June 25, 2009

SPECIAL PROVISION

PROJECT # F-I84-6(97)108
PIN # 6560

SECTION 03139S

CONCRETE BRIDGE DECK REMOVAL

Add Section 03139:

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Description of the work including removal of the bridge deck, use of reinforcing and shear connectors in conjunction with the planned replacement of the bridge deck, and lists the necessary materials and equipment to complete the work as shown on the plans. This specification does not include bridge deck removal where the supporting structure is not salvaged.

B. Requirements for protecting adjacent travelways, property, and the environment.

1.2 RELATED SECTIONS

A. Section 01554: Traffic Control

1.3 REFERENCES

A. ANSI/AASHTO/AWS D1.5 Bridge Welding Code

1.4 DEFINITIONS

A. Continuous multi-span steel girder bridges:
   1. Negative moment regions: Generally the areas near the interior supports (piers).
   2. Positive moment regions: All other areas of the bridge, generally away from the interior supports.

B. Hydraulic Breaker: A powerful percussion hammer fitted to an excavator for demolishing concrete structures powered by the hydraulic system on the excavator, often referred to as a Hoe Ram.

C. Hydraulic Shear: A process of removing concrete using a machine that can cut through relatively thin reinforced concrete elements.

D. Longitudinal Saw Cut: A saw cut that is along a line that is parallel to the supporting girders.

E. Saw Cut: A process of cutting through reinforced concrete with a circulating saw. Often the saw blade has a diamond edge to improve cutting.

F. Transverse Saw Cut: A saw cut along a line that is generally perpendicular to the supporting girders (or along the skew for bridge decks that are skewed less than 20 degrees).

1.5 SUBMITT ALS

A. Demolition Plan

1. Submit a demolition plan to the Engineer for approval depicting the proposed methods of deck removal. Submit the plan a minimum of 30 days prior to the commencement of work.
   a. Submit five sets half-size, 11½ x 17 inch sheets with a 1½-inch blank margin on the left-hand edge.
   b. Place the project designation data in the lower right-hand corner of each sheet.
   c. Comply with all requirements of applicable environmental permits.
   d. Comply with the construction timeframes specified in Section 01554.
   e. Include a written sequence of the specific steps for demolition.
   f. Include a work area plan, depicting utilities overhead and below the work area, drainage inlet structures, protective measures, etc.
   g. Include details of all equipment that will be used for the deck removal, paying special attention to the methods of removing the deck directly over the girders and adjacent to expansion joints that are to remain without causing damage.
   h. Include details of all equipment used to lift large portions of the deck such as cranes, excavators, lifting slings, sling hooks, jacks. Include as a minimum, crane locations, operation radii, lifting calculations.
   i. Include details of debris shield used to protect adjacent travelways, property and areas of the environmental specified for protection.
   j. Include details of debris protection and containment including calculations of containment structures.

k. Include calculations that demonstrate the satisfactory stability and strength of the bridge under all anticipated loads and removal methods. Account for the loss of composite action as the bridge deck is being removed.

l. Include procedures for repairing the top girder flange if damage occurs (nicks, dents, spalls).

m. Include methods of disposal of debris from the deck removal including final disposal site. Comply with all local, state and federal regulations.

n. Prepare the plan under the seal of a Professional Engineer licensed in Utah.

o. Engineer reserves the right to retain the plan up to 14 calendar days without granting an increase in the number of working days on the project. This is reduced to 7 days when the drawings are submitted electronically. This right applies each time the plans are submitted.

PART 2 PRODUCTS

2.1 ACCEPT ABLE EQUIPMENT

A. Sawcutting:
1. Use saws capable of cutting through concrete and reinforcing steel.
2. Use water to facilitate the cutting operation. Collect the runoff water if there are roadways or environmentally sensitive areas under the bridge.

B. Hydraulic Breakers:
1. Do not use a hydraulic breaker with a blunt tip in the vertical direction within six inches of a bridge girder or underlying structure walls that will remain.
2. Use wide, cross-cut chisel bits oriented on a flat angle over steel girder flanges to remove concrete and shear connectors if it will not cause damage to the girder.
3. Specialized pavement removal buckets may be used to lift sections of slabs that have been pre-cut.

C. Pneumatic Hammer:
1. Pneumatic hammers may be used to remove concrete over beams if they will not cause damage to the girder.

D. Hand Held Cutting Tools:
1. Cutting torches of varying types may be used to cut existing reinforcing and shear connectors that are specified to be removed.

2. Use hand-held grinding equipment to remove portions of shear connectors.

E. Other equipment:
1. Other equipment may be used if it will not cause damage to the girder.

PART 3 EXECUTION

3.1 BRIDGES OVER ROADWAYS AND RAILROADS

A. Provide the necessary workers, materials, and equipment at the site as needed to proceed with the removal work in an expeditious manner prior to closing the roadway to traffic to accommodate the deck removal.

B. Comply with all Maintenance of Traffic specifications.

C. Coordinate all work with Railroad. Provide railroad flaggers as required.

D. Pursue work promptly without interruptions while the roadway is closed to public traffic. Debris from deck removal operations may be allowed to fall directly onto the roadway below if pavement and structures are adequately protected.

E. Install protective debris shields if required.

F. Install protective debris shield for utilities if required.

G. Repair damage to girders, framing, utilities, adjacent travelways, and property.

3.2 BRIDGES OVER ENVIRONMENTALLY SENSITIVE AREAS

A. Provide the necessary equipment and shielding to prevent debris from falling into area below the bridge. This includes the collection of water used during deck removal.

B. Locate cranes away from sensitive areas as specified in the project environmental documents.

C. Install protective debris shield for utilities if required.

D. Repair damage to girders, framing, utilities, adjacent travelways, property and areas of the environmental specified for protection.

3.3 ACCEPTABLE PROCEDURES FOR ACCELERATED DECK REMOVAL

A. The following procedures may be used for the rapid removal of bridge decks. The Engineer responsible for the development of the demolition plan will carefully review and consider any procedures. Provide adequate strength and stability of the bridge per AASHTO requirements during all phases of the deck removal. Use operating level bridge rating calculations for the short-tem saw cuts described below.

1. Prior to bridge closure:
    a. Locate the reinforcing elevations at various locations along the bridge prior to closure. Use coring, drilling, chipping, or other means to locate the reinforcing. Minimize the size of exploratory holes.
    b. Partial depth transverse pre-demolition saw cutting of the bridge deck is allowed for simple span bridges and positive bending moment areas of continuous span bridges. A 50 percent cut of the deck depth may be cut during off-peak closures within one week of the complete removal of the bridge deck. Use a minimum spacing of cuts of approximately four feet. Traffic may be allowed on the deck in the interim period between the saw cutting and the full deck removal. There will be a potential for concrete to spall under the saw cuts after the bridge is re-opened to traffic. Design a debris shield for spall containment.
    c. Vertical cuts through the parapet will be allowed within one week of the full deck removal provided that the cuts are less than two inches wide.
    d. Full removal of parapets prior to bridge closure will be allowed if the deck overhang is protected with a properly anchored temporary traffic barrier.
2. After bridge closure:
    a. Partial depth transverse saw cuts used prior to the bridge closure may be extended through the full thickness after bridge closure. Continuously monitor the extension of the saw blade from under the deck during the cutting operation to prevent cutting into the top of the flange of the girders. Maintain radio or visual contact between the monitoring personnel and the cutting crew.
    b. Longitudinal saw cuts above the centerline of the girder top flange will be allowed provided that the depth of the saw cut is limited to just below the bottom mat of reinforcing steel.
    c. Lift slab sections using cranes or pavement removal buckets mounted on hydraulic excavators.

d. Remove the concrete over the girder flange on steel girder bridges with hand operated pneumatic hammers or hydraulic breakers equipped with a wide cross cut chisel bit set to a flat angle to shear off the shear connectors. Alternate methods of concrete removal over the girders may be used with prior approval from the Engineer. Modify the removal process if any damage occurs to the top flange.

e. Remove the concrete over the girder on concrete girder bridges with hand operated pneumatic hammers. Use 50 pound or smaller chipping hammers within six inches of the girder flange edge.

3.4 REPAIR OF DAMAGED FLANGES

A. The demolition plan Engineer is responsible for anticipating potential damage to the top flange of the girders and developing appropriate repair procedures prior to demolition. The following guidelines can be used for the repairs.

1. Simple span steel girder bridges:
   a. Do not repair minor dents and nicks in the top flange. Minor dents are defined as less than ½ inch deep. Minor nicks are defined as less than ¼ inch deep. Repair bent flanges if damaged beyond these limits. Repair nicks and gouges if damaged beyond these limits.
   b. Repair any bent transverse vertical stiffeners of connection plates.
   c. Leave remnants of the shear connectors in place. Remove a sufficient amount or all of the connectors to allow placement of the new deck.
   d. Repair any sawcut that penetrates the top flange. Welding of the sawcut is allowed using an approved welding procedure that meets the requirements of ANSI/AASHTO/AWS D1.5 Bridge Welding Code.
   e. Report any damage beyond these limits to the Engineer. Develop special repair procedures for these situations and obtain approval prior to commencement of the repair procedure.
2. Continuous multi-span steel girder bridges:
   a. There are two different areas on a continuous steel bridge that require different repair approaches. The negative and positive moment regions are shown on the plans.
   b. Treat the positive moment region areas as simple span bridges.

c. Negative moment regions:
   1) Do not repair minor dents. Minor dents are defined as less than ½ inch deep. Repair bent flanges if damaged beyond these limits.
   2) Repair any bent transverse vertical stiffeners of connection plates.
   3) Repair all nicks and gouges in the top flange in negative moment regions. Grind out nicks that are less than ¼ inch deep by grinding in a direction parallel to the girder span. Repair deeper nicks and gouges by welding using an approved welding procedure that meets the requirements of ANSI/AASHTO/AWS D1.5 Bridge Welding Code. Grind all welds flush with the surface of the top flange by grinding in the direction parallel to the girder span.
   4) Remnants of the shear connectors may be left in place. Remove a sufficient amount or all of the connectors to allow for placement of the new deck.
   5) Repair any saw cut that penetrates the top flange. Welding of the saw cut will be allowed using an approved welding procedure that meets the requirements of ANSI/AASHTO/AWS D1.5 Bridge Welding Code. Treat the weld repair as a tension flange splice. Grind all welds flush with the surface of the top flange by grinding in the direction parallel to the girder span.

3. Concrete girder bridges:
   a. Do not repair minor spalls in the top flange provided that the area is to be filled with concrete or grout in the completed bridge deck. Minor is defined as less than 1½ inch deep. Repair larger spalls using an approved patching material.
   b. Repair any cracks in the top flange using epoxy injection crack repair methods.
   c. Do not repair saw cuts that are less than ¼ inch deep. Repair saw cuts that are deeper than ¼ inch by chipping out the area and patching with an approved patching material.
   d. Report any damage beyond these limits to the Engineer. Develop special repair procedures for these situations and obtain approval prior to commencement of the repair procedure.

END OF SECTION