (FALL PROTECTION)

- A. General
1. Provide structural fall restraint and fall arrest system capable of withstanding loads and stresses within limits and under conditions specified in OSHA and other applicable safety codes.
 2. Provide fall protection system permanently attached to top of pipeline in accordance with OSHA Fall Protection Code 1910.66 App C and ANSI Fall Protection Code Z359.
 3. Provide cable lifeline system to allow continuous travel between anchor points.
-

- B. Contractor shall submit design calculations for permanent lifeline attached to the pipeline where indicated on plans. Design Requirements: Anchors and accessories comprising system of following types:
1. Anchors, spaced as indicated by manufacturer, for safety snap connection by individual workers capable of withstanding a 5,000 pound load or safety factor of 2 meeting the requirements of OSHA 1926.502(d)(8).
 2. Cable lifeline to pass through intermediate anchor attachment points and restrained at either end by steel shackle and cable fist grips; detaching and reattaching to the system at intermediate anchors required.
 3. In-line shock absorber; 1 each for total spans up to 60' and 2 each for total spans greater than 60' and up to 100'.
 4. Fall Restraint – 4 Users
 5. Fall Arrest – 2 Users
 6. Design fall protection anchors to resist at least a 5,000 pound load applied in any direction at maximum anchor height or provide engineered system designed meeting the requirements of OSHA 1926.502(d)(8).
 7. Design system to limit loads on horizontal lifeline anchors to 2,500 pounds.
- C. Lifeline system shall accommodate up to 4 workers.
- D. Lifeline system shall be made of 3/8-inch galvanized steel cable and anchor posts, o-ring connections, absorbinator HLL kit (each kit consisting of 1 or 2 shock absorbers, 1 turnbuckle, 2 shackles, 6 cable fist grips, and 2 O-rings), meeting all applicable OSHA regulations.
- E. Manufacturer shall be Guardian Fall Protection of Kent, WA or approved equal.
- F. Manufacturer Qualification - Firm having at least 5 years continuous experience in manufacturing fall safety equipment similar to systems specified and exhibiting records of successful in-service acceptability and performance. Firm must employ personnel dedicated to providing regularly scheduled Authorized and Competent Person Training courses as mandated by OSHA 1926 and 1910 for owner's authorized safety personnel.
- G. Provide 3 complete vertical lifeline assemblies designed to go with the horizontal lifeline system:
1. Heavy-duty 5/8" blue steel polyolefin cord, 25 ft long
 2. Self-locking snaphooks/carabiners

3. Positioning device with 18" lanyard to keep the positioning device within reach.
 4. Guardian Fall Protection model 53500 or approved equal.
- H. Testing: Test on site 100% of anchors relying upon chemical adhesive fasteners using load cell test apparatus in accordance with manufacturer's written recommendations.

Provide manufacturer's standard warranty to guarantee products will be free from defects for a period of 24 months. Warranty period shall become effective on date of substantial completion.

3.04 SECURITY FENCING

A. Installation:

1. Fence shall be installed to the lines and grades indicated. The area on either side of the fence line shall be cleared per drawings. Line posts shall be spaced equidistant at intervals not exceeding 10 feet. Terminal (corner, gate, and pull) posts shall be set at abrupt changes in vertical and horizontal alignment. Fabric shall be continuous between terminal posts as practical; however, runs between terminal posts shall not exceed 200 feet for security fences. Any damage to galvanized surfaces shall be repaired with paint containing zinc dust in accordance with ASTM A 780.
2. All fence and gate bolts shall be mounted so they cannot be easily removed from the unsecured side of the fence or gate.
3. All fence and gates shall be installed so that the fence or gate cannot be easily climbed from the unsecured side of the fence/gate due to improperly mounted fence rails, fence hardware, or gate hardware.
4. The gap at the bottom of the fence should be as small as possible to prevent prying. The fence bottom rail should be a maximum of 3 inches from the concrete/asphalt. The fence fabric shall extend below the bottom rail so that the maximum gap between the fabric and the concrete/asphalt is 2 inch.

B. Excavation:

1. Postholes shall be cleared of loose material. Waste material shall be spread as directed by the Engineer. The ground surface irregularities along the fence line shall be eliminated to the extent necessary to maintain a minimum clearance between the bottom rail and finish grade, asphalt, or concrete curb.

For over excavated areas, fill area with concrete or asphalt with strength similar to the concrete post.

C. Post Installation:

1. Post installation and footing as indicated on Drawings.
 - a. Concrete and grout shall be thoroughly consolidated around each post, shall be free of voids and finished to form a dome. Concrete and grout shall be allowed to cure for 72 hours prior to attachment of any items to the posts.
 - b. Line posts may be mechanically driven, for temporary fence construction only, if rock is not encountered. Driven posts shall be set to a minimum depth of 3 feet and shall be protected with drive caps when being set.
 - c. Fence post rigidity shall be tested by applying a 50 pound force on the post, perpendicular to the fabric, at 5 feet above ground; post movement measured at the point where the force is applied shall be less than or equal to 3/4 inch from the relaxed position; every tenth post shall be tested for rigidity; when a post fails this test, further tests on the next four posts on either side of the failed post shall be made; all failed posts shall be removed, replaced, and retested at the Contractor's expense.

D. Rails:

1. Top and bottom rails shall be installed as indicated as Drawings.
2. Field verify all horizontal and vertical angles and custom fabricate brackets as needed. Submit to Engineer for review.

E. Chain link Fabric:

1. Chain link fabric shall be installed on the side of the post indicated on the Contract drawings. Fabric shall be attached to terminal posts as indicated on drawings. The fabric shall be installed and pulled taut to provide a smooth and uniform appearance free from sag, without permanently distorting the fabric diamond or reducing the fabric height.
2. After installation is complete, contractor shall provide testing equipment, and the fabric shall be tested by applying a 30 pound pull at the center of the panel shall cause fabric deflection of not more than 2-1/2 inches when pulling fabric from the post side of the fence; every second fence panel shall meet this requirement; all failed panels shall be re-secured and re-tested at the Contractor's expense. In areas where posts are directly driven; failure to achieve necessary tension required shall result in the posts being set in concrete.

F. Gate Installation:

1. Gates shall be installed at the locations shown. Hinged gates shall be mounted to swing as indicated. Latches stops, and keepers shall be installed as required. Hinge pins, and hardware shall be welded or otherwise secured to prevent removal. Gates shall be constructed in such a manner as to prevent the ability of a person from climbing over the secured side of an unopened gate.

G. Cleaning and Touch Up:

1. Posts and rails and accessories shall be cleaned and touched up of missing coatings and debris with vinyl coated PVC product.

3.05 SIGNS

- A. Install signs as directed by Owner or Engineer.

3.06 WARRANTY

- A. The bridge manufacturer shall warrant their steel structures to be free of design, material and workmanship defects for a period of five years from the date of delivery. The bridge manufacturer shall provide written inspection and maintenance procedures to be followed by the Owner.

END OF SECTION