

SECTION UC-055
STRUCTURAL WORK

PART 1 - GENERAL

1.01 SCOPE OF WORK

The Contractor shall provide all labor, material, supervision and equipment required to perform all structural work, including welding, in this project, stated on the plans or required for a complete installation.

1.02 RELATED SECTION

- A. Section UC-090 - Piling for Aerial Crossing
- B. Section 15075 - Aerial Crossing

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

3.01 STRUCTURAL WORK, GENERAL

- A. All reinforcement shall be delivered without rust. It shall at all times be fully protected from grease, dirt, or mortar. Before being placed in position it shall be thoroughly cleaned of all foreign matter, loose mill scale, and rust. Reinforcing bars (Section UC-000, Subsection -2.14) shall be securely wired together at all intersections and held clear of forms by concrete blocks or other approved devices. Steel wire chairs with or without plastic tips will not be accepted. Stirrups and hoops shall pass around the outside of the main reinforcement in beams and columns. The bars shall be bent cold, to the shapes indicated on the Plans. Bending shall be done in the shop before shipment and not in the field unless otherwise noted on the Plans or directed by the Department. Unless otherwise noted on the Plans, splice lengths shall not be less than 40 bar diameters.
- B. Forms shall be designed and constructed that they may be removed without injuring the concrete.
- C. The forms shall be built true to line and braced in a substantial and unyielding manner. They shall be mortar tight and, if necessary to close cracks due to shrinkage, shall be thoroughly soaked with water.
- D. In designing forms and centering, the concrete shall be treated as a liquid weighing 150 pounds per cubic foot for vertical loads, and 85 pounds per cubic foot for horizontal pressure. The unsupported length of the wooden columns and compression members shall not exceed 30 times the diameter or least side.

- E. Blocks and bracing shall be removed with the form and in no case shall any portion of the wood forms be left in the concrete. The forms shall be so constructed that the finished concrete shall be of the form and dimensions as shown on the Plans and true to line and grade.
- F. No concrete shall be placed until the depth and character of the foundation, the adequacy of the forms and falsework, and the placing of steel have been approved by the Department.
- G. Concrete shall be placed in the forms immediately after mixing and in no case shall concrete be used which does not reach position in the forms within 30 minutes after the time that water is first added to the mix, unless otherwise approved by the Department. The method and manner of placing shall be such as to avoid the possibility of segregation or separation of the aggregate or the displacement of the reinforcement.
- H. Troughs, pipes or chutes used as aids in placing concrete shall be arranged and used in such a manner that the ingredients of the concrete are not separated. When pipes are used they shall be kept full of concrete and have their lower ends kept buried in fresh concrete and in the same manner that a tremie is used. All chutes, troughs and pipes shall be kept clean and free from coatings of hardened concrete by thoroughly flushing with water after each run.
- I. Dropping the concrete a distance of more than 10 feet or depositing a large quantity at any point and running or working it along the forms will not be permitted..
- J. Placing of concrete shall be so regulated that the pressure caused by the wet concrete shall not exceed that used in the design of the forms.
- K. Special care shall be taken to fill each part of the form by depositing concrete directly as near to final position as possible, and to work the coarse aggregates back from the face to force the concrete under and around the reinforcing bars without displacing them. After the concrete has taken its initial set, care shall be exercised to avoid jarring the forms or placing any strain on the ends of projecting reinforcing bars.
- L. The external surface of all concrete shall be thoroughly worked during the placing operation by means of concrete vibrators of an approved type. The working shall be such as to force all coarse aggregate from the surface and thoroughly work the mortar against the forms to produce a smooth finish free from water and air pockets or honeycomb.
- M. If, in performing the concrete work hereunder, the forms holding the concrete should fail, sag, or get out of line in any way whatever, the Contractor shall remove and replace such concrete work unless the damage can be repaired in the opinion of the Engineer of Record and to the satisfaction of the Department. All completed members shall be straight and true and shall present a uniform appearance. All exposed corners shall be chamfered with a 3/4-inch chamfer unless otherwise noted on the Plans or specifically described elsewhere in the Specifications.
- N. The operation of depositing and compacting the concrete shall be conducted so as to form a compact, dense, impervious, artificial stone of uniform texture which shall show smooth faces on exposed surfaces. If any section of concrete is found porous, has been plastered, or is otherwise defective, it shall be removed and replaced in whole or in part, as directed by the Department.
- O. Concrete deposited under water shall be carefully placed in the space in which it is to remain in

a compacted mass, by means of a tremie. No concrete shall be placed in running water, and all form work designed to retain concrete under water shall be watertight. Special care shall be exercised to prevent segregation and the consistency shall be carefully regulated. The concrete flow shall preferably be continuous and in no case shall be interrupted until the work is completed. Special care must be exercised to maintain still water at the point of deposit.

- P. The time of removal of forms shall be subject to the approval of the Department, subject to weather and other conditions.
- Q. No forms whatever shall be removed at any time without the consent of the Engineer of Record. Such consent shall not relieve the Contractor of responsibility for the safety of the work.
- R. All concrete surfaces shall be inspected immediately after the forms are removed. Defective areas shall be chipped away to the depth of the imperfections but not less than one inch deep. These areas shall be kept wet for at least two hours before patching. Immediately thereafter, all holes shall be brushed with a cement grout. While the grout is still wet, the holes shall be filled with a barely moist mortar consisting of one part Portland cement and 3 parts sand, which shall be driven tight with wooden caulking tools and finished off flush and smooth.
- S. Careful attention shall be given by the Contractor to the proper curing of concrete and finished surfaces. Such surfaces shall be protected from the sun and the whole structure shall be kept wet for a period of at least seven days. Exposed finished surfaces shall be properly covered and protected until fully set and hardened.
- T. Concrete surfaces that are not exposed in the completed work will require no special finish other than pointing up and rubbing as is necessary to leave it smooth and impervious.
- U. In addition to the above specified requirements for finishing concrete, the exterior surfaces which will be exposed in the completed work shall be finished by being rubbed smooth with a carborundum brick and water. The grout worked up by the brick shall not be washed away but shall be spread smooth with a brush and allowed to reset. The final surface shall be smooth and dense, without pits, irregularities, blow holes or bubbles.

3.02 WELDING

- A. All welding done under this Contract shall be performed by operators who are certified by a testing laboratory (known to and satisfactory to the Engineer whose word shall be final) as qualified to weld downhand and overhead. The Contractor shall furnish proof that his welders are so qualified.
- B. Steel welding shall meet the requirements of A.I.S.C. "Recommended Fundamental Principles, Minimum Requirements, and Tentative Standard Welded Connections for Buildings".
- C. All welding done throughout the Project shall conform to all of the applicable recommendations of the American Welding Society and the American Institute of Steel Construction. All steel welding shall be by the shielded metal arc process, with D.C. machines and reverse polarity. Size and type of welding rod and coating shall be suitable for the particular metal to be welded, and the above process, in accordance with the best practices. Welders requiring the use of Department electric power will not be acceptable.

- D. All welding of aluminum shall be by inert gas shielded tungsten-arc or inert gas shielded metal arc procedures. Procedures shall fully conform with AWS Standard D1.2-83 and the best current accepted practices of the trade.
- E. The dimensions of all fillets and reinforcements shall be in accordance with the applicable recommendations of the American Welding Society and the American Institute of Steel Construction. Depth of fusion will be checked during the welding and incomplete fusion will be cause for rejection of the part of work affected. Rejected welds shall be cut out, a backing strip of the same character and thickness as the base metal placed, and the joints rewelded.
- F. Fabricated items shall be hot-dip galvanized (steel) or anodized (aluminum) after fabrication. Fabricated items of stainless steel require no special finish. Where galvanizing has received minor damage, and the Engineer of Record approves repair instead of replacement, all traces of the damaged zinc shall be removed by grinding or wire brushing to expose clean, bright metal which shall be painted with minimum 2 coats of zinc-rich paint as specified under Section 15065 "Miscellaneous Materials".

END OF SECTION