

ATTACHMENT 7-1: Environmental Commitments Summary

COMMITMENT NUMBER	COMMITMENT TEXT	RESPONSIBLE PARTY
1	INDOT shall notify school corporations, hospitals and emergency services at least two weeks prior to any construction that would block or limit access.	IFA
2	Workers who are working in or near water with E. coli shall wear appropriate PPE, observe proper hygiene procedures, including regular hand washing, and limit personal exposure.	Design-Build Contractor
3	Additional investigation may be necessary if construction generates sediment and/or disturbs soils in the Ohio River. Coordination with INDOT ES and KYTC will be required.	Design-Build Contractor
4	Any excavation which occurs in or near 44 W. 5th Street, New Albany, IN, will require analysis for lead prior to removal and disposal of soil and/or groundwater.	Design-Build Contractor
5	Accommodations shall be provided for the following special events and festivals. Full bridge closures shall not occur on: New Year's Day, Good Friday, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Christmas Day, Thunder over Louisville, Kentucky Derby, and Harvest Homecoming Festival.	Design-Build Contractor
6	Temporary access or use of any Section 4(f) or 6(f) resource during construction, shall require the Design-Build Contractor to coordinate with necessary agencies including but not limited to INDOT, KYTC, FHWA, the City of New Albany, the City of Louisville, the Louisville Parks and Recreation, and the Ohio River Greenway Commission, as Section 4(f) or Section 6(f) analysis may be required.	Design-Build Contractor
7	Early coordination response information received from Indiana Geological Survey is to be reviewed by the Design-Build Contractor.	Design-Build Contractor
8	United States Coast Guard will require Design-Build Contractor to submit a work plan for review. A work conditions letter will be issued from the USCG before any work can commence.	IFA
9	No impacts will occur to the Ohio River due to construction. Should impacts be unavoidable Design-Build Contractor will be required to coordinate with Kentucky Division of Environmental Analysis to obtain clearance.	Design-Build Contractor
10	Design-Build Contractor shall coordinate the final design with KYTC. KYTC shall provide Kentucky SHPO with the final design and the final archeological effects recommendation.	Design-Build Contractor
11	KYTC shall determine the Area of Potential Effect for the final design prepared by Design-Build Contractor and coordinate with the appropriate consulting parties.	IFA
12	Work outside of the existing ROW Limits or MOT Limits will require coordination with INDOT and KYTC.	Design-Build Contractor
13	Restrict below low-water work in streams to placement of culverts, piers, pilings and/or footings, shaping of the spill slopes around the bridge abutments, and placement of the riprap.	Design-Build Contractor
14	Minimize the extent of hard armor (riprap) in bank stabilization by using bioengineering techniques whenever possible. If riprap is utilized for bank stabilization, extend it below low-water elevation to provide aquatic habitat.	Design-Build Contractor
15	Implement pollution prevention and control measures during all construction activities to reduce the potential for hazardous spills or other materials entering the Ohio River. This will include the placement of refueling staging areas, fuel storage, and hazardous materials away from the river, and may also require specific containment measures for painting, sanding, etc.	Design-Build Contractor
16	If a causeway must be used, then locate the causeway primarily outside of the cobble/gravel substrate area, which is the most suitable habitat for many mussel species.	Design-Build Contractor
17	Install culverts/pipes within the causeway to allow continued flow of water through the area to prevent pooling and stagnation.	Design-Build Contractor
18	The height of the causeway should be kept to a minimum to allow over-topping during heavy rain events to prevent upstream flooding.	Design-Build Contractor
19	Use clean fill material and remove immediately once project is completed.	Design-Build Contractor
20	The causeway structure should not be in the stream longer than a year in order to minimize disruption of the mussel and host fish reproductive cycles.	Design-Build Contractor
21	All equipment to be used in the river should be inspected using accepted protocols and determined free of zebra mussel adults and veligers.	Design-Build Contractor
22	In the event a barge is used, all barge equipment maintenance will be conducted away from the river, whenever possible. Fuel storage shall be contained/maintained in an area where leakage and spilling into the river will be avoided.	Design-Build Contractor
23	Excavation for deadman anchors and steel cables shall be performed in a manner to minimize the amount of surface disturbance, and appropriate measures would be implemented to prevent the discharge of material into the river channel. During excavation, temporary silt fence shall be installed around each deadman anchor site during excavation and installation. Extreme caution will be exercised during excavation/installation activities to prevent sediment from being washed into the Ohio River.	Design-Build Contractor
24	Minimize impacts to shoreline and substrate via barge grounding.	Design-Build Contractor
25	Align the road along or through previously disturbed and degraded areas and disturb as narrow an area as possible to minimize negative impacts. Avoid tree removal to the greatest extent possible. Plant native hardwood trees to replace the vegetation destroyed during construction.	Design-Build Contractor
26	All plant material, mud, and debris should be removed, and all water drained from equipment before entering or leaving the waterway to prevent the spread of aquatic and terrestrial invasive species.	Design-Build Contractor
27	Avoid staging and construction access within or wooded areas to the extent possible.	Design-Build Contractor
28	Impacts to non-wetland forest of one (1) acre or more should be mitigated at a minimum 2:1 ratio. If less than one acre of non-wetland forest is removed in a rural setting, replacement should be at a 1:1 ratio based on area. Impacts to non-wetland forest under one (1) acre in an urban setting should be mitigated by planting five trees, at least 2 inches in diameter-at-breast height (dbh), for each tree which is removed that is 10 inches dbh or greater (5:1 mitigation based on the number of large trees).	Design-Build Contractor
29	The proposed project would require two applications to be submitted for authorization under Section 404 of the Clean Water	IFA

ATTACHMENT 7-1: Environmental Commitments Summary

	Act and Section 10 of the Rivers and Harbors act - one application for impacts to waters of the U.S. in Kentucky and one application for impacts in Indiana.	
30	If barges are to be moored on the Ohio River or doing any work on the river, a Section 10 permit would be required. A map showing the location of barges would be required, along with drawings stamped by a professional engineer showing the locations and mooring configurations (including locations of deadmen that would be installed). A narrative/description of the mooring configuration and work to be performed shall be provided.	IFA
31	Work within the river would require coordination with the Navigation Branch of the Louisville District US Army Corps, which may necessitate a permit. Permittees should anticipate a requirement to notify the Navigation Branch 30 days prior to the commencement of work/mooring on the river, resulting in a Notice to Navigation Interests.	IFA
32	The US Army Corps permit application must include the location, size and work for any staging, borrow and/or waste sites, with a description of work at those locations' areas; temporary work to be performed, including the installation of temporary mats, cofferdams, etc. All future correspondence with the US Army Corps shall reference US Army Corps ID number LRL-2018-1114.	IFA
33	The US Army Corps permit issued for this project will require the Design-Build Contractor to notify the Corps if potential endangered species or historic/archeological resources are encountered during the course of work.	IFA
34	The US Army Corps must be notified of any modifications to the authorized work.	IFA
35	The US Army Corps will require either a U.S. Coast Guard (USCG) permit or correspondence from the USCG stating a permit is not required prior to issuance of any Corps permits.	IFA
36	Design-Build Contractor shall notify IFA in writing within 24 hours of inadvertent impacts to wetlands or waterways for which activities are not permitted. Inadvertent impacted areas shall be immediately restored to the full satisfaction of IFA and the appropriate Governmental Entities. Except as specifically provided otherwise in the PPA, the cost incurred for, and the delay to the Project Schedule resulting from, restoration and, as applicable, mitigation of any inadvertent impacted areas shall be the sole responsibility of the Design-Build Contractor.	Design-Build Contractor
37	Design-Build Contractor shall coordinate with the INDOT Environmental Services Division and KYTC Division of Environmental Analysis regarding temporary impacts to waterway, wetland and other water resources.	Design-Build Contractor
38	Coordination with the Louisville Parks and Recreation is to be maintained by the Design-Build Contractor with project updates to ensure the safety of trail users.	Design-Build Contractor
39	Should accidental discovery occur in Indiana during construction the Design Build Contractor shall stop work within 100 feet of the discovery area shall but may continue in other areas. The Design-Build Contractor shall notify IFA and INDOT- Cultural Resource Office (CRO) of the discovery by calling 317-234-5168. The INDOT Archaeology Team Lead can be reached at 317-233-6795 for additional assistance	Design-Build Contractor
40	Should accidental discovery occur in Indiana during construction the Design Build Contractor shall provide a description of the discovery, along with digital photographs if possible, to CRO at the time of the discovery. A set of scaled photographs will allow CRO staff to evaluate the discovery and determine whether work may resume or whether additional documentation will be necessary without the time required for a site visit.	Design-Build Contractor
41	Should accidental discovery occur in Indiana during construction the Design Build Contractor shall provide an on-site evaluation is conducted and a treatment plan(s) is developed, as needed.	Design-Build Contractor
42	Should the Design-Build Contractor change the scope of work within the existing APE (deep trenching, etc.) then, additional coordination and archaeological investigation would be required. If the Design-Build Contractor proposes work activities that lie outside of the existing APE, additional coordination would be required and, potentially, a new APE would be established and additional investigation/analysis would most likely be required given the nature and extent of cultural resources within the vicinity of the bridge	Design-Build Contractor
43	Should accidental discovery occur in Kentucky during construction the Design Build Contractor shall stop work within 100 feet of the discovery area, but work can continue in other areas. The Design Build Contractor shall immediately notify IFA and KYTC DEA archaeologists at (502) 564-7250.	Design-Build Contractor
44	Should accidental discovery occur in Kentucky during construction the Design Build Contractor Shall notify Kentucky Heritage Council (KHC/SHPO) archaeologists at (502) 892-3614.	Design-Build Contractor
45	Should accidental discovery occur in Kentucky during construction the Design Build Contractor shall have a qualified professional archaeologist on-call, approved by KYTC Division of Environmental Analysis, who can respond and report to the Site within four hours in case of discovery of any Differing Site Conditions. The qualified professional archaeologist shall have experience with documentation, excavation, and mitigation of historic urban archaeological sites.	Design-Build Contractor
46	If human remains are encountered during project activities in Kentucky, all work within 100 feet shall be immediately stopped. The area shall be cordoned off, and, in accordance with KRS 72.020, the county coroner and local law enforcement shall be contacted immediately. Upon confirmation that the human remains are not of forensic interest, the unanticipated discovery shall be reported to Nicolas Laracuenta at the Kentucky Heritage Council at (502) 892-3614, George Crothers at the Office of State Archaeology at (859) 257-1944, and KYTC Division of Environmental Analysis archaeologists at (502) 564-7250.	Design-Build Contractor
47	Should accidental discovery occur in Kentucky during construction the Design Build Contractor shall ensure identified archeological sites will not be disturbed unless the site is cleared by established procedures and written authorization to enter the site has been obtained by the Design-Build Contractor.	Design-Build Contractor
48	Design-Build Contractor shall be responsible for any archaeology surveys and any associated additional mitigation for Construction Work outside the previously surveyed area and Planned ROW Limits.	Design-Build Contractor
49	Following rehabilitation of the Kentucky Approach Bridge, the Design Build Contractor shall re-seed grass and restore landscaped elements of the affected parcels to pre-existing condition.	Design-Build Contractor
50	Design-Build Contractor shall coordinate with the Louisville Parks and Recreation to ensure the safety of trail users.	Design-Build Contractor
51	If a towboat is used, operation shall be restricted to the lowest practicable speed when approaching and departing the work zone to minimize river bottom scouring and downstream siltation.	Design-Build Contractor
52	Design-Build Contractor shall coordinate with IFA regarding any potential deviation from the approved environmental	Design-Build Contractor

ATTACHMENT 7-1: Environmental Commitments Summary

	document.	
53	Notice of any closure which extends 24 hours or more, shall be given to Louisville Metro Public Works, emergency management organizations, and the Transit City Authority of River City (TARC) prior to the closure.	IFA

ATTACHMENT 7-2

UNIQUE SPECIAL PROVISION

PROVISIONS FOR LEAD-BASED PAINT

Description

HANDLING, TESTING, AND DISPOSING OF EXISTING CONCRETE BRIDGE DECK, CLEANING TOP FLANGE OF STEEL STRUCTURAL MEMBERS, AND BRIDGE PAINTING SPECIFICATION REVISIONS

The 2020 Standard Specifications are revised as follows:

SECTION 202, BEGIN LINE 92, INSERT AS FOLLOWS:

202.03 Removal of Bridges, Culverts, and Other Drainage Structures

Bridges, culverts, and other drainage structures in use by traffic shall not be removed in whole or in part until satisfactory arrangements have been made to accommodate traffic. Any excavation adjacent to the structure or to its approaches shall be shored adequately to avoid damage to them or to traffic.

When a reinforced concrete arch bridge is to be removed, either in whole or in part, the work shall include the removal of miscellaneous items within the limits of the structure, which must be removed prior to or in conjunction with the removal of the structure. These miscellaneous items shall include but shall not be limited to: concrete and asphalt pavements; concrete and asphalt sidewalks; and fill within the arches regardless of content.

For all painted or coated structural steel including beams, girders, diaphragms, cross frames, plates, and all other structural steel items that become the property of the Design-Build Contractor through either a complete bridge removal in accordance with 202.03(a) or the removal of portions of a bridge in accordance with 202.03(b), the Design-Build Contractor shall either:

- 1. take the steel to a recycling facility for proper disposal, or*
- 2. take ownership of the steel.*

For structures shown in the contract documents as being built before 1995, the Design-Build Contractor shall assume that the existing coating contains Hazardous Materials and that mill scale exists on the steel.

If the Design-Build Contractor elects to take the steel to a recycling facility, a receipt from the facility shall be provided. The receipt from the recycling facility shall show the name of the facility that accepted the material, address, city, state, zip code, contract number, bridge number, date material was received from the Design-Build Contractor, weight of the material accepted by the recycling facility, and detailed description of the items given to the recycling facility.

If the Design-Build Contractor elects to take ownership of the steel, the steel shall be cleaned in accordance with 619.14 prior to its removal from the project.

SECTION 202, AFTER LINE 167, INSERT AS FOLLOWS:

When a reinforced concrete bridge deck is to be removed, either in whole or in part, from a steel superstructure, portions of the existing coating and rust from the top flange of the steel superstructure adhere to the bottom of the concrete bridge deck. A random sample of the concrete,

coating, and rust waste stream shall be obtained and tested in order to characterize the waste stream. The sampling process depends on the Design-Build Contractor's method of concrete removal and shall be in accordance with one of the following. If the Design-Build Contractor chooses to use both methods to remove a reinforced concrete bridge deck, either in whole or in part, then separate piles of concrete debris shall be maintained and sampled as directed in 1. and 2. below.

1. Bridge Deck Removal in Slabs

If the Design-Build Contractor elects to remove the existing bridge deck or portions thereof by saw cutting the concrete bridge deck slab into smaller slab pieces, the concrete slabs shall be stored at a location proposed by the Design-Build Contractor, and approved by IFA and shall remain at the approved location until the waste stream has been characterized.

Any existing coating and rust that adheres to the underside of the concrete slabs shall be removed by any of the mechanical surface preparation methods listed in SSPC-SP13. Removal efforts shall continue until all remnants of existing coating and rust have been removed from the concrete. Containment in accordance with 619.07(b)1.a shall be used. The waste residue stream from removing the existing coating and rust from the concrete shall be commingled with the waste residue stream from cleaning the top of the steel structural member, which was generated as a result of 619.18.

The waste residue sample from the combined coating and rust waste stream and the top of the top flange waste stream shall be sampled in accordance with 3a below. Concrete shall be disposed of in accordance with 202.03(c).

2. Bridge Deck Removal in Chunks

If the Design-Build Contractor elects to remove the existing bridge deck or portions thereof in chunks by breaking with hydraulic hammers, by crushing, or by any other means that results in concrete chunks being generated from the bridge deck removal operation, all concrete waste shall be stored at a location proposed by the Design-Build Contractor, and approved by IFA and shall remain at the approved location until this waste stream has been characterized.

3. Sampling Procedure

For concrete generated from removal methods 1 and 2 above, the Engineer will witness the extraction of the waste residue sample. The Design-Build Contractor shall maintain custody of the waste residue sample until it is shipped. The sample shall be analyzed for all contaminants listed in ITM 803 by the TCLP and Total Metals. All remaining waste residue shall be placed in an approved container. Such containers shall be labeled and maintained to comply with 40 CFR 264.

a. For Waste Streams in accordance with 202.03(b)1

The waste residue sample shall be taken by random method as described in the QCP which reflects representation of the entire bridge. The waste stream consisting of paint, rust, existing structural steel coating, fine concrete particles, and all other items related to the removal of the residue from the concrete and steel shall be disposed of as described in 202.03(c).

b. For Waste Streams in accordance with 202.03(b)2

A random sample of the crushed concrete shall be obtained by the following procedure:

One shovel full of material shall be taken from three random locations within the crushed concrete waste pile. The sample shall consist of varying sizes of material. The material shall be placed in a 5 gallon bucket. The contents of the bucket shall then be dumped over a No. 4 sieve

into another 5 gallon bucket. All material that passes the No. 4 sieve shall be placed in a quart or gallon size plastic bag with a zipper seal and labeled as to which bridge the sample represents. If the material that passes the No. 4 sieve amounts to less than a handful, all of the material that was retained on the No. 4 sieve shall be crushed with a sledge hammer or other suitable device until sufficient material is generated that passes the No. 4 sieve. The Engineer will send the sample to the laboratory for testing. The waste residue sample are required to be tested for arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver by the TCLP in accordance with 40 CFR 261.24. If any of these contaminants are present in a concentration which exceeds the respective regulatory level indicated in Table 1 of 40 CFR 261.24, the entire crushed concrete waste pile shall be considered hazardous and disposed of accordingly. The waste residue sample is also required to be tested for eight Total Metals consisting of: arsenic, barium, cadmium, chromium, lead, selenium, and silver by the EPA SW-846-method 6010, and mercury by the EPA SW-846-method 7471.

If the waste characterization of the crushed concrete bridge deck waste stream is hazardous and matches the waste characterization of the waste stream from the top of the steel structural members for that bridge, the waste streams may be commingled and disposed of as one in an appropriate disposal facility as described in 202.03(c). If the waste characterizations are different or are non-hazardous, then each waste stream shall remain separate. The waste stream from the top of the top flange of the steel structural members shall be disposed of in accordance with 619.07(b). The crushed concrete waste stream shall be disposed of as described in 202.03(c).

(c) Disposal of Concrete

All concrete from complete or partial removals, which is determined to be acceptable for riprap, shall be used on the project as directed. Concrete which has paint or other coatings adhering to it or exposed reinforcing bars shall not be used for riprap. Disposal or placement as riprap will not be paid for directly, but the cost thereof shall be included in the cost of removal. ~~Disposal of concrete from complete or partial removals shall be in accordance with 203.08.~~

If Hazardous Materials equal to or exceeding the established threshold in 40 CFR 261.24 Table 1 are present, disposal of the reinforced concrete bridge deck shall be in accordance with SSPC-Guide 7 and 619.07(b). If Hazardous Materials are not above the established threshold in 40 CFR 261.24, the reinforced concrete bridge deck shall be disposed of in accordance with 203.08. The paint, rust, and cleaning debris from cleaning paint from the concrete shall be disposed of in accordance with 619.07(b) and will be paid as disposal of cleaning waste in accordance with 619.20. Crushed concrete or post-hydrodemolition concrete shall not be disposed of in a clean fill facility.

SECTION 202, BEGIN LINE 519, INSERT AS FOLLOWS:

Removal of present structure or portions thereof will not be measured for payment.

For steel that the Design-Build Contractor elects to take to a recycling facility, handling, hauling, and all other activities involved with removing and properly disposing of existing steel at a recycling facility will not be measured for payment.

For steel that will become the property of the Design-Build Contractor, required cleaning of existing steel, removal of mill scale, testing, disposal of the waste stream, containment, and all other items involved with removing and properly disposing of the existing coating will not be measured for payment.

Pavement removal will be measured by the square yard of the area removed.

Sampling, laboratory costs, and all other expenses associated with determining whether or not the reinforced concrete bridge deck must be disposed of in a disposal facility that accepts hazardous waste, a standard construction debris facility, or a clean fill facility will not be measured for payment. The method of removal of the existing paint, rust, and structural steel coating from the concrete and the disposal of this waste will not be measured for payment.

Cleaning of the structural steel on a bridge superstructure to be removed will not be measured for payment.

SECTION 202, AFTER LINE 614, INSERT AS FOLLOWS:

The cost of transportation and disposal of spent materials, waste residues, waste residue containers, and all other debris generated from environmental control and cleaning the paint and rust from the concrete that gets disposed of shall be paid for when the Design-Build Contractor provides a paid invoice showing at what facility the disposal occurred. Payment will be made for disposal of cleaning waste in accordance with 619.20.

SECTION 202, AFTER LINE 666, INSERT AS FOLLOWS:

The cost of sampling, laboratory costs, and all other expenses associated with determining whether or not the reinforced concrete bridge deck must be disposed of in a disposal facility that accepts hazardous waste, a standard construction debris facility, or a clean fill facility shall be included in the present structure remove or present structure remove portions pay item. All costs associated with removing existing paint, rust, and structural steel coating from the existing concrete shall be included in the cost of the present structure remove or present structure remove portions pay item.

Where the existing structural steel is shown to be removed and becomes the property of the Design-Build Contractor, the cost of the following: removal of mill scale, furnishing all materials, equipment, and labor required for scraping, steel brushing, or other acceptable methods for complete removal of the existing coating on all areas of the structural steel to the level of cleanliness specified in 619.14, performing the quality control tasks outlined in 619.03, testing, use of special cleaning methods, and shipping of waste residue samples, shall be included in either the present structure remove, or present structure remove portion pay item for the respective bridge number.

SECTION 202, BEGIN LINE 749, INSERT AS FOLLOWS:

The cost of all handling of the product, removal of the product from the tank, disposal, all required packaging, and transportation shall be included in the cost of underground storage tank, liquid waste disposal.

All necessary cleanup of spills caused by the ~~Contractor~~ Design-Build Contractor will not be paid for.

For steel that the Design-Build Contractor elects to take to a recycling facility, the cost of handling, hauling, and all other costs involved with removing and properly disposing of existing steel at a recycling facility shall be included in the cost of present structure remove, or present

structure remove, portions pay item. The Department will withhold a payment equal to 50% of the present structure remove, or present structure remove, portions pay item until the Design-Build Contractor presents a receipt from the recycling facility indicating that the recycling facility is now in possession of the steel.

For steel that will become the property of the Design-Build Contractor, the cost of cleaning existing steel, removal of mill scale, testing, disposal of the waste stream, containment, and all other costs involved with removing and properly disposing of the existing coating shall be included in the cost of present structure remove, or present structure remove, portions pay item. The Department will withhold payment of 50% of the present structure remove, or present structure remove, portions pay item until the Design-Build Contractor presents a receipt from the facility where the waste stream disposal occurred.

ATTACHMENT 14-3

UNIQUE SPECIAL PROVISION

LINK SLAB

Description

The number of deck joints shall be minimized to the extent practical to minimize future maintenance and to accommodate superstructure movement. Joints shall be replaced with a link slab system. The link slab system used shall be reinforced concrete or Ultra-High-Performance Concrete (UHPC) with design in a method acceptable to the INDOT Office of Structural Design or with fiber reinforced concrete according to the following specifications for Structural Concrete (Link Slab).

If fiber reinforced concrete is used then INDOT standard concrete mix design for bridge deck (Class C) shall apply for the link slab concrete except modified to include fiber reinforcement as specified herein.

Use a combination of micro and macro non-metallic synthetic fibers to provide crack control and improve the long-term performance of the bridge decks. The maximum allowable slump may be increased by 1 inch for concrete mixes that include these fibers. Incorporate the fibers into the mix design in accordance with the applicable requirement of the INDOT Standard Specifications.

Material

Supply synthetic fibers for the stated purpose of controlling plastic shrinkage cracks in PCC and to provide increased residual flexural strength in the concrete. The supplied fibers should meet INDOT Reoccurring Special Provision (RSP) 912-M-050 and come from one of the products from INDOT's approved list.

Manufacturer Product Name	Addition Rate:
ABC Polymer Industries, LLC FIBERFORCE 650 (1.5" length only)	4.5 lbs/cyd
ABC POLYMER INDUSTRIES, LLC FIBERFORCE 1000 HP (2" length only)	4.5 lbs/cyd
BASF CORPORATION MASTERFIBER MAC MATRIX (2.1" length only)	4.5 lbs/cyd
BASF CORPORATION MASTERFIBER MAC 360 FF	4.0 lbs/cyd

Trial Batch and Test Placement:

In addition to a flexural strength test in accordance with ASTM C293, contractor is required to produce a test batch and test placement.

Allow District Testing Engineer (DTE) ample opportunity to witness trial batching. Provide DTE notice and mix proportions 7 calendar days prior to this event.

Mix trial batch (a minimum of 3 cubic yards in size) at least 30 calendar days prior to planned placement. Establish batching sequence of materials during trial batch.

The test batch shall be 8 inches in thickness and 100 square feet minimum in plan dimensions. Two layers of epoxy coated reinforcement shall be placed in a test batch with a similar bar size, spacing and minimum clearance to those for the production link slabs as shown in the contract plans. Place and consolidate using methods typical for bridge deck pours. Finish concrete by hand and evaluate mix workability and finishability for intended application and method of placement. The test placement may be directly poured on grade. Contractor is required to demonstrate the proposed placement and finishing processes.

ATTACHMENT 14-4

UNIQUE SPECIAL PROVISION

STRUCTURAL REPAIRS: HANGER REPLACEMENT

Description

This work shall consist of furnishing all labor, materials, equipment, services and incidentals necessary and design, fabricate, and install a complete and functioning hanger system to replace the existing hangers at panel points 3 through 19 on both East and West truss of Spans 1 and 2 in accordance with 105.03.

Each hanger shall consist of two individual strands with anchor sockets connected to the existing structure under the lower chord at top and above the floor beam flange at bottom. The Contractor may utilize the existing anchor socket holes at those locations for the new hanger connection design to the existing structure. Existing turned bolts shall be replaced with new turned bolts. New holes shall match the existing holes in size and alignment when bolting new steel to existing steel. Replacement hangers and sockets shall be designed for HS20-44 loading in accordance with 2002 *AASHTO Standard Specifications for Highway Bridges, 17th Edition*, and shall be designed for actual dead loads. Weldments and connections shall also be designed in accordance with AASHTO LRFDF.

The structural strand shall be designed for a safety factor of 3:1 for breaking strength versus unfactored dead load plus live load and impact.

Hanger replacement work shall include the work to furnish and erect a temporary support system designed to support the floor beam during the hanger replacement process. This shall include temporary jacks, materials, and appurtenances needed for the safe removal and disposal of the existing cables and associated hardware and load transfer to the hanger replacement cables.

Hanger replacements shall be constructed in phases as necessary to accommodate the MOT Plans and the maintenance of traffic requirements.

If required by the work sequence, a portion of the existing concrete bridge deck coping shall be removed as necessary to construct the temporary hangers. Anchored temporary barriers shall be provided across open areas in the coping.

The work shall also include testing of the existing hanger strand system to measure dead load tension in the existing hanger cables, including the purchase or rental of required equipment to perform the testing.

The work shall also include testing the existing hanger strands for any residual tension following load transfer to the temporary support, and prior to cutting and removing the existing hanger strands.

The work shall also include monitoring the distance between the upper and lower hanger anchor points for all hangers prior to the start of hanger replacement activities, after each individual hanger is replaced, and immediately after the conclusion of hanger replacement activities. Measurements shall be taken before and after the individual hanger is replaced as a way to verify that this distance during the cable replacement process.

The work shall also include cleaning and spot painting of existing steel work wherever the existing paint coatings have been damaged or disturbed by the hanger replacement work to three (3) inches beyond all such areas affected by the replacement work in all directions. Steelwork exposed to the environment by removing the existing hanger system shall be considered as disturbed and shall be spot painted as a part of the work. Spot painting shall use the Partial Paint System in accordance with 619. Galvanized materials shall not be cleaned or painted and shall be protected from overspray during painting operations. Any damaged galvanized surfaces shall be repaired in accordance with ASTM A780-09(2015), Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coating.

Materials

Fabricated Structural Steel

Structural steel shall be grade 50 or higher and in accordance with 910.02 meeting fracture critical member Charpy V-notch requirements of temperature zone 2 as specified in AASHTO LRFD Bridge Design Specifications, 8th Edition Section 6.6.2.1.

Fabrication shall be in a fabricating plant that is certified in ABR (Certified Bridge Fabricator-Advanced (Major) under the AISC Quality Certification Program in accordance with 711.04(b)3.

High Strength Bolts

Bolts shall be Type 1 Galvanized ASTM F3125, Grade A325 (AASHTO M164) and in accordance with 910.02. Grade A490 may be used with temporary connections.

Where required, turned bolts shall be new galvanized ASTM A449 Type 1 high strength turned bolts and ASTM A53DH heavy hex nuts. All bolts, nuts, and washers to be galvanized shall be in accordance with ASTM B695 (AASHTO M298, class 50). The turned body of the bolt shall be 1/16" larger than the nominal thread size.

Structural Strand

Structural strand shall conform to ASTM A586 Grade 1, Class A weight zinc-coated inner wires and Class C weight zinc-coated outer wires. The inner wires shall be lubricated with Prelubeor 19 corrosion inhibiting grease manufactured by Grignard Company, LLC or equivalent, which shall be injected during manufacturing of the strand which will provide additional corrosion protection for the inner wires.

Strands shall have a minimum breaking strength of 376 tons. All strands shall be pre-stretched to 55% of the breaking strength in accordance with ASTM A586. A minimum modulus of elasticity of 23,000ksi shall be required for pre-stretched strands for Class C weight of zinc-coated outer wires.

The manufacturer of the structural strand shall be ISO 9001 certified

Socket Assemblies

All anchor sockets shall be cast steel conforming to ASTM A148. Sockets and the socketed zinc connections shall at least be Grade 105/85 and meet or exceed 100% of the breaking strength of the designated structural strand attached. Each

socket installed as part of the structure shall be proof loaded to 50% of the breaking strength of the attached structural strand following attachment of the structural strand.

All anchor sockets and components shall be Class A galvanized conforming to the requirements of ASTM A153. One end of each cable assembly shall be an adjustable socket with the adjustable range large enough to accommodate that required for cable elongation and construction tolerance and allows for tensioning the cable.

Pin holes for open strand sockets shall be line bored in accordance with 711.38. Provide a pin hole diameter that does not exceed that of the pin by more than .0625 inches as measured on the galvanized surfaces. The galvanizing thickness on the inside surface of the pin hole where it contacts the pin shall not exceed .03125 inches.

All socket pins shall have one end headed and one end fitted for a retaining device. The pin retaining device may be a threaded pin cap or cotter pin. The pin head and retaining device must be capable of sustaining a force along the axis of the pin equal to or greater than 5% of the minimum breaking strength of the attached structural strand. Charpy V-notch testing shall be performed per ASTM E23 at 40 °F on one pin per lot and the results shall be submitted to IFA.

All components shall be designed to develop the minimum breaking strength of the attached structural strand without experiencing stresses beyond the yield point of the socket steel or excessive creep of the zinc filler under load. All sockets, rods and pins shall be considered fracture critical and shall adhere to the requirements of AASHTO/AWS D1.5.

All sockets shall be fully inspected by magnetic particle examination conforming to ASTM A 781, supplemental requirement S1 in accordance with:

- a. ASTM E 709 - Standard Guide for Magnetic Particle Testing
- b. ASTM E 125 - Standard Reference Photographs for Magnetic Particle Indications on Ferrous Castings.

Magnetic Particle Testing acceptance levels shall be in accordance with ASTM E125 as follows and discontinuities exceeding the degree shown in the following table shall be cause of rejection of a socket:

TABLE 1: SEVERITY LEVEL - MAGNETIC PARTICLE TESTING CASTINGS

Category ASTM E125	Defect	Acceptable Severity Level
I	Hot Tear, Crack	*
II	Shrinkage	2
III	Inclusions	2
IV	Internal Chills & Chaplets	Not Acceptable
V	Porosity	1

* Indications must be removed by grinding and blending. Repaired sockets must be retested and evaluated. Each casting meeting these requirements shall be stamped "MT" (indicating Magnetic Particle Tested) on a non-machined surface.

Each socket type shall be subjected to radiographic examination conforming

to ASTM A781, supplemental requirement S2, in accordance with the following frequency: 1st, 8th, 18th, 38th, 68th, 108th, and 136th socket. Contractor shall submit radiographic shot schedule of castings to IFA for approval for each socket type.

Radiographic inspection shall be performed by the Contractor and witnessed by IFA or their representative in accordance with the following specifications, as applicable:

- a) ASTM E 94 - Standard Guide for Radiographic Examination.
- b) ASTM E 446 - Standard Reference Radiographs for Steel Casting up to 2 inches in Thickness.

The surface of the casting shall be examined visually and free of adhering sand, scale, cracks and hot tears.

Large sand spots, inclusions and blow holes, as determined by IFA or their representative, shall be cause for rejection of the casting.

Defects exceeding the degree shown in the following table shall be cause for rejection of a socket.

Table 2: SEVERITY LEVEL - RADIOGRAPHICALLY INSPECTED CASTINGS

Category ASTM E446 up to 2 inches	Defect	Acceptable Severity Level
A	Gas Porosity	3
B	Sand Slag Inclusions	3
C	Shrinkage:	
	Type 1	3
	Type 2	3
	Type 3	3
	Type 4	3
D	Crack	Not Acceptable
E	Hot Tear	Not Acceptable
F	Insert	Not Acceptable
G	Mottling	Not Acceptable

If a socket is rejected, all other sockets from the same heat shall be radiographically inspected at no additional expense.

Rejected castings may be repaired at the sole discretion of IFA. If approved by IFA, repairs shall be performed repairs at no additional expense. Minor defects may be removed by grinding or chipping without welding repair, provided the following requirements are complied with:

- The depth of the defect does not exceed 3% of the specified dimension.
- The removal of metal does not appreciably affect the strength of the casting, as determined by the Engineer of Record.
- The remaining wall thickness is equal to or greater than the required wall thickness.
- The surrounding metal is ground to a smooth contour with the elimination of apparent stress risers.

Defects exceeding those defined above may be repaired by welding if approved by IFA. All proposed repair procedures shall be submitted to IFA in writing. The request shall include a description of the defect, the size and shape of the excavation, the welding specification, and the amount of preheat and post heat to be utilized.

Contractor shall perform and provide certification for radiographic inspections to IFA for review and approval. Inspections shall be performed by approved American Society for Nondestructive Testing ASNT-TC-1A examiners.

The anchor sockets shall be Charpy V-notch impact tested in accordance with ASTM A 781, supplemental requirement S9. The testing frequency shall be performed at the same frequency as for the radiographic testing. The samples shall withstand an impact of 25 foot-pound at 40°F. Contractor shall submit the documented results to IFA.

Pins

Pins connecting the open strand sockets to the anchor plate shall conform to the requirements of ASTM A668, Class F. Supplemental requirement S6 magnetic particle test and S7 ultrasonic test shall apply. Ultrasonic testing shall be performed at the same frequency as for the radiographic testing of the anchor sockets.

Charpy V-notch impact testing shall be performed on the pins in accordance with ASTM A673, P frequency. The samples shall withstand an impact of 25 foot-pounds (force) at 40°F.

Pins shall be fabricated in accordance with 711.37. Pins shall be galvanized in accordance with ASTM A153. The galvanizing thickness on the pin shall not exceed 0.03125 inch.

Cotter Pins

Stainless steel type 316 cotter pins shall be supplied.

Construction Requirements

Field Verification

Complete field survey and measurement of all steelwork and work locations shall be performed as necessary to furnish complete and accurate shop drawings. Adjustment or modification in the field may be necessary to assure a reasonable fit.

Shop drawings of the existing materials are available for the Contractor's use. However, field measurements shall be taken to confirm dimensions where necessary. Fully dimensioned shop drawings of all new materials, superimposed on existing materials shall be submitted in accordance with 105.02.

The Contractor shall verify the dead load tension in the existing hanger strands prior to performing removal work. The testing procedure proposed for use shall be submitted to IFA for review and approval prior to performing any testing at the bridge. The Contractor shall perform tension testing to approximate a "no live load" condition and shall specify means to achieve a minimal live load force effect in the testing procedure.

A complete summary of all hanger dead load tension readings shall then be provided to IFA for review and approval upon completion of the testing. The approved dead load summary table shall be submitted to the hanger strand manufacturer for use prior to fabrication of any hanger strands.

Temporary Jacking

The Contractor shall be responsible for design, fabrication and construction of all temporary jacking systems required to support the relevant in-service loads and construction loads. Calculations and working drawings shall be submitted to IFA for all temporary jacking systems and related component designs in accordance with 105.02. All design calculations shall conform to the design criteria and shall be signed and sealed by a Licensed Engineer in the State of Indiana.

All jacking operations shall be performed in the presence of IFA or their representative. Actual jacking forces, including increments of application at each jack, shall be carefully monitored and recorded. The relative displacement of the floor beam shall not exceed 1/8" from the reference datum. The actual deflection of the floor beam shall be continuously monitored during jacking operations.

Following jacking operations, the Contractor shall test the existing hanger strand at each truss panel point to ensure that all load has been successfully transferred to the temporary support and no residual tension is carried by the existing hanger strand prior to its cutting and removal. Flame cutting shall not be used to cut the hanger unless all load has been removed from the hanger. The method for performing this testing shall be defined by the Contractor as part of the jacking procedure, which shall be submitted to IFA for review and approval in advance of any jacking operations at the site.

Jacking during hanger installation operations shall not be allowed and/or shall be ceased immediately when the sustained wind velocity exceeds 30 mph. The Contractor shall only perform jacking and load transfer between the existing and replacement hangers at one truss panel point location at a time anywhere on Span 1 and 2 separately or concurrently. However, the Contractor shall be allowed to perform all other work concurrently along both the East and West trusses.

Local spot painting shall be performed whenever existing paint coats are disturbed and may be staged concurrently along the East and West trusses. The limits of the spot painting shall be an additional three inches beyond all areas affected by the Contractor on all sides. All new galvanized steel shall be protected from overspray during spot painting operations.

Fabrication

Working drawings for all hanger assemblies suitable for approval for construction purposes relevant to the hanger replacement work shall be submitted in accordance with 105.02. Fabrication or construction shall not start on an item of work before working drawings are approved. Working drawings and design calculations shall be signed by and sealed by a professional engineer registered in the State of Indiana.

Erection plans shall be submitted which completely describe the method of erection and jacking procedure. Details of all false work, guys, lifting

devices, hydraulic jacks and attachments to bridge members shall be included. An erection sequence for all anticipated phases and conditions of erection showing crane capacities and crane locations and lifting points shall also be included. Cable force calculations shall be provided to demonstrate that the cable allowable stress will not be exceeded.

All structural strand, socket components and socket installation shall be performed by a fabricator having a minimum of 10 years of experience in the manufacturing of the specific components. The fabricator shall submit their quality procedures plan and manual to the IFA for review.

The fabricator's quality procedures plan and manual are subject to approval by IFA. Fabricators of structural strand, cast sockets, and pins shall demonstrate a familiarity with procedures required to produce fracture critical members in accordance with a fracture control plan as defined by AASHTO/AWS D1.5.

At the time the structural strands are measured, a permanent paint stripe shall be placed on the top surface along the full length of the strand which shall be referenced to eliminate any change in length of the hanger strand due to twisting.

All hanger assemblies shall be preassembled and delivered to the site as complete units. The hanger assemblies shall be packaged on reels with a minimum diameter of 5 feet. The structural strand after it is pre-stretched shall not be pulled into a curve smaller than 5 feet.

Certification of the following type shall be submitted to IFA in accordance with 916.02:

- Manufacture of strand, type C
- Tensile strength of strand, type B
- Modulus of elasticity of strand, type B
- Pre-stretching, measuring, and proof loading, type B
- Material certification of sockets and pins, type C

Testing and Fabrication of Wire, Strand and Sockets

Wires used in each hanger shall be made in one continuous piece in accordance with the requirements of ASTM A586 Section 10 Joints and Splices. The splicing of finished outer wires will not be allowed. Strand shall be of long lay but shall not be of such length to prevent keeping the center in its true position during any of the operations before the hangers are in their final positions.

Testing of Wire for Strand

Prior to fabrication, the zinc-coated steel wire used in the manufacture of structural strand shall be tested for physical properties in accordance with ASTM A586 and the following:

- a. No less than 10 percent of the coils of any lot of zinc-coated wire shall be tested for tensile strength. If any of these coils fails to meet the requirements, IFA may require that all coils of such lot be tested and

reject all individual coils which do not meet the requirements for tensile strength.

- b. No less than 10 percent of the coils of any lot of zinc-coated wire shall be tested for stress at 0.7 percent extension. If any of these coils fails to meet the requirements, IFA may require that all coils of such lot be tested and reject all individual coils which do not meet the requirements of stress.
- c. No less than 5 percent of the coils of any lot of zinc-coated wire shall be tested for zinc coating (weight and adherence). If any of these coils fails to meet the requirements, IFA may require that all coils of such lot be tested. Unless at least 80 percent of the coils pass the test, the entire lot will be rejected.

Any coil failing to meet the requirements will be rejected.

Fabrication of Structural Strand:

The strand shall be manufactured to meet or exceed the strength requirements specified herein. Documentation of compliance with these requirements and make-up of the wires in the strand shall be submitted to IFA.

The strand shall be manufactured in machines of adequate size to ensure first-class workmanship and fabrication to the final length. Once the manufacture of strand has started, no changes shall be made in wire grade, construction, or lay of strand, or other factors that would affect the uniformity of the finished product. Bent wires shall not be straightened or used. Any kinked or damaged strands will be rejected.

All strands shall be pre-stretched by stressing each strand with a load equal to 55 percent of the breaking strength in straight tension. The load shall be maintained and/or repeated until the strand reaches a stable condition and shows a well-defined and uniform elastic stretch and recovery under stressing. The modulus of elasticity shall be determined in accordance with ASTM A586. This information shall be submitted to IFA.

A test for modulus of elasticity and breaking strength shall be performed for each manufactured length of strand in accordance with ASTM A586. The gauge length of the specimen shall be 100 inches. The strand shall have the anchor sockets attached to each end and shall be loaded through the sockets. The socketing procedures used for the test specimen and assemblies shipped to site shall be identical.

If the test specimen fails to meet the minimum breaking strength requirement, another test sample shall be cut from the same manufactured length and tested. Should it also fail, the manufactured length of strand shall be rejected. If rejected, the contractor shall furnish new strand length that is subject to the same testing and approval procedures outlined herein. No compensation will be made for the cost of the rejected strand, including testing costs. All tests results shall be submitted to IFA for review and approval.

The strand hanger lengths shall be measured after pre-stretching using calibrated steel tapes while under a known tension equal to the dead load shown on the erection plans. After marking for length, the load shall be released and then reapplied. A second measurement shall be taken and the two measurements shall check within a tolerance of 0.25 inches.

At the time strands are measured for cutting, a continuous paint stripe shall be made on one side of the strand for its entire length to assure correct alignment of the strands during socketing and erection.

The strand shall then be cut and the sockets shall be put on carefully to ensure socket and strand alignment. The sockets shall be attached to the strands by using zinc, and using a reliable method that will not permit the strand, when stressed to 100 percent of minimum breaking strength under the test specified hereafter, to seat more than 0.5 inches. If a greater movement should occur, the method of attachment shall be changed until a satisfactory one is found. Each end fitting of the finished assembly shall be proof-loaded to a minimum of 50 percent of the strand breaking strength.

When cutting the strand, an allowance for obtaining test specimens shall be included.

Strand identification marks shall be provided to facilitate erection. Each strand shall be marked with a legible waterproof tag attached to it giving the fabricated length and cable ID number as noted in the erection plans.

Strands shall be properly coiled or reeled in such a manner so that no permanent deformation of wires in the strand will occur. Strands shall be stored in a well-protected location. Strands shall be handled, transported, and stored in accordance with the AISI Wire Rope Users' Manual. Any strands damaged by the handling, transporting or storing shall be replaced at the Contractor's expense.

Socket Finishing

All sockets shall be given a visual inspection and evaluated for defects. Practice A802 or other visual standards may be used to define acceptable surface discontinuities and finish. Such visual inspection shall be performed by an independent commercial testing laboratory approved by IFA. Visual surface discontinuities that are unacceptable shall be removed and the removal verified by visual examination of the resultant cavities.

Non-destructive tests shall be performed by the same approved laboratory, in accordance with the appropriate Supplementary Requirements of ASTM A781. IFA will determine the acceptability of sockets evaluated in accordance with this standard.

Any socket that is unacceptable shall be replaced; or alternatively, the contractor may propose the use of other non-destructive test methods to establish the acceptability and/or repairability of the socket. Those test methods, done at the expense of the contractor, may include, for example, radiography, ultrasonic, magnetic particle or dye penetrant. For those sockets that are repaired, follow-up non-destructive tests, at no cost to the Department, shall be performed to verify the success of the repair procedure. IFA shall evaluate the acceptability and/or repairability of a socket based on the results of the tests conducted and shall be the sole judge as to the suitability of a repaired casting.

Sockets shall be neatly finished to the dimensions of the selected style. Manufacturer tolerances prior to galvanization shall be submitted to IFA for review prior to casting. A qualified independent inspector hired by the Design-Build Contractor and approved by IFA shall visually examine each socket for defects. Defects judged to be unacceptable by the independent inspector shall be repaired to the satisfaction of IFA or the socket shall be replaced with a new

casting. The basis for allowing a socket to be repaired shall be at the discretion of IFA. Additional non-destructive tests to determine the type and amount of repair and where repairs are required shall be performed at each unacceptable defect where the Inspector considers repairs necessary. Such tests may be radiograph, ultrasonic, magnetic particle, or liquid penetrant and shall be at the Contractor's expense. IFA may direct, approve, or reject such tests.

Weld preparation shall be examined using magnetic particle or liquid penetrant methods in accordance with ASTM A781, S5. Repaired areas shall be retested using magnetic particle or liquid penetrant methods as directed or approved. At the IFA's option, large repairs may require heat treatment in accordance with ASTM A148 requirements. The acceptance of a repaired socket shall be at the discretion of IFA.

Only cast sockets designed for strand shall be supplied. The compatibility of the pin and anchor socket dimensions and structural steel dimensions shall be certified by both the socket manufacturer and steel fabricator and shall be covered by type C certifications in accordance with 916.02. Shop drawings and material and product certifications shall be submitted for each type of anchor socket.

Holes for socket pins shall be line-bored to final dimensions. Holes shall not exceed that of the pin by more than 0.0625 inch as measured on the galvanized surfaces. Galvanizing thickness shall not exceed 0.03125 inch on the inside surface of the pin hole where it connects with the pin.

Socket Installation

Sockets shall be attached to the strands in accordance with the procedures submitted to IFA prior to socketing.

Sockets shall be attached to the structural strand. After being splayed in preparation for socketing, the wires of a strand shall be cleaned of grease and other impurities by a carefully controlled process that will assure no harm is done to the wire zinc coating. After socketing, the strand wires shall be re-lubricated adjacent to the socket.

The socket basket of the socket shall be preheated to expel moisture and to prevent the molten zinc from congealing before it completely fills the narrow lower end of the basket. The strand will be rejected if visual inspection of the socketing procedure indicates bare wires within the socket.

Zinc that complies with ASTM B6, High Grade, or better shall be furnished to attach the sockets to the strand. The socket shall be filled with molten zinc in one continuous operation. The molten zinc shall be placed at the lowest practical temperature, usually approximately 925°F but never exceeding 1000°F, to minimize the effect of heat on the strands. The zinc temperature at the time of pouring shall be recorded and submitted to IFA.

Visually ensure socket and strand alignment, and that the lengths of the cable assemblies after socketing are correct. A tabulation of shop-measured lengths of each assembly shall be submitted to IFA for use in erection. The ambient temperature in the shop at the time the final strand assembly lengths are determined shall be recorded.

Testing of Structural Strand and Sockets

One piece at least 100 inches long from each pre-stretched length of strand

shall be cut and tested as specified in paragraph 9 of ASTM A586 to demonstrate the strength of the strand and sockets. The ends of test pieces with installed sockets shall be selected at random from those that are to be used in filling the order shall be used for testing. The material and method of socketing shall be the same for test and production pieces. The sockets shall be attached to the jaws of the testing machine in such a manner that the stresses in the socket will reproduce those expected when the socket is installed in the bridge.

The Contractor shall provide positive means to ensure that the strand does not twist after pre-stretching and that the upper and lower sockets are prevented from rotating with respect to each other.

The first six pieces shall be stressed, and any other as directed by IFA, to destruction in a suitable testing machine. All the pieces shall be tested to not less than the minimum specified breaking strength. If, after six or more tests of pre-stretched strands have been made, IFA finds that the strength and elasticity have sufficient uniformity, IFA may direct that the testing be reduced to two pieces, one from each end of each manufactured length of strand instead of one from each pre-stretched length. The sockets used for these tests shall not be used in the bridge.

If a socket breaks during the strand testing specified above, two additional sockets attached to strand shall be selected and the test repeated. Testing shall continue until the socket reliability is satisfactory to IFA, at which point the lot will be accepted. If 10 percent or more of the sockets tested break at a load less than the specified minimum breaking strength, the entire lot will be rejected and a new lot shall be furnished and tested.

Delivery to Job Site and Storage of New Cable Assemblies

The cable assemblies shall be visually inspected prior to shipping and again prior to installation. The assemblies shall be transported to the job site in a manner such that no permanent deformation of the strand occurs. Any cable assembly damaged by handling, transporting, or storing shall be replaced at Contractor's expense.

The new assemblies shall be stored under a roofed structure. Assemblies shall not be dragged at any time. Assemblies with damage to the zinc coating will be rejected. The assemblies shall be stored off the ground to keep strands dry.

Removal of Existing Hangers

The Contractor shall coordinate with IFA during the removal of the hanger cables. IFA shall be responsible to designate specific cables to be salvaged and provided to INDOT for material testing purposes. Salvaged cables shall be rolled and bound, placed on a pallet, and transported to the INDOT Falls City substation for future use. The Contractor will be responsible for the disposal of all other hanger cables.

Submittals

The following submittals are required in addition to those listed in the Construction Requirements for Field Verification, Temporary Jacking, and Fabrication and Testing.

The Contractor shall submit working drawings with supporting calculations

in accordance with 105.02 for the temporary support system designed to support the floor beam during the hanger replacement process. The drawings shall include temporary jacks, materials, and appurtenances needed for the safe removal and replacement of the existing cables and associated hardware and load transfer to the hanger replacement cables.

The Contractor shall submit the names and qualifications of the professional engineers that will take responsibility for all aspects of the hanger replacement process. These engineers shall be registered in the state of Indiana, shall meet INDOT Prequalification category 9.3, Bridge Level 3 design qualification, and shall submit qualifying experience for cable structures approval prior to working on these aspects of the project.

The Contractor shall submit to IFA for approval of all details, calculations, and any required shop drawings, catalog cuts, materials, equipment, methods and procedures proposed for the manufacture and fabrication of the hangers and sockets, and the assembly, testing, and erection of the hangers all complete in place. All calculations and shop drawings shall be signed and sealed by a professional engineer registered in the State of Indiana.

The submittal shall include all material designations and certified test reports or certificates of conformance or compliance, furnished by the manufacturer's testing laboratory or independent testing agency, attesting that all materials meet the requirements specified.

The submittal shall also include the exact size of strand proposed for the hangers, together with details for the construction of the hanger, giving the exact number and size of wires in each of the outer and inner layers, and their arrangement.

The dimensions relative to hanger lengths and strand elongations or that are otherwise dependent on the hanger modulus of elasticity, shall be adjusted if the actual modulus of elasticity, as determined by the Contractor after pre-stretching the strand, differs from the design assumptions. In that case, the proposed adjustments shall be submitted with calculations to IFA for approval.

Installation records shall be submitted to IFA. Records shall include survey records; date, time and ambient temperatures; cable forces; cable elongation measurements; deck loading conditions; and all other special notations. Records shall include documentation of monitoring the Profile Grade for the various stages of construction beginning with the first cable replacement and concluding with the last cable replacement as well as final cable adjustments, if required, after all dead loads are in place.

ATTACHMENT 14-10

UNIQUE SPECIAL PROVISION

PAINT NAVIGATION CLEARANCE GAUGE

Description

This work shall consist of cleaning bridge pier surfaces to be painted of all contaminants and old clearance gauge coatings, painting clearance gauges to indicate the vertical clearance available beneath the navigation span, and providing all necessary incidentals required to complete the work in accordance with 105 and the Public-Private Agreement (PPA) submittal requirements. All existing clearance gauge coatings and markings shall be removed, including those on the surfaces not to be painted.

(A) Submittals

The Design-Build Contractor shall submit the following written items to IFA:

1. An Environmental Compliance Plan, a Waste Management Plan, a Ground Water Surface Water Protection Plan, and a Catch Basin Plan for the Paint Navigation Clearance Gauge work.
2. Manufacturer product data, and film thickness, surface preparation, mixing, and application instruction for the coating system to be used.
3. Manufacturer samples of clearance gauge paint colors.
4. Manufacturer certification that materials comply with specified requirements and are suitable for intended application.
5. Rigging Plan design.

All items shall be submitted to IFA for review and approval prior to beginning work.

Materials

A clearance gauge consisting of painted marks and numerals shall be painted on the upstream side of right descending channel pier 3, and the downstream side of left descending channel pier 2. Marks and numerals shall be accurately located as shown in the Appendix.

The painted areas shall receive two coats of non-reflective white for background after which gauge numbers and markings shall be painted thereon in two coats of black. The two coats of white background and black gauge markings shall have a flat finish. Each coat shall be applied with a minimum of 24 hours drying time per coat. The surfaces to be painted shall be thoroughly dry before application.

All materials used shall be guaranteed by the manufacturer to be suitable for use on concrete under severe exposure and submerged in water conditions.

All materials the Design-Build Contractor proposes to use shall be submitted for IFA review and approval.

All paint application shall be executed in accordance with the manufacturer recommendations. Perform surface preparation and apply paint only when weather conditions meet the manufacturer recommendations. Paint shall be applied only to surfaces clean, dry, and free of bond-inhibiting contaminants.

All paint application shall be executed using brushes, rollers, etc. Spray application is not permitted. Painting shall start when the clearance gauge can be reasonably expected to be completed with all paint coats plus at least seven days before any portion of the clearance gauge may become submerged.

Clearance gauge paint shall be supplied by the following partial list of manufacturers believed to be capable of supplying a water repellent finish paint suitable for severe exterior exposure:

PPG Industries, Devco Deflex

Tnemec Company, Inc., EnviroCrete Series 156

Sherwin Williams, Acrolon 218 HS

Construction Requirements

(A) Surface Preparation. Surface preparation shall include total removal of all old clearance gauge paint on surfaces not to be painted as well as surfaces to be painted. This work shall be completed in accordance with SSPC-SP 13/NACE No. 6 Surface Preparation of Concrete, and requirements of the coating manufacturer.

All surface contamination such as oil, grease, dirt, foreign matter, laitance, efflorescence, and sealers shall be removed. The steel nose shall be cleaned to bare metal and primed prior to clearance gauge coating application. Primer and gauge materials shall be compatible from a single manufacturer.

An acceptable prepared surface shall be free of contaminants, laitance, loosely adhering concrete, existing coatings, and dust, and shall provide a sound, uniform substrate suitable to promote adhesion for the application of the clearance gauge coating system.

(B) Catch Basin System. The Design-Build Contractor shall construct a catch basin system to contain waste wash water for filtering during pressure washing procedures and contain all coating that may be spilled during the coating application.

(C) Residual Lead Paint. Residual lead paint may still be on the bridge and could be encountered when cleaning the steel nose on the bridge pier columns. The Design-Build Contractor is advised to take all necessary protective measures including worker safety and environmental regulations when performing surface

preparation and other work. The IFA will not consider any claims based on residual lead paint.

(D) Workmanship. All specified surfaces shall be properly cleaned and painted to the satisfaction of IFA. There shall be no provision for missed areas or substandard work regardless of size of the area in question. All improperly prepared or painted surfaces shall be repaired to meet the provisions of this specification.

The Design-Build Contractor shall be solely responsible for any damages arising from the painting operations. All defects in the new paint shall be repaired.

(E) Inspection. IFA will provide inspection for all items required in this contract.

1. Power Washing: Visual Inspection.

2. Clearance Gauge Paint

(a) First Coat Application: Check for wet film thickness, and defects in the paint.

(b) Finish Coat Application: Check for wet film thickness, paint appearance, color and quality of application.

(F) Paint Storage, Handling, Sampling, Mixing and Thinning

A paint storage site for receiving and storing paint delivered for use on the project shall be established. The paint storage site shall be located separate from the job site.

All new paint accepted by certification shall be received at the storage site for inventory. At that time, the Design-Build Contractor and the IFA shall independently inventory the supplied paint by batch number and quantities delivered. Tallies shall be compared, and all differences resolved.

The IFA inspector will examine all paint containers delivered and those with 1) broken seals, 2) rust, 3) and altered, missing or illegible batch numbers or labels will be rejected. The IFA inspector will number and initial each container with an indelible marker. Rejected paint containers shall be labeled "REJECTED" and disposed of promptly. The containers of paint unapproved or rejected shall be stored separately from those that have been approved. No paint shall be permitted at the actual job site until approved by IFA.

The Design-Build Contractor shall conduct a daily start-up inventory for IFA review of containers of approved paint brought to the job site noting batch numbers and the IFA inspector container numbers. At the end of the workday, the Design-Build Contractor shall conduct another inventory noting the number of paint containers expended, the IFA

inspector inventory numbers, and types of paint and provide the inventory for IFA review. Paint containers brought on the job site and not used shall be inventoried and inventoried again if those paint containers are taken back to the job site to be used.

The addition of solvents to paint will be permitted only by written approval from IFA. Only new solvents supplied by the paint manufacturer shall be used. Solvents shall only be used at the job site in the presence of the IFA inspector. Solvents from new, unopened containers with the solvent manufacturer labeling intact shall be used. The Design-Build Contractor shall record locations where solvent-thinned paint was used.

Solvents used for cleaning at the job site shall be kept in sealed containers away from mixing operations. Solvents used to clean brushes or rollers shall be collected in sealed containers and stored and disposed of as a hazardous waste.

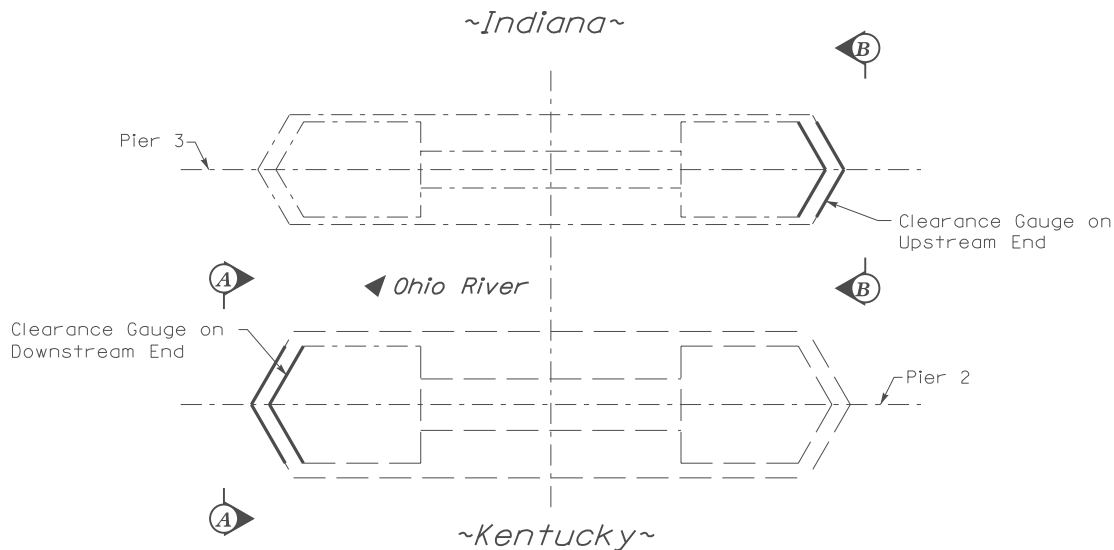
The Design-Build Contractor shall provide for a paint manufacturer to provide a technical representative at the job site when requested by the IFA.

(G) Environmental and Safety Requirements

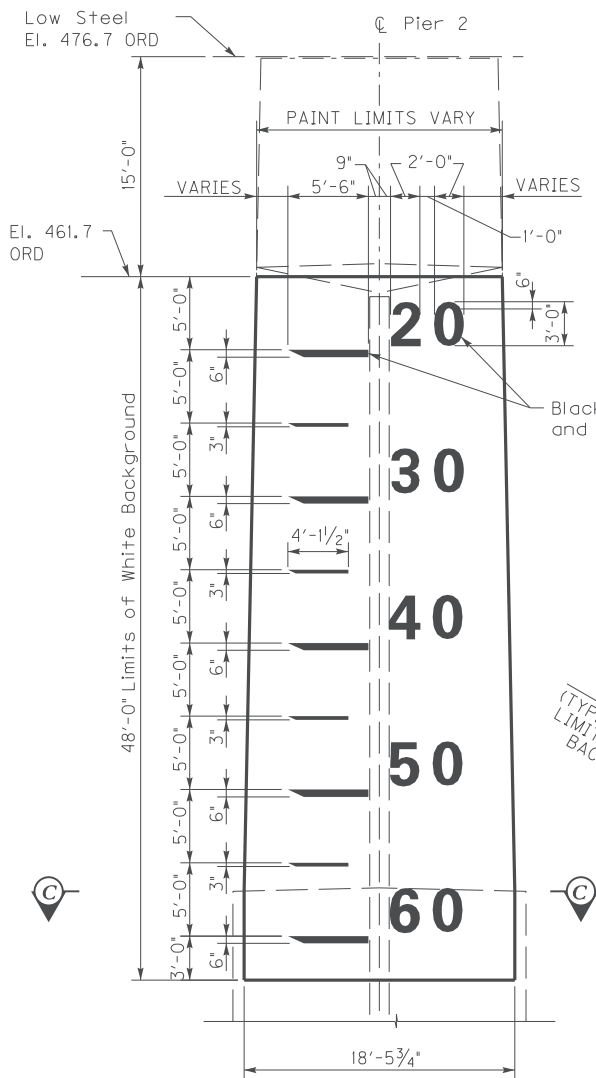
The Design-Build Contractor shall conform to INDOT Standard Specification 619, and follow 619.07 for pollution control and waste disposal of existing paint residue and debris.

APPENDIX

PAGE 1 OF 3	Pier 2 Navigational Clearance Gauge Details
PAGE 2 OF 3	Pier 3 Navigational Clearance Gauge Details
PAGE 3 OF 3	Navigational Clearance Gauge Details



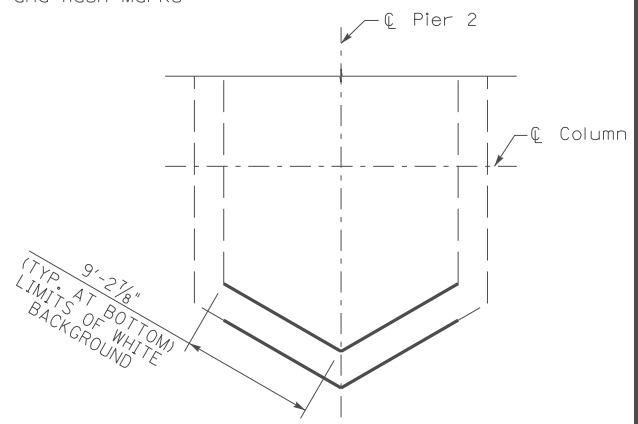
PLAN ~ MAIN RIVER PIERS



VIEW A-A
(DEVELOPED)
PIER 2

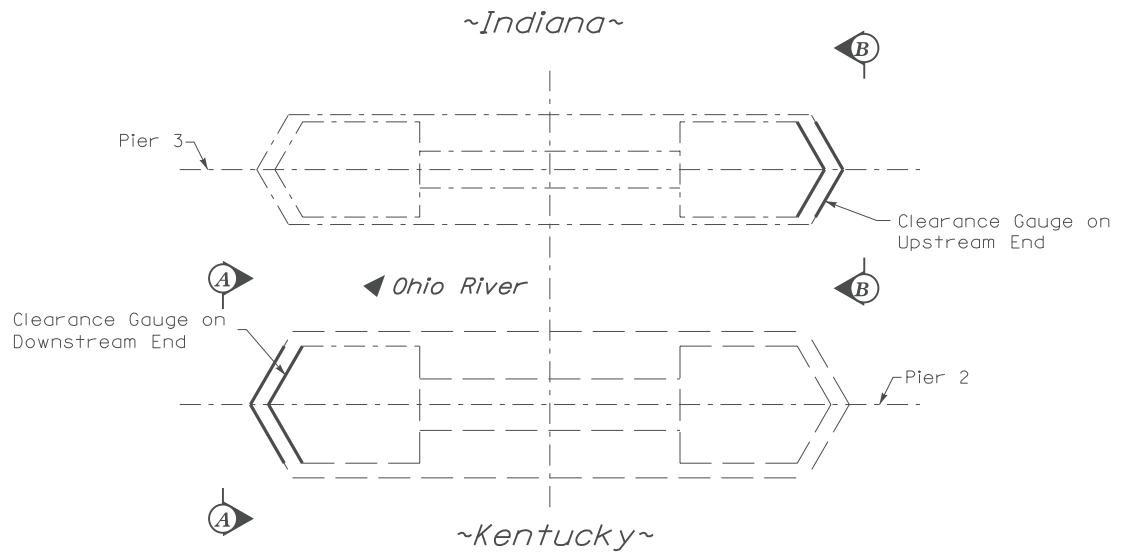
Notes:

1. For Notes, see page 2 of 3.
2. For Pier 3 Clearance Gauge, see page 2 of 3.

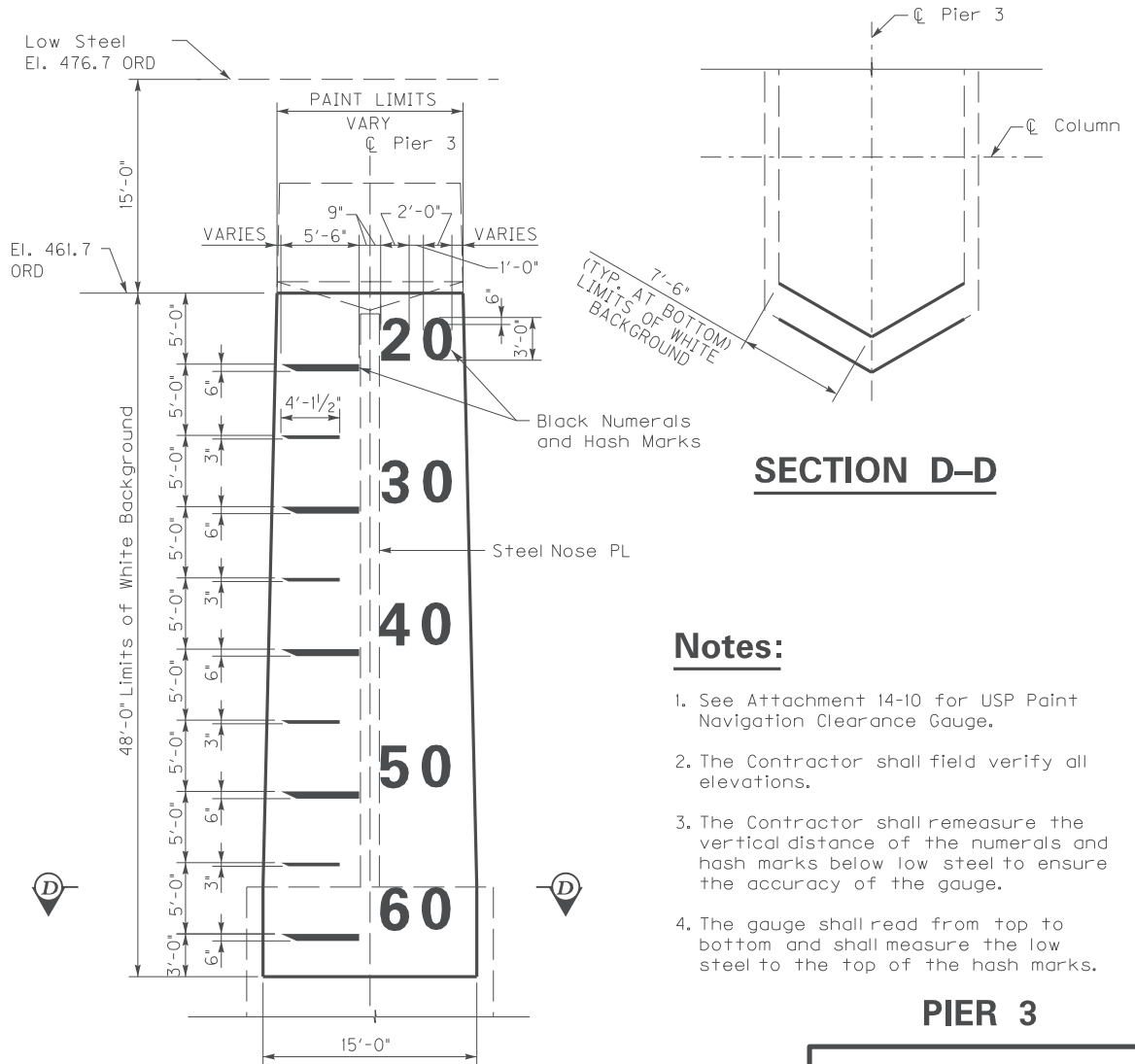


SECTION C-C

PIER 2



PLAN ~ MAIN RIVER PIERS



SECTION D-D

Notes:

1. See Attachment 14-10 for USP Paint Navigation Clearance Gauge.
2. The Contractor shall field verify all elevations.
3. The Contractor shall remeasure the vertical distance of the numerals and hash marks below low steel to ensure the accuracy of the gauge.
4. The gauge shall read from top to bottom and shall measure the low steel to the top of the hash marks.

PIER 3

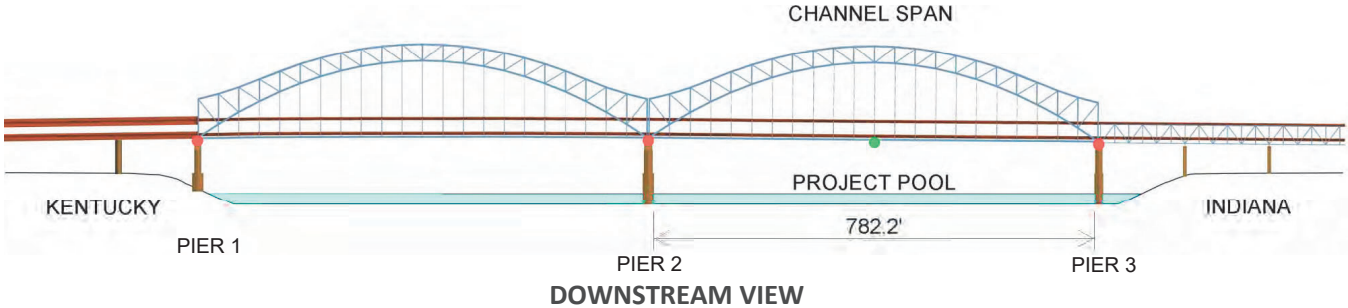
**NAVIGATIONAL
CLEARANCE
GAUGE DETAILS
PAGE 2 OF 3**

VIEW B-B

(DEVELOPED)
PIER 3

Sherman Minton Hwy (I-64) Bridge

RIVER MILE 608.6



PROJECT POOL STAGE	
DATUM	ELEV.
OHIO RIVER DATUM	383.00
NGVD 29	382.18
NAVD 88	381.71

CHANNEL SPAN									
VERTICAL DATUM	OHIO RIVER DATUM (ORD)			NGVD 29			NAVD 88		
LOCATION	PIER 1	PIER 2	PIER 3	PIER 1	PIER 2	PIER 3	PIER 1	PIER 2	PIER 3
ELEVATION OF LOW STEEL	483.3	479.8	476.7	482.5	479.0	475.9	482.0	478.5	475.4
VERT. CLEARANCE AT PROJECT POOL STAGE	100.3	96.8	93.7	100.3	96.8	93.7	100.3	96.8	93.7

NOTE: ALL UNITS ARE IN FEET

**AGREEMENT COVERING ROADWAY RECONSTRUCTION
WITH OVERHEAD BRIDGE REHABILITATION**

Bridge Information:

Westbound Bridge – NBI: **034515**

Eastbound Bridge - NBI: **034513**

INDOT Des#: **1702255**

INDOT Contract: **B-40719**

RR File: **BR0013459**

Daily Train Count: **13**

Location: **The WB and EB Indiana Approaches to the Sherman Minton Bridge carrying Interstate 64 over the Norfolk Southern RR in the city of New Albany, Floyd County, Indiana**

Structure Number: **I64-123-02294 DWBL**

Structure Number: **I64-123-02294 JDEB-**

Draft of: **June 14, 2020**

DOT #: **724 957T**

RR MP: **0267.630 W**

Max Train Speed: **45 mph**

THIS AGREEMENT, made and entered into by and between the STATE OF INDIANA, acting by and through the Indiana Department of Transportation, hereinafter called "INDOT" and the Norfolk Southern Railways, hereinafter called the "Railway" and INDOT's design contract awardee and any of their contractors, hereinafter called the "Design Builder".

W I T N E S S E T H

WHEREAS, Interstate 64 passes over tracks and operating Right-of-way of the Railway in the city of New Albany, Floyd County, Indiana (the "Premises"):

WHEREAS, in the interest of public safety and convenience INDOT desires to reconstruct, via a "Design Build/Best Value Contract," an overhead highway bridge and approaches to carry highway traffic over and across the Railway's track and right-of-way:

WHEREAS, under Indiana Code 8-23-2-6 and 8-23-3 INDOT is authorized "to cooperate with the United States Government under any Federal law in any manner necessary to secure for the State of Indiana the proportion of any Federal appropriation which may be made in the Future"; and;

WHEREAS, INDOT desires to reconstruct said overhead highway bridge and the highway approaches thereto with the aid of Federal funds apportioned to the State as authorized by Title 23, United States Code, (Public Law 85-767, 85th Congress) or any other Acts supplemental thereto of amendatory thereof.

NOW THEREFORE, in consideration of the premises and the mutual dependent covenants herein contained, the parties hereto agree as follows:

Section 1. The Railway, insofar as its title enables it to do so and subject to the rights of the Railway to operate and maintain its Railway and Railway appurtenances along, in and over its right-of-way, grants INDOT and Design Builder without any compensation other than the performance of this agreement, the right to enter upon the Railway's property to reconstruct and maintain the overhead highway bridge, including the approaches thereto as well as the piers which are partially located on Railway right-of-way, over and across its tracks and operating right-of-way in accordance with the general plans and specifications for **Project Des Number 1702255** which are incorporated and made a part hereof by reference, at the location shown in **Exhibit 1**

attached hereto. It is understood that the actual conveyance of any lands or rights, if such are required by Indiana State Law, shall be by means of other instruments to be negotiated between INDOT and the Railway.

Section 2. Detailed plans and specifications for the structure and approaches thereto, shall be prepared by INDOT and/or the Design Builder and approved by the Federal Highway Administration. All plans and specifications affecting the interests of the Railway shall also be subject to approval by the Chief Engineer of the Railway before work is started. No changes in the plans affecting the interests of either party hereto shall be made without the written consent of said party.

Section 3. The parties hereto shall construct or cause to be constructed in substantial accordance with the plans and specifications, the following items of work:

(a) Work by INDOT and/or the Design Builder:

INDOT and/or the Design Builder shall be responsible for obtaining all necessary consents from the Railway and shall reconstruct the overhead bridge structure, approach fills, highway surfacing, highway drainage, including other drainage made necessary by the construction of the highway facilities.

For the avoidance of doubt, the Design Builder and their Contractor shall comply with all terms of the Special Provisions in connection with its performance of any work on the property of Railway.

(b) Work by the Railway:

The Railway shall perform, or cause to be performed such temporary and permanent alterations of communication lines, signal lines, signals, and other facilities on its operating right-of-way, and do such other work and furnish such services, as are required by the installation of the grade separation improvement, in accordance with the estimate of force account work marked **Exhibit 2**, attached hereto and made a part hereof. This work shall be performed by the Railway with its own forces on a force account basis. If the Railway is not equipped to perform any part of the work with its own forces, it may request the permission of INDOT to do the work by contract. After receiving written approval of the method of selection the Railway may proceed, subject to written concurrence by INDOT, to award a contract for the work. The provisions of section 11 of this agreement shall apply to any portion of the work, including engineering services, which the Railway may perform by the contract method. The Railway shall keep complete records of the cost of the above work to be performed by it and shall submit to INDOT and/or the Design Builder on request such information as it may require concerning the cost and other details of the work. The Railway's accounts shall be kept in such manner that they may be readily audited and actual costs readily determined, and such accounts shall be available for audit by representatives of INDOT and Federal Highway Administration for a period of three years from the date final payment has been received by the Railway. Except as otherwise provided in this agreement, INDOT and/or the Design Builder shall reimburse the Railway for the actual cost of the above work performed by it which is estimated to be **\$401,291.00**. In the event there are increases in the extent of the work or changes in the methods of performing the work, this amount may be increased by mutual agreement. The eligibility for reimbursement of costs of changes to the Railway's facilities and facilities jointly owned or used by the Railway and utility companies shall be determined in accordance with the regulations as set forth in the Federal-Aid Policy Guide 23 CFR, Part 140, Subpart I, Subchapter B, and 23 CFR, Part 646, Subpart B issued December 9,

1991, and subsequent amendments or supplements thereto, which are incorporated herein by reference. It is agreed that progress payments will be made by INDOT and/or the Design Builder to the Railway for the total amount of work done as shown on monthly statements or when the amount due the Railway equals \$1,000.00 or more, said progress billing to be paid within thirty-five (35) days of receipt of the Railway progress billing. Upon receipt of the final bill, the Railway shall be reimbursed for such items of project work and project expense, in such amounts as are proper and eligible for payment and the project shall be submitted for final audit by INDOT. In the event final audit discloses that INDOT and/or the Design Builder has reimbursed the Railway more than the amount due under the terms of this agreement, the Railway shall promptly repay INDOT and/or the Design Builder the amount overpaid it. Billings to INDOT and/or the Design Builder shall clearly show whether they are partial or final claims. INDOT and/or the Design Builder will reimburse the Railway for any items of work and expense performed by it at the written direction of INDOT and/or the Design Builder, which are not eligible for reimbursement from Federal funds. The Railway shall not commence any of the work to be undertaken by it hereunder until notified in writing by INDOT to proceed and said work by the Railway shall be commenced within thirty days after such notification to proceed. Buying and assembling of materials as well as scheduling required manpower shall be construed as compliance with the foregoing thirty-day provision.

Section 4. It is agreed that any necessary falsework, bracing, or forms may be erected to provide the following temporary minimum clearances:

- Vertical: Twenty-three feet (23'-0") from top of highest rail.
- Lateral: Thirteen feet (13'-0") from centerline of tangent track or
Fourteen feet (14'-0") from centerline of curved track.

Section 5. On all contract construction operations involving direct interference with the Railway's tracks or traffic, the fouling of Railway operating clearances, or reasonable probability of accidental hazard to Railway traffic, INDOT shall require the Design Builder to arrange for the necessary Railway personnel to protect such operations as required by the regular operating rules of the Railway as determined by the Chief Engineer of the Railway or his authorized representative, except in connection with the Railway force account work as provided in Section 3b hereof. The Railway will be reimbursed for the actual cost of such protective services furnished by it, at project expense in accordance with the estimate of force account work, as set forth in **Exhibit 2**, attached hereto and made a part hereof. INDOT shall make final settlement with said Design Builder contingent on a showing that the Railway has been reimbursed for any expenses which are for the sole benefit of the Design Builder or that satisfactory arrangements have been made for such reimbursement.

Section 6. All work herein provided to be done by INDOT and/or the Design Builder on the Railway's operating right-of-way shall be done in a manner satisfactory to the Chief Engineer of the Railway or his authorized representative, and shall be performed at such times and in such manner as not to interfere unnecessarily with the movement of trains or traffic upon the tracks of the Railway. The Design Builder agrees to comply with the terms of the Special Provisions and to use all reasonable care and precaution in order to avoid accidents, damage, or unnecessary delay or interference with the Railway's trains or other property.

Section 7. The Design Builder, upon completion of the work, shall remove from within the limits of the Railway's operating right-of-way all machinery, equipment, surplus materials, falsework, rubbish, or temporary buildings of such Design Builder, and to leave the operating right-of-way in a neat condition, satisfactory to the Chief Engineer of the Railway or his authorized representative.

Section 8. The Design Builder shall take out, before work is commenced and to keep in effect until work is completed and accepted, which shall include a Railway Protective Public Liability Policy of Insurance in the name of the Railway, said policy to be in the form specified in the Federal-Aid Policy Guide 23 CFR, Part 646, Subpart B, issued December 9, 1991, and any subsequent amendments or supplements thereto. The policies of insurance specified in this section shall be with a company authorized to do business in the State of Indiana.

Section 9. Upon completion of the project, INDOT shall at its own cost and expense maintain or by agreement with others provide for the maintenance of the bridge structure, approach grades and all other highway facilities including the drainage thereof, except that in the event of Railway derailments, accidents, or collisions resulting in damage to the bridge structure INDOT shall make the repairs necessary to restore the structure substantially to its former condition, and the Railway agrees to reimburse INDOT for the cost of such repairs, if said derailments, accidents, or collisions are caused solely by the negligence of the Railway, its agents or servants. The Railway, at the expense of INDOT, will repair or replace or cause to be repaired or replaced the Railway's track, ties, ballast, communications and signal system, and roadbed which may be damaged or destroyed by accident or as a result of structure maintenance, or otherwise resulting from the sole negligence of INDOT, its agents or servants. The Railway shall at its own cost and expense maintain its own roadway and tracks and the drainage thereof; provided Railway shall not be responsible for any personal injury or property damage losses that are caused by or result from INDOT's breach of this Agreement, including but not limited to its failure to maintain the highway facilities, including the drainage thereof.

Section 10. In the event that delays or difficulties arise in securing necessary approvals, or in acquiring necessary right-of-way, or in settling damages or damage claims, or for other reasons, which in the opinion of INDOT render it impracticable to utilize funds from current appropriation for the construction of the project, then at any time before actual construction is started by INDOT and/or Design Builder pursuant to proper approval or authority, INDOT may serve formal notice of cancellation upon the Railway and this agreement shall thereupon become null and void. INDOT and/or the Design Builder shall reimburse the Railway for all costs incurred by it at the written request of INDOT and/or the Design Builder on account of the project prior to cancellation.

Section 11. Non-Discrimination

1. To the extent required by I.C. 22-9-1-10 and Title VI of the Civil Rights Act of 1964, the RAILWAY shall not discriminate against any employee or applicant for employment, to be employed in the performance of work under this Contract, with respect to hire, tenure, terms, conditions or privileges of employment or any matter directly or indirectly related to employment, because of race, color, religion, sex, disability, national origin, ancestry or status as a veteran. Acceptance of this Contract also signifies compliance with applicable

Federal laws, regulations, and executive orders prohibiting discrimination in the provision of services based on race, color, national origin, age, sex, disability or status as a veteran.

2. The RAILWAY understands that INDOT is a recipient of Federal Funds. Pursuant to that understanding, the RAILWAY agrees that if the RAILWAY employs fifty (50) or more employees and does at least \$50,000 worth of business with the State and is not exempt, the RAILWAY will comply with the affirmative action reporting requirements of 41 CFR 60-1.7. The RAILWAY shall comply with Section 202 of executive order 11246, as amended, 41 CFR 60-250, and 41 CFR 60-741, as amended, which are incorporated herein by specific reference.

It is the policy of INDOT to assure full compliance with Title VI of the Civil Rights Act of 1964, the Americans with Disabilities Act and Section 504 of the Vocational Rehabilitation Act and related statutes and regulations in all programs and activities. Title VI and related statutes require that no person in the United States shall on the grounds of race, color or national origin be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance. (INDOT's Title VI enforcement shall include the following additional grounds: sex, ancestry, age, income status, religion, disability, and status of a veteran.)

3. During the performance of this Contract, the RAILWAY, for itself, its assignees and successors in interest (hereinafter referred to as the "RAILWAY") agrees to the following assurances under Title VI of the Civil Rights Act of 1964:
 - a. Compliance with Regulations: In the performance of work under this agreement, the RAILWAY shall comply with the regulations relative to nondiscrimination in Federally-assisted programs of the Department of Transportation, Title 49 CFR Part 21, as they may be amended from time to time (hereinafter referred to as the Regulations), which are herein incorporated by reference and made a part of this Contract.
 - b. Nondiscrimination: In the performance of work under this agreement, the RAILWAY, with regard to the work performed by it during the Contract, shall not discriminate on the grounds of race, color, sex, national origin, religion, disability, ancestry, or status as a veteran in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The RAILWAY shall not participate either directly or indirectly in the discrimination prohibited by section 21.5 of the Regulation, including employment practices when the Contract covers a program set forth in Appendix B of the Regulations.
 - c. Solicitations for Subcontracts, Including Procurements of Materials and Equipment: In the performance of work under this agreement, in all solicitations either by competitive bidding or negotiation made by the RAILWAY for work to be performed under a subcontract, including procurements of materials or leases of equipment, each potential subcontractor or supplier shall be notified by the RAILWAY of the RAILWAY's obligations under this Contract, and the

Regulations relative to nondiscrimination on the grounds of race, color, sex, national origin, religion, disability, ancestry, or status as a veteran.

- d. Information and Reports: In the performance of work under this agreement, the RAILWAY shall provide all information and reports required by the Regulations, or directives issued pursuant thereto, and shall permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Indiana Department of Transportation and Federal Highway Administration to be pertinent to ascertain compliance with such Regulations, orders and instructions. Where any information required of the RAILWAY is in the exclusive possession of another who fails or refuses furnish this information, the RAILWAY shall so certify to the Indiana Department of Transportation or the Federal Highway Administration as appropriate, and shall set forth what efforts it has made to obtain the information.
- e. Sanctions for Noncompliance: In the performance of work under this agreement, in the event of the RAILWAY's noncompliance with the nondiscrimination provisions of this Contract, the Indiana Department of Transportation shall impose such contract sanctions as it or the Federal Highway Administration may determine to be appropriate, including, but not limited to: (a) withholding payments to the RAILWAY under the Contract until the RAILWAY complies, and/or (b) cancellation, termination or suspension of the Contract, in whole or in part.
- f. Incorporation of Provisions: In the performance of work under this agreement, the RAILWAY shall include the provisions of paragraphs a through f in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Regulations, or directives issued pursuant thereto.

Section 12. This project does not eliminate an existing grade crossing with active warning devices; so in accordance with the Federal-Aid Policy Guide 23 CFR, Section 646.210, issued December 9, 1991, and subsequent amendments or supplements thereto, there shall be no required Railway share of the project cost.

Section 13. It is understood that the project herein contemplated is to be financed with the aid of funds appropriated by the Federal Government and expended under Federal regulations; that all plans, estimates of cost, specifications, awards of contracts, acceptance of work, and procedures in general are subject at all times to all Federal laws, rules, regulations, orders, and approvals applying to it, as a Federal project.

Section 14. Buy America Certification: The Railway agrees that all steel and cast-iron materials and products to be used under this agreement will be produced and manufactured in the United States of America pursuant to the requirements of 23 CFR 635.410.

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This Agreement shall be binding upon the parties hereto, and their successors or assigns.

IN WITNESS WHEREOF, the parties have caused these presents to be executed by their proper officers thereunto duly authorized.

Design Builder

BY: _____

DATE: _____

Typed Name:

Title:

Norfolk Southern Railways Company

BY Kraig J. Barner

DATE: 8-21-2020

Typed Name: Kraig J. Barner

Title: General Manager.

STATE OF INDIANA

BY _____

DATE: _____

Michael Jett, State Director of Utilities and
Railways, Capital Program Management
For: Joseph McGuinness, Commissioner
Indiana Department of Transportation

Approved for form and legality by:

Curtis T. Hill, Jr.
Indiana Attorney General

(for)

(Date approved)

EXHIBIT 1: Project Location

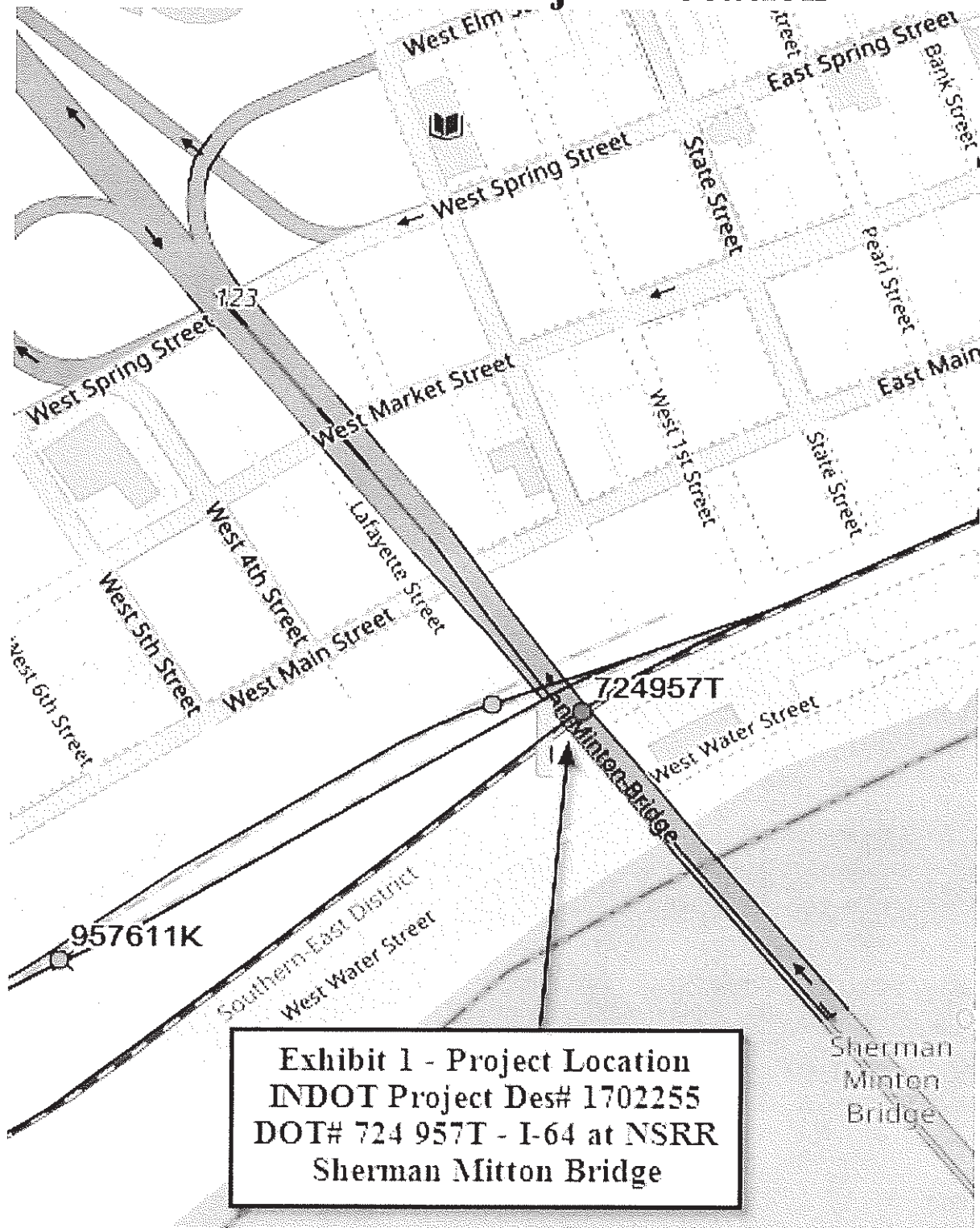


EXHIBIT 2: Force Account Estimate

FORCE ACCOUNT ESTIMATE

Work to be Performed By:	Norfolk Southern Railway Company
For the Account of:	Indiana Department of Transportation
Project Description:	I-64 Rehabilitation over Norfolk Southern
Location:	New Albany, Floyd County, Indiana
Project No.:	Des 1702255
Milepost:	267.60-W
File:	BR0013459
Date:	May 4, 2020

<u>SUMMARY</u>	
ITEM A - Preliminary Engineering	19,929
ITEM B - Construction Engineering	62,929
ITEM C - Accounting	2,622
ITEM D - Flagging Services	315,811
ITEM E - Communications Changes	0
ITEM F - Signal & Electrical Changes	0
ITEM G - Track Work	0
ITEM H - T-Cubed	0
GRAND TOTAL	\$ 401,291

ITEM A - Preliminary Engineering

(Review plans and special provisions, prepare estimates, etc.)

Labor:	60 Hours @ \$60 / hour=	3,600
Labor Additives:		2,829
Travel Expenses:		1,500
Services by Contract Engineer:		12,000

NET TOTAL - ITEM A	\$ 19,929
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ITEM B - Construction Engineering

(Coordinate Railway construction activities,
review contractor submittals, etc.)

Labor:	60 Hours @ \$60 / hour=	3,600
Labor Additives:		2,829
Travel Expenses:		1,500
Services by Contract Engineer:		55,000
	NET TOTAL - ITEM B	\$ 62,929

ITEM C - Administration

Agreement Construction, Review and/or Handling:		1,250
Accounting Hours (Labor):	25 Hours @ \$30 / hour=	750
Accounting Additives:		622
	NET TOTAL - ITEM C	\$ 2,622

ITEM D - Flagging Services

(During construction on, over,
under, or adjacent to the track.)

Labor:	Flagging Foreman	
	260 days @ 390.00 per day=	101,400
	(based on working 12 hours/day)	
Labor Additive:		188,411
Travel Expenses, Meals & Lodging:	260 days @ \$100/day=	26,000
Rental Vehicle	0 months @ \$950/month=	0
	NET TOTAL - ITEM D	\$ 315,811

ITEM E - Communications Changes

Material:		0
Labor:		0
Purchase Services:		0
Subsistence:		0
Additive:		0
	NET TOTAL - ITEM E	\$ -

ITEM F - Signal & Electrical Changes

Material:	0
Labor:	0
Purchase Services:	0
Other:	0

NET TOTAL - ITEM F \$ -

ITEM G - Track Work

Material:	(see attached summary)	0
Labor:	(see attached summary)	0
Additive:	(see attached summary)	0
Purchase Services:	(see attached summary)	0

NET TOTAL - ITEM G \$ -

ITEM H - T-CUBED

Lump Sum \$ -

NOTES

1. For all groups of CONTRACT employees, the composite labor surcharge rate used in this estimate (including insurance) is 185.81%. Self Insurance - Public Liability Property Damage is estimated at 16.00%. Work will be billed at actual current audited rate in effect at the time the services are performed.
2. For all groups of NON-CONTRACT employees, the composite labor surcharge rate used in this estimate (including insurance is 78.59%. Self Insurance - Public Liability Property Damage is estimated at 16.00%. Work will be billed at actual current audited rate in effect at the time the services are performed.
3. All applicable salvage items due the Department will be made available to it at the jobsite for its disposal.
4. The Force Account Estimate is valid for one (1) year after the date of the estimate (05/04/2020). If the work is not performed within this time frame the Railway may revise the estimate to (1) include work not previously indicated as necessary and (2) reflect changes in cost to perform the force account work.

Special Provisions for Protection of Railway Interests

1. AUTHORITY OF RAILROAD ENGINEER AND SPONSOR ENGINEER:

Norfolk Southern Railway Company, hereinafter referred to as “Railroad”, and their authorized representative shall have final authority in all matters affecting the safe maintenance of railroad traffic including the adequacy of the foundations and structures supporting the railroad tracks. For Public Projects impacting the Railroad, the Railroad’s Public Projects Engineer, hereinafter referred to as “Railroad Engineer”, will serve as the authorized representative of the Railroad.

The authorized representative of the Project Sponsor (“Sponsor”), hereinafter referred to as the “Sponsor’s Engineer”, shall have authority over all other matters as prescribed herein and in the Project Specifications.

The Sponsor’s Prime Contractor, hereinafter referred to as “Contractor” shall be responsible for completing any and all work in accordance with the terms prescribed herein and in the Project Specifications. These terms and conditions are subject to change without notice, from time to time in the sole discretion of the Railroad. Contractor must request from Railroad and follow the latest version of these provisions prior to commencing work.

2. NOTICE OF STARTING WORK:

A. The Contractor shall not commence any work on railroad rights-of-way until he has complied with the following conditions:

1. Signed and received a fully executed copy of the required Norfolk Southern Contractor Right of Entry Agreement.
2. Given the Railroad written notice in electronic format to the Railroad Engineer, with copy to the Sponsor’s Engineer who has been designated to be in charge of the work, at least ten days in advance of the date he proposes to begin work on Railroad rights-of-way.
3. Obtained written approval from the Railroad of Railroad Protective Liability Insurance coverage as required by paragraph 14 herein. It should be noted that the Railroad does not accept notation of Railroad Protective insurance on a certificate of liability insurance form or Binders as Railroad must have the full original countersigned policy. Further, please note that mere receipt of the policy is not the only issue but review for compliance. Due to the number of projects system-wide, it typically takes a minimum of 30-45 days for the Railroad to review.
4. Obtained Railroad’s Flagging Services as required by paragraph 7 herein.
5. Obtained written authorization from the Railroad to begin work on Railroad’s rights-of-way, such authorization to include an outline of specific conditions with which he must comply.
6. Furnished a schedule for all work within the Railroad’s rights-of-way as required by paragraph 7.B.1.

B. The Railroad’s written authorization to proceed with the work shall include the names, addresses, and telephone numbers of the Railroad’s representatives who are to be

notified as hereinafter required. Where more than one representative is designated, the area of responsibility of each representative shall be specified.

3. INTERFERENCE WITH RAILROAD OPERATIONS:

- A. The Contractor shall so arrange and conduct his work that there will be no interference with Railroad's operations, including train, signal, telephone and telegraphic services, or damage to the property of the Railroad or to poles, wires, and other facilities of tenants on the rights-of-way of the Railroad. Whenever work is liable to affect the operations or safety of trains, the method of doing such work shall first be submitted to the Railroad Engineer for approval, but such approval shall not relieve the Contractor from liability. Any work to be performed by the Contractor which requires flagging service or inspection service shall be deferred by the Contractor until the flagging service or inspection service required by the Railroad is available at the job site.
- B. Whenever work within Railroad's rights-of-way is of such a nature that impediment to Railroad's operations such as use of runaround tracks or necessity for reduced speed is unavoidable, the Contractor shall schedule and conduct his operations so that such impediment is reduced to the absolute minimum.
- C. Should conditions arising from, or in connection with the work, require that immediate and unusual provisions be made to protect operations and property of the Railroad, the Contractor shall make such provisions. If in the judgment of the Railroad Engineer, or in his absence, the Railroad's Division Engineer, such provisions is insufficient, either may require or provide such provisions as he deems necessary. In any event, such unusual provisions shall be at the Contractor's expense and without cost to the Railroad or the Sponsor.
- D. "One Call" Services do not locate buried Railroad utilities. The contractor shall contact the Railroad's representative 2 days in advance of work at those places where excavation, pile driving, or heavy loads may damage the Railroad's underground facilities. Upon request from the Contractor or Sponsor, Railroad forces will locate and paint mark or flag the Railroad's underground facilities. The Contractor shall avoid excavation or other disturbances of these facilities. If disturbance or excavation is required near a buried Railroad facility, the contractor shall coordinate with the Railroad to have the facility potholed manually with careful hand excavation. The facility shall be protected by the Contractor during the course of the disturbance under the supervision and direction of the Railroad's representative.

4. TRACK CLEARANCES:

- A. The minimum track clearances to be maintained by the Contractor during construction are shown on the Project Plans. If temporary clearances are not shown on the project plans, the following criteria shall govern the use of falsework and formwork above or adjacent to operated tracks.
 - 1. A minimum vertical clearance of 22'-0" above top of highest rail shall be maintained at all times.
 - 2. A minimum horizontal clearance of 13'-0" from centerline of tangent track or 14'-0" from centerline of curved track shall be maintained at all times. Additional horizontal clearance may be required in special cases to be safe for operating conditions. This additional clearance will be as determined by the Railroad Engineer.

3. All proposed temporary clearances which are less than those listed above must be submitted to Railroad Engineer for approval prior to construction and must also be authorized by the regulatory body of the State if less than the legally prescribed clearances.
 4. The temporary clearance requirements noted above shall also apply to all other physical obstructions including, but not limited to: stockpiled materials, parked equipment, placement or driving of piles, and bracing or other construction supports.
- B. Before undertaking any work within Railroad right-of-way, and before placing any obstruction over any track, the Contractor shall:
1. Notify the Railroad's representative at least 72 hours in advance of the work.
 2. Receive assurance from the Railroad's representative that arrangements have been made for flagging service as may be necessary.
 3. Receive permission from the Railroad's representative to proceed with the work.
 4. Ascertain that the Sponsor's Engineer has received copies of notice to the Railroad and of the Railroad's response thereto.

5. CONSTRUCTION PROCEDURES:

A. General:

1. Construction work and operations by the Contractor on Railroad property shall be:
 - a. Subject to the inspection and approval of the Railroad Engineer or their designated Construction Engineering Representative.
 - b. In accordance with the Railroad's written outline of specific conditions.
 - c. In accordance with the Railroad's general rules, regulations and requirements including those relating to safety, fall protection and personal protective equipment.
 - d. In accordance with these Special Provisions.
2. Submittal Requirements
 - a. The Contractor shall submit all construction related correspondence and submittals electronically to the Railroad Engineer.
 - b. The Contractor shall allow for 30 days for the Railroad's review and response.
 - c. All work in the vicinity of the Railroad's property that has the potential to affect the Railroad's train operations or disturb the Railroad's Property must be submitted and approved by the Railroad prior to work being performed.
 - d. All submittals and calculations must be signed and sealed by a registered engineer licensed in the state of the project work.

- e. All submittals shall first be approved by the Sponsor’s Engineer and the Railroad Engineer, but such approval shall not relieve the Contractor from liability.
- f. For all construction projects, the following submittals, but not limited to those listed below, shall be provided for review and approval when applicable:
 - (1) General Means and Methods
 - (2) Ballast Protection
 - (3) Construction Excavation & Shoring
 - (4) Pipe, Culvert, & Tunnel Installations
 - (5) Demolition Procedure
 - (6) Erection & Hoisting Procedure
 - (7) Debris Shielding or Containment
 - (8) Blasting
 - (9) Formwork for the bridge deck, diaphragms, overhang brackets, and protective platforms
 - (10) Bent Cap Falsework. A lift plan will be required if the contractor want to move the falsework over the tracks.
- g. For Undergrade Bridges (Bridges carrying the Railroad) the following submittals in addition to those listed above shall be provided for review and approval:
 - (1) Shop Drawings
 - (2) Bearing Shop Drawings and Material Certifications
 - (3) Concrete Mix Design
 - (4) Structural Steel, Rebar, and/or Strand Certifications
 - (5) 28 day Cylinder Test for Concrete Strength
 - (6) Waterproofing Material Certification
 - (7) Test Reports for Fracture Critical Members
 - (8) Foundation Construction Reports

Fabrication may not begin until the Railroad has approved the required shop drawings.

- h. The Contractor shall include in all submissions a detailed narrative indicating the progression of work with the anticipated timeframe to complete each task. Work will not be permitted to commence until the Contractor has provided the Railroad with a satisfactory plan that the project will be undertaken without scheduling, performance or safety related issues. Submission shall also provide a listing of the anticipated equipment to be used, the location of all equipment to be used and insure a contingency plan of action is in place should a primary piece of equipment malfunction.

B. Ballast Protection

- 1. The Contractor shall submit the proposed ballast protection system detailing the specific filter fabric and anchorage system to be used during all construction activities.

2. The ballast protection is to extend 25' beyond the proposed limit of work, be installed at the start of the project and be continuously maintained to prevent all contaminants from entering the ballast section of all tracks for the entire duration of the project.
- C. Excavation:
1. The subgrade of an operated track shall be maintained with edge of berm at least 10'-0" from centerline of track and not more than 24-inches below top of rail. Contractor will not be required to make existing section meet this specification if substandard, in which case existing section will be maintained.
 2. Additionally, the Railroad will require the installation of an OSHA approved handrail and orange construction safety fencing for all excavations of the Railroad right-of-way.
- D. Excavation for Structures and Shoring Protection:
1. The Contractor will be required to take special precaution and care in connection with excavating and shoring pits, and in driving piles or sheeting for footings adjacent to tracks to provide adequate lateral support for the tracks and the loads which they carry, without disturbance of track alignment and surface, and to avoid obstructing track clearances with working equipment, tools or other material.
 2. All plans and calculations for shoring shall be prepared, signed, and sealed by a Registered Professional Engineer licensed in the state of the proposed project, in accordance with Norfolk Southern's Overhead Grade Separation Design Criteria, subsection H.1.6.E-Construction Excavation (Refer to Norfolk Southern Public Projects Manual Appendix H). The Registered Professional Engineer will be responsible for the accuracy for all controlling dimensions as well as the selection of soil design values which will accurately reflect the actual field conditions.
 3. The Contractor shall provide a detailed installation and removal plan of the shoring components. Any component that will be installed via the use of a crane or any other lifting device shall be subject to the guidelines outlined in section 5.G of these provisions.
 4. The Contractor shall be required to survey the track(s) and Railroad embankment and provide a cross section of the proposed excavation in relation to the tracks.
 5. Calculations for the proposed shoring should include deflection calculations. The maximum deflection for excavations within 18'-0" of the centerline of the nearest track shall be 3/8". For all other cases, the max deflection shall not exceed 1/2".
 6. Additionally, the Railroad will require the installation of an OSHA approved handrail and orange construction safety fencing for all excavations of the Railroad right-of-way.
 7. The front face of shoring located to the closest NS track for all shoring set-ups located in Zone 2 as shown on NS Typical Drawing No. 4 – Shoring Requirements (Appendix I) shall remain in place and be cut off 2'-0" below the final ground elevation. The remaining shoring in Zone 2 and all shoring in Zone 1 may be removed and all voids must be backfilled with flowable fill.
- E. Pipe, Culvert, & Tunnel Installations

1. Pipe, Culvert, & Tunnel Installations shall be in accordance with the appropriate Norfolk Southern Design Specification as noted below:
 - a. For Open Cut Method refer to Norfolk Southern Public Projects Manual Appendix H.4.6.
 - b. For Jack and Bore Method refer to Norfolk Southern Public Projects Manual Appendix H.4.7.
 - c. For Tunneling Method refer to Norfolk Southern Public Projects Manual Appendix H.4.8.
2. The installation methods provided are for pipes carrying storm water or open flow run-off. All other closed pipeline systems shall be installed in accordance Norfolk Southern's Pipe and Wire Program and the NSCE-8

F. Demolition Procedures

1. General

- a. Demolition plans are required for all spans over the track(s), for all spans adjacent to the track(s), if located on (or partially on) Railroad right-of-way; and in all situations where cranes will be situated on, over, or adjacent to Railroad right-of-way and within a distance of the boom length plus 15'-0" from the centerline of track.
- b. Railroad tracks and other Railroad property must be protected from damage during the procedure.
- c. A pre-demolition meeting shall be conducted with the Sponsor, the Railroad Engineer or their representative, and the key Contractor's personnel prior to the start of the demolition procedure.
- d. The Railroad Engineer or his designated representative must be present at the site during the entire demolition procedure period.
- e. Existing, obsolete, bridge piers shall be removed to a sufficient depth below grade to enable restoration of the existing/proposed track ditch, but in no case less than 2'-0" below final grade.

2. Submittal Requirements

- a. In addition to the submittal requirements outlined in Section 5.A.2 of these provisions, the Contractor shall submit the following for approval by the Railroad Engineer:
 - (1) A plan showing the location of cranes, horizontally and vertically, operating radii, with delivery or disposal locations shown. The location of all tracks and other Railroad facilities as well as all obstructions such as wire lines, poles, adjacent structures, etc. must also be shown.

- (2) Rating sheets showing cranes or lifting devices to be adequate for 150% of the actual weight of the pick, including all rigging components. A complete set of crane charts, including crane, counterweight, and boom nomenclature is to be submitted. Safety factors that may have been “built-in” to the crane charts are not to be considered when determining the 150% factor of safety.
- (3) Plans and computations showing the weight of the pick must be submitted. Calculations shall be made from plans of the existing structure showing complete and sufficient details with supporting data for the demolition the structure. If plans do not exist, lifting weights must be calculated from field measurements. The field measurements are to be made under the supervision of the Registered Professional Engineer submitting the procedure and calculations.
- (4) The Contractor shall provide a sketch of all rigging components from the crane’s hook block to the beam. Catalog cuts or information sheets of all rigging components with their lifting capacities shall be provided. All rigging must be adequate for 150% of the actual weight of the pick. Safety factors that may have been “built-in” to the rating charts are not to be considered when determining the 150% factor of safety. All rigging components shall be clearly identified and tagged with their rated lifting capacities. The position of the rigging in the field shall not differ from what is shown on the final plan without prior review from the Sponsor and the Railroad.
- (5) A complete demolition procedure, including the order of lifts, time required for each lift, and any repositioning or re-hitching of the crane or cranes.
- (6) Design and supporting calculations for the temporary support of components, including but not limited to the stability of the superstructure during the temporary condition, temporary girder tie-downs and falsework.

3. Overhead Demolition Debris Shield

- a. The demolition debris shield shall be installed prior to the demolition of the bridge deck or other relevant portions of the superstructure over the track area to catch all falling debris.
- b. The demolition debris shield shall provide a minimum vertical clearance as specified in Section 4.A.1 of these provisions or maintain the existing vertical clearance if the existing clearance is less than that specified in Section 4.A.1.
- c. The Contractor shall include the demolition debris shield installation/removal means and methods as part of the proposed Demolition procedure submission.
- d. The Contractor shall submit the demolition debris shield design and supporting calculations for approval by the Railroad Engineer.

- e. The demolition debris shield shall have a minimum design load of 50 pounds per square foot plus the weight of the equipment, debris, personnel, and other loads to be carried.
- f. The Contractor shall include the proposed bridge deck removal procedure in its demolition means and methods and shall verify that the size and quantity of the demolition debris generated by the procedure does not exceed the shield design loads.
- g. The Contractor shall clean the demolition debris shield daily or more frequently as dictated either by the approved design parameters or as directed by the Railroad Engineer.

4. Vertical Demolition Debris Shield

- a. A vertical demolition debris shield may be required for substructure removals in close proximity to the Railroad's track and other facilities, as determined by the Railroad Engineer.

G. Erection & Hoisting Procedures

1. General

- a. Erection plans are required for all spans over the track(s), for all spans adjacent to the track(s), if located on (or partially on) Railroad right-of-way; and in all situations where cranes will be situated on, over, or adjacent to Railroad right-of-way and within a distance of the boom length plus 15'-0" from the centerline of track.
- b. Railroad tracks and other Railroad property must be protected from damage during the erection procedure.
- c. A pre-erection meeting shall be conducted with the Sponsor, the Railroad Engineer or their representative, and the key Contractor's personnel prior to the start of the erection procedure.
- d. The Railroad Engineer or his designated representative must be present at the site during the entire erection procedure period.
- e. For field splices located over Railroad property, a minimum of 50% of the holes for each connection shall be filled with bolts or pins prior to releasing the crane. A minimum of 50% of the holes filled shall be filled with bolts. All bolts must be appropriately tightened. Any changes to previously approved field splice locations must be submitted to the Railroad for review and approval. Refer to Norfolk Southern's Overhead Grade Separation Design Criteria for additional splice details (Norfolk Southern Public Projects Manual Appendix H.1, Section 4.A.3.).

2. Submittal Requirements

- a. In addition the submittal requirements outlined in Section 5.A.2 of these provisions, the Contractor shall submit the following for approval by the Railroad Engineer:
 - (1) As-built beam seat elevations - All as-built bridge seats and top of rail elevations shall be furnished to the Railroad Engineer for review and verification at least 30 days in advance of the erection, to ensure that minimum vertical clearances as approved in the plans will be achieved.
 - (2) A plan showing the location of cranes, horizontally and vertically, operating radii, with delivery or staging locations shown. The location of all tracks and other Railroad facilities as well as all obstructions such as wire lines, poles, adjacent structures, etc. must also be shown.
 - (3) Rating sheets showing cranes or lifting devices to be adequate for 150% of the actual weight of the pick, including all rigging components. A complete set of crane charts, including crane, counterweight, and boom nomenclature is to be submitted. Safety factors that may have been "built-in" to the crane charts are not to be considered when determining the 150% factor of safety.
 - (4) Plans and computations showing the weight of the pick must be submitted. Calculations shall be made from plans of the proposed structure showing complete and sufficient details with supporting data for the erection of the structure. If plans do not exist, lifting weights must be calculated from field measurements. The field measurements are to be made under the supervision of the Registered Professional Engineer submitting the procedure and calculations.
 - (5) The Contractor shall provide a sketch of all rigging components from the crane's hook block to the beam. Catalog cuts or information sheets of all rigging components with their lifting capacities shall be provided. All rigging must be adequate for 150% of the actual weight of the pick. Safety factors that may have been "built-in" to the rating charts are not to be considered when determining the 150% factor of safety. All rigging components shall be clearly identified and tagged with their rated lifting capacities. The position of the rigging in the field shall not differ from what is shown on the final plan without prior review from the Sponsor and the Railroad.
 - (6) A complete erection procedure, including the order of lifts, time required for each lift, and any repositioning or re-hitching of the crane or cranes.
 - (7) Design and supporting calculations for the temporary support of components, including but not limited to temporary girder tie-downs and falsework.

H. Blasting:

1. The Contractor shall obtain advance approval of the Railroad Engineer and the Sponsor Engineer for use of explosives on or adjacent to Railroad property. The request for permission to use explosives shall include a detailed blasting plan. If permission for use of explosives is granted, the Contractor will be required to comply with the following:
 - a. Blasting shall be done with light charges under the direct supervision of a responsible officer or employee of the Contractor and a licensed blaster.
 - b. Electric detonating fuses shall not be used because of the possibility of premature explosions resulting from operation of two-way radios.
 - c. No blasting shall be done without the presence of the Railroad Engineer or his authorized representative. At least 72 hours advance notice to the person designated in the Railroad's notice of authorization to proceed (see paragraph 2.B) will be required to arrange for the presence of an authorized Railroad representative and such flagging as the Railroad may require.
 - d. Have at the job site adequate equipment, labor and materials and allow sufficient time to clean up debris resulting from the blasting without delay to trains, as well as correcting at his expense any track misalignment or other damage to Railroad property resulting from the blasting as directed by the Railway's authorized representative. If his actions result in delay of trains, the Contractor shall bear the entire cost thereof.
 - e. The blasting Contractor shall have a copy of the approved blasting plan on hand while on the site.
 - f. Explosive materials or loaded holes shall not be left unattended at the blast site.
 - g. A seismograph shall be placed on the track shoulder adjacent to each blast which will govern the peak particle velocity of two inches per second. Measurement shall also be taken on the ground adjacent to structures as designated by a qualified and independent blasting consultant. The Railroad reserves the option to direct the placement of additional seismographs at structures or other locations of concern, without regard to scaled distance.
 - h. After each blast, the blasting Contractor shall provide a copy of their drill log and blast report, which includes number of holes, depth of holes, number of decks, type and pounds of explosives used per deck.
 - i. The Railroad may require top of rail elevations and track centers taken before, during and after the blasting and excavation operation to check for any track misalignment resulting from the Contractor's activities.

2. The Railroad representative will:
 - a. Determine approximate location of trains and advise the Contractor the appropriate amount of time available for the blasting operation and clean up.
 - b. Have the authority to order discontinuance of blasting if, in his opinion, blasting is too hazardous or is not in accord with these special provisions.
3. The Contractor must hire, at no expense to the Railroad, a qualified and independent blasting consultant to oversee the use of explosives. The blasting consultant will:
 - a. Review the Contractor's proposed drilling and loading patterns, and with the blasting consultant's personnel and instruments, monitor the blasting operations.
 - b. Confirm that the minimum amounts of explosives are used to remove the rock.
 - c. Be empowered to intercede if he concludes that the Contractor's blasting operations are endangering the Railway.
 - d. Submit a letter acknowledging that he has been engaged to oversee the entire blasting operation and that he approves of the blasting plan.
 - e. Furnish copies of all vibration readings to the Railroad representative immediately after each blast. The representative will sign and date the seismograph tapes after each shot to verify the readings are for that specific shot.
 - f. Advise the Railroad representative as to the safety of the operation and notify him of any modifications to the blasting operation as the work progresses.
4. The request for permission to use explosives on the Railroad's Right-of-Way shall include a blasting proposal providing the following details:
 - a. A drawing which shows the proposed blasting area, location of nearest hole and distance to Railway structures, all with reference to the centerline of track.
 - b. Hole diameter.
 - c. Hole spacing and pattern.
 - d. Maximum depth of hole.
 - e. Maximum number of decks per hole.
 - f. Maximum pounds of explosives per hole.
 - g. Maximum pounds of explosives per delay.
 - h. Maximum number of holes per detonation.

- i. Type of detonator and explosives to be used. (Electronic detonating devices will not be permitted). Diameter of explosives if different from hole diameter.
- j. Approximate dates and time of day when the explosives are to be detonated.
- k. Type of flyrock protection.
- l. Type and patterns of audible warning and all clear signals to be used before and after each blast.
- m. A copy of the blasting license and qualifications of the person directly in charge of the blasting operation, including their name, address and telephone number.
- n. A copy of the Authority's permit granting permission to blast on the site.
- o. A letter from the blasting consultant acknowledging that he has been engaged to oversee the entire blasting operation and that he approves of the blasting plan.
- p. In addition to the insurance requirements outlined in Paragraph 14 of these Provisions, A certificate of insurance from the Contractor's insurer stating the amount of coverage for XCU (Explosive Collapse and Underground Hazard) insurance and that XCU Insurance is in force for this project.
- q. A copy of the borings and Geotechnical information or report.

I. Track Monitoring

- 1. At the direction of the Railroad Engineer, any activity that has the potential to disturb the Railroad track structure may require the Contractor to submit a detailed track monitoring program for approval by the Railroad Engineer.
- 2. The program shall specify the survey locations, the distance between the location points, and frequency of monitoring before, during, and after construction. Railroad reserves the right to modify the survey locations and monitoring frequency as necessary during the project.
- 3. The survey data shall be collected in accordance with the approved frequency and immediately furnished to the Railroad Engineer for analysis.
- 4. If any movement has occurred as determined by the Railroad Engineer, the Railroad will be immediately notified. Railroad, at its sole discretion, shall have the right to immediately require all Contractor operations to be ceased and determine what corrective action is required. Any corrective action required by the Railroad or performed by the Railroad including the monitoring of corrective action of the Contractor will be at project expense.

J. Maintenance of Railroad Facilities:

- 1. The Contractor will be required to maintain all ditches and drainage structures free of silt or other obstructions which may result from his operations and provide and maintain any erosion control measures as required. The Contractor will promptly

repair eroded areas within Railroad rights-of-way and repair any other damage to the property of the Railroad or its tenants.

2. If, in the course of construction, it may be necessary to block a ditch, pipe or other drainage facility, temporary pipes, ditches or other drainage facilities shall be installed to maintain adequate drainage, as approved by the Railroad Engineer. Upon completion of the work, the temporary facilities shall be removed and the permanent facilities restored.
3. All such maintenance and repair of damages due to the Contractor's operations shall be done at the Contractor's expense.

K. Storage of Materials and Equipment:

1. Materials and equipment shall not be stored where they will interfere with Railroad operations, nor on the rights-of-way of the Railroad without first having obtained permission from the Railroad Engineer, and such permission will be with the understanding that the Railroad will not be liable for damage to such material and equipment from any cause and that the Railroad Engineer may move or require the Contractor to move, at the Contractor's expense, such material and equipment.
2. All grading or construction machinery that is left parked near the track unattended by a watchman shall be effectively immobilized so that it cannot be moved by unauthorized persons. The Contractor shall protect, defend, indemnify and save Railroad, and any associated, controlled or affiliated corporation, harmless from and against all losses, costs, expenses, claim or liability for loss or damage to property or the loss of life or personal injury, arising out of or incident to the Contractor's failure to immobilize grading or construction machinery.

L. Cleanup:

1. Upon completion of the work, the Contractor shall remove from within the limits of the Railroad rights-of-way, all machinery, equipment, surplus materials, falsework, rubbish or temporary buildings of the Contractor, and leave said rights-of-way in a neat condition satisfactory to the Railroad Engineer or his authorized representative.

6. DAMAGES:

- A. The Contractor shall assume all liability for any and all damages to his work, employees, servants, equipment and materials caused by Railroad traffic.
- B. Any cost incurred by the Railroad for repairing damages to its property or to property of its tenants, caused by or resulting from the operations of the Contractor, shall be paid directly to the Railroad by the Contractor.

7. FLAGGING SERVICES:

A. Requirements:

1. Flagging services will not be provided until the Contractor's insurance has been reviewed & approved by the Railroad.

2. Under the terms of the agreement between the Sponsor and the Railroad, the Railroad has sole authority to determine the need for flagging required to protect its operations. In general, the requirements of such services will be whenever the Contractor's personnel or equipment are or are likely to be, working on the Railroad's right-of-way, or across, over, adjacent to, or under a track, or when such work has disturbed or is likely to disturb a Railroad structure or the Railroad roadbed or surface and alignment of any track to such extent that the movement of trains must be controlled by flagging.
3. Normally, the Railroad will assign one flagman to a project; but in some cases, more than one may be necessary, such as yard limits where three (3) flagmen may be required. However, if the Contractor works within distances that violate instructions given by the Railroad's authorized representative or performs work that has not been scheduled with the Railroad's authorized representative, a flagman or flagmen may be required full time until the project has been completed.
4. For Projects exceeding 30 days of construction, Contractor shall provide the flagmen a small work area with a desk/counter and chair within the field/site trailer, including the use of bathroom facilities, where the flagman can check in/out with the Project, as well as to the flagman's home terminal. The work area should provide access to two (2) electrical outlets for recharging radio(s), and a laptop computer; and have the ability to print off needed documentation and orders as needed at the field/site trailer. This should aid in maximizing the flagman's time and efficiency on the Project.

B. Scheduling and Notification:

1. The Contractor's work requiring Railroad flagging should be scheduled to limit the presence of a flagman at the site to a maximum of 50 hours per week. The Contractor shall receive Railroad approval of work schedules requiring a flagman's presence in excess of 40 hours per week.
2. Not later than the time that approval is initially requested to begin work on Railroad right-of-way, Contractor shall furnish to the Railroad and the Sponsor a schedule for all work required to complete the portion of the project within Railroad right-of-way and arrange for a job site meeting between the Contractor, the Sponsor, and the Railroad's authorized representative. Flagman or Flagmen may not be provided until the job site meeting has been conducted and the Contractor's work scheduled.
3. The Contractor will be required to give the Railroad representative at least 10 working days of advance written notice of intent to begin work within Railroad right-of-way in accordance with this special provision. Once begun, when such work is then suspended at any time, or for any reason, the Contractor will be required to give the Railroad representative at least 3 working days of advance notice before resuming work on Railroad right-of-way. Such notices shall include sufficient details of the proposed work to enable the Railroad representative to determine if flagging will be required. If such notice is in writing, the Contractor shall furnish the Engineer a copy; if notice is given verbally, it shall be confirmed in writing with copy to the Engineer. If flagging is required, no work shall be undertaken until the flagman, or flagmen are present at the job site. It may take up to 30 days to obtain flagging initially from the Railroad. When flagging begins, the flagman is usually assigned by the Railroad to work at the project site on a continual basis until no longer

needed and cannot be called for on a spot basis. If flagging becomes unnecessary and is suspended, it may take up to 30 days to again obtain from the Railroad. Due to Railroad labor agreements, it is necessary to give 5 working days notice before flagging service may be discontinued and responsibility for payment stopped.

4. If, after the flagman is assigned to the project site, an emergency arises that requires the flagman's presence elsewhere, then the Contractor shall delay work on Railroad right-of-way until such time as the flagman is again available. Any additional costs resulting from such delay shall be borne by the Contractor and not the Sponsor or Railroad.

C. Payment:

1. The Sponsor will be responsible for paying the Railroad directly for any and all costs of flagging which may be required to accomplish the construction.
2. The estimated cost of flagging is the current rate per day based on a 10-hour work day. This cost includes the base pay for the flagman, overhead, and includes a per diem charge for travel expenses, meals and lodging. The charge to the Sponsor by the Railroad will be the actual cost based on the rate of pay for the Railroad's employees who are available for flagging service at the time the service is required.
3. Work by a flagman in excess of 8 hours per day or 40 hours per week, but not more than 12 hours a day will result in overtime pay at 1 and 1/2 times the appropriate rate. Work by a flagman in excess of 12 hours per day will result in overtime at 2 times the appropriate rate. If work is performed on a holiday, the flagging rate is 2 and 1/2 times the normal rate.
4. Railroad work involved in preparing and handling bills will also be charged to the Sponsor. Charges to the Sponsor by the Railroad shall be in accordance with applicable provisions of Subchapter B, Part 140, Subpart I and Subchapter G, Part 646, Subpart B of the Federal-Aid Policy Guide issued by the Federal Highway Administration on December 9, 1991, including all current amendments. Flagging costs are subject to change. The above estimates of flagging costs are provided for information only and are not binding in any way.

D. Verification:

1. Railroad's flagman will electronically enter flagging time via Railroad's electronic billing system. Any complaints concerning flagging must be resolved in a timely manner. If the need for flagging is questioned, please contact the Railroad Engineer. All verbal complaints will be confirmed in writing by the Contractor within 5 working days with a copy to the Sponsor's Engineer. Address all written correspondence electronically to Railroad Engineer.
2. The Railroad flagman assigned to the project will be responsible for notifying the Sponsor Engineer upon arrival at the job site on the first day (or as soon thereafter as possible) that flagging services begin and on the last day that he performs such services for each separate period that services are provided. The Sponsor's Engineer will document such notification in the project records. When requested, the Sponsor's Engineer will also sign the flagman's diary showing daily time spent and activity at the project site.

8. HAUL ACROSS RAILROAD TRACK:

- A. Where the plans show or imply that materials of any nature must be hauled across Railroad's track, unless the plans clearly show that the Sponsor has included arrangements for such haul in its agreement with the Railroad, the Contractor will be required to make all necessary arrangements with the Railroad regarding means of transporting such materials across the Railroad's track. The Contractor or Sponsor will be required to bear all costs incidental to such crossings whether services are performed by his own forces or by Railroad personnel.
- B. No crossing may be established for use of the Contractor for transporting materials or equipment across the tracks of the Railroad unless specific authority for its installation, maintenance, necessary watching and flagging thereof and removal, until a temporary private crossing agreement has been executed between the Contractor and Railroad. The approval process for an agreement normally takes 90 days.

9. WORK FOR THE BENEFIT OF THE CONTRACTOR:

- A. All temporary or permanent changes in wire lines or other facilities which are considered necessary to the project are shown on the plans; included in the force account agreement between the Sponsor and the Railroad or will be covered by appropriate revisions to same which will be initiated and approved by the Sponsor and/or the Railroad.
- B. Should the Contractor desire any changes in addition to the above, then he shall make separate arrangements with the Railroad for same to be accomplished at the Contractor's expense.

10. COOPERATION AND DELAYS:

- A. It shall be the Contractor's responsibility to arrange a schedule with the Railroad for accomplishing stage construction involving work by the Railroad or tenants of the Railroad. In arranging his schedule he shall ascertain, from the Railroad, the lead time required for assembling crews and materials and shall make due allowance therefore.
- B. No charge or claim of the Contractor against either the Sponsor or the Railroad will be allowed for hindrance or delay on account of railroad traffic; any work done by the Railroad or other delay incident to or necessary for safe maintenance of railroad traffic or for any delays due to compliance with these special provisions.

11. TRAINMAN'S WALKWAYS:

- A. Along the outer side of each exterior track of multiple operated track, and on each side of single operated track, an unobstructed continuous space suitable for trainman's use in walking along trains, extending to a line not less than 10 feet from centerline of track, shall be maintained. Any temporary impediments to walkways and track drainage encroachments or obstructions allowed during work hours while Railroad's protective service is provided shall be removed before the close of each work day. If there is any excavation near the walkway, a handrail, with 10'-0" minimum clearance from centerline of track, shall be placed and must conform to AREMA and/or FRA standards.

12. GUIDELINES FOR PERSONNEL ON RAILROAD RIGHT-OF-WAY:

- A. The Contractor and/or the Sponsor's personnel authorized to perform work on Railroad's property as specified in Section 2 above are not required to complete Norfolk Southern Roadway

Worker Protection Training; However the Contractor and the Sponsor's personnel must be familiar with Norfolk Southern's standard operating rules and guidelines, should conduct themselves accordingly, and may be removed from the property for failure to follow these guidelines.

- B. All persons shall wear hard hats. Appropriate eye and hearing protection must be used. Working in shorts is prohibited. Shirts must cover shoulders, back and abdomen. Working in tennis or jogging shoes, sandals, boots with high heels, cowboy and other slip-on type boots is prohibited. Hard-sole, lace-up footwear, zippered boots or boots cinched up with straps which fit snugly about the ankle are adequate. Wearing of safety boots is strongly recommended. In the vicinity of at-grade crossings, it is strongly recommended that reflective vests be worn.
- C. No one is allowed within 25' of the centerline of track without specific authorization from the flagman.
- D. All persons working near track while train is passing are to lookout for dragging bands, chains and protruding or shifted cargo.
- E. No one is allowed to cross tracks without specific authorization from the flagman.
- F. All welders and cutting torches working within 25' of track must stop when train is passing.
- G. No steel tape or chain will be allowed to cross or touch rails without permission from the Railroad.

13. GUIDELINES FOR EQUIPMENT ON RAILROAD RIGHT-OF-WAY:

- A. No crane or boom equipment will be allowed to set up to work or park within boom distance plus 15' of centerline of track without specific permission from Railroad official and flagman.
- B. No crane or boom equipment will be allowed to foul track or lift a load over the track without flag protection and track time.
- C. All employees will stay with their machines when crane or boom equipment is pointed toward track.
- D. All cranes and boom equipment under load will stop work while train is passing (including pile driving).
- E. Swinging loads must be secured to prevent movement while train is passing.
- F. No loads will be suspended above a moving train.
- G. No equipment will be allowed within 25' of centerline of track without specific authorization of the flagman.
- H. Trucks, tractors or any equipment will not touch ballast line without specific permission from Railroad official and flagman. Orange construction fencing may be required as directed.
- I. No equipment or load movement within 25' or above a standing train or Railroad equipment without specific authorization of the flagman.

- J. All operating equipment within 25' of track must halt operations when a train is passing. All other operating equipment may be halted by the flagman if the flagman views the operation to be dangerous to the passing train.
- K. All equipment, loads and cables are prohibited from touching rails.
- L. While clearing and grubbing, no vegetation will be removed from Railroad embankment with heavy equipment without specific permission from the Railroad Engineer and flagman.
- M. No equipment or materials will be parked or stored on Railroad's property unless specific authorization is granted from the Railroad Engineer.
- N. All unattended equipment that is left parked on Railroad property shall be effectively immobilized so that it cannot be moved by unauthorized persons.
- O. All cranes and boom equipment will be turned away from track after each work day or whenever unattended by an operator.
- P. Prior to performing any crane operations, the Contractor shall establish a single point of contact for the Railroad flagman to remain in communication with at all times. Person must also be in direct contact with the individual(s) directing the crane operation(s).

14. INSURANCE:

- A. In addition to any other forms of insurance or bonds required under the terms of the contract and specifications, the Prime Contractor will be required to carry insurance of the following kinds and amounts:
 - 1. a. Commercial General Liability Insurance having a combined single limit of not less than \$2,000,000 per occurrence for all loss, damage, cost and expense, including attorneys' fees, arising out of bodily injury liability and property damage liability during the policy period. Said policy shall include explosion, collapse, and underground hazard (XCU) coverage, shall be endorsed to name Railroad specified in item A.2.c. below both as the certificate holder and as an additional insured, and shall include a severability of interests provision.
 - b. Automobile Liability Insurance with a combined single limit of not less than \$1,000,000 each occurrence for injury to or death of persons and damage to or loss or destruction of property. Said policy or policies shall be endorsed to name Railroad specified in item A.2.c. below both as the certificate holder and as an additional insured and shall include a severability of interests provision.
 - 2. Railroad Protective Liability Insurance having a combined single limit of not less than \$2,000,000 each occurrence and \$6,000,000 in the aggregate applying separately to each annual period. If the project involves track over which passenger trains operate, the insurance limits required are not less than a combined single limit of \$5,000,000 each occurrence and \$10,000,000 in the aggregate applying separately to each annual period. Said policy shall provide coverage for all loss, damage or expense arising from bodily injury and property damage liability, and physical damage to property attributed to acts or omissions at the job site.

The standards for the Railroad Protective Liability Insurance are as follows:

- a. The insurer must be rated A- or better by A.M. Best Company, Inc.
NOTE: NS does not accept from insurers Chartis (AIG or Affiliated Company including Lexington Insurance Company), Hudson Group or Liberty or Affiliated Company, American Contractors Insurance Company and Erie Insurance Company including Erie Insurance Exchange and Erie Indemnity Company.

- b. The policy must be written using one of the following combinations of Insurance Services Office (“ISO”) Railroad Protective Liability Insurance Form Numbers:
- (1) CG 00 35 01 96 and CG 28 31 10 93; or
 - (2) CG 00 35 07 98 and CG 28 31 07 98; or
 - (3) CG 00 35 10 01; or
 - (4) CG 00 35 12 04; or
 - (5) CG 00 35 12 07; or
 - (6) CG 00 35 04 13.

- c. The named insured shall read:

Norfolk Southern Corporation and its subsidiaries
Three Commercial Place
Norfolk, Virginia 23510-2191
Attn: Risk Manager

(NOTE: Railroad does not share coverage on RRPL with any other entity on this policy)

- d. The description of operations must appear on the Declarations, must match the project description in this agreement, and must include the appropriate Sponsor project and contract identification numbers.
- e. The job location must appear on the Declarations and must include the city, state, and appropriate highway name/number. **NOTE: Do not include any references to milepost, valuation station, or mile marker on the insurance policy.**
- f. The name and address of the prime Contractor must appear on the Declarations.
- g. The name and address of the Sponsor must be identified on the Declarations as the “Involved Governmental Authority or Other Contracting Party.”
- h. Endorsements/forms that are **required** are:
- (1) Physical Damage to Property Amendment
 - (2) Terrorism Risk Insurance Act (TRIA) coverage must be included
- i. Other endorsements/forms that will be accepted are:

- (1) Broad Form Nuclear Exclusion – Form IL 00 21
- (2) 30-day Advance Notice of Non-renewal or cancellation
- (3) Required State Cancellation Endorsement
- (4) Quick Reference or Index Form CL/IL 240

- j. Endorsements/forms that are NOT acceptable are:
- (1) Any Pollution Exclusion Endorsement except CG 28 31
 - (2) Any Punitive or Exemplary Damages Exclusion
 - (3) Known injury or Damage Exclusion form CG 00 59
 - (4) Any Common Policy Conditions form
 - (5) An Endorsement that limits or excludes Professional Liability coverage
 - (6) A Non-Cumulation of Liability or Pyramiding of Limits Endorsement
 - (7) An Endorsement that excludes TRIA coverage
 - (8) A Sole Agent Endorsement
 - (9) Any type of deductible endorsement or amendment
 - (10) Any other endorsement/form not specifically authorized in item no. 2.h above.

- B. If any part of the work is sublet, similar insurance, and evidence thereof as specified in A.1 above, shall be provided by or on behalf of the subcontractor to cover its operations on Railroad's right of way.
- C. All insurance required under the preceding subsection A shall be underwritten by insurers and be of such form and content, as may be acceptable to the Company. Prior to entry on Railroad right-of-way, the original Railroad Protective Liability Insurance Policy shall be submitted by the Prime Contractor to the Department at the address below for its review and transmittal to the Railroad. In addition, certificates of insurance evidencing the Prime Contractor's and any subcontractors' Commercial General Liability Insurance shall be issued to the Railroad and the Department at the addresses below, and forwarded to the Department for its review and transmittal to the Railroad. The certificates of insurance shall state that the insurance coverage will not be suspended, voided, canceled, or reduced in coverage or limits without (30) days advance written notice to Railroad and the Department. No work will be permitted by Railroad on its right-of-way until it has reviewed and approved the evidence of insurance required herein.

SPONSOR:

RAILROAD:

Risk Management
Norfolk Southern Railway Company
Three Commercial Place
Norfolk, Virginia 23510-2191

- D. The insurance required herein shall in no way serve to limit the liability of Sponsor or its Contractors under the terms of this agreement.
- E. Insurance Submission Procedures
1. Railroad will only accept initial insurance submissions via US Mail or Overnight carrier to the address noted in C above. Railroad will NOT accept initial insurance submissions via email or faxes. **Please provide point of contact information with the submission including a phone number and email address.**

2. Railroad requires the following two (2) forms of insurance in the initial insurance submission to be submitted under a cover letter providing details of the project and contact information:
 - a. The full original or certified true countersigned copy of the railroad protective liability insurance policy in its entirety inclusive of all declarations, schedule of forms and endorsements along with the policy forms and endorsements.
 - b. The Contractor's commercial general, automobile, and workers' compensation liability insurance certificate of liability insurance evidencing a combined single limit of a minimum of \$2M per occurrence of general and \$1M per occurrence of automobile liability insurance naming Norfolk Southern Railway Company, Three Commercial Place, Norfolk, VA 23510 as the certificate holder and as an additional insured on both the general and automobile liability insurance policy.
3. It should be noted that the Railroad does not accept notation of Railroad Protective insurance on a certificate of liability insurance form or Binders as Railroad must have the full original countersigned policy. Further, please note that mere receipt of the policy is not the only issue but review for compliance. Due to the number of projects system-wide, it typically takes a minimum of 30-45 days for the Railroad to review.

15. FAILURE TO COMPLY:

- A. In the event the Contractor violates or fails to comply with any of the requirements of these Special Provisions:
 1. The Railroad Engineer may require that the Contractor vacate Railroad property.
 2. The Sponsor's Engineer may withhold all monies due the Contractor on monthly statements.
- B. Any such orders shall remain in effect until the Contractor has remedied the situation to the satisfaction of the Railroad Engineer and the Sponsor's Engineer.

16. PAYMENT FOR COST OF COMPLIANCE:

- A. No separate payment will be made for any extra cost incurred on account of compliance with these special provisions. All such costs shall be included in prices bid for other items of the work as specified in the payment items.

17. PROJECT INFORMATION

- A. Date: _____
- B. NS File No.: _____
- C. NS Milepost: _____
- D. Sponsor's Project No.: _____

TABLE OF CONTENTS

TABLE OF CONTENTS	1
LOWERING DEVICE.....	2
CCTV ASSEMBLY	5
CCTV CAMERA OUTDOOR WEATHERSEAL.....	9
CCTV FIELD CONTROLLER.....	10
CCTV CAMERA COMPOSITE CABLE	13
CCTV KEYBOARD CONTROLLER	14
ELECTRICAL CONDUIT.....	15
ELECTRICAL SERVICE	15
MODEL 334 AND 336 ENCLOSURES	16
JUNCTION BOX.....	23
SURGE DEVICES.....	24
TRENCHING AND BACKFILLING	26
PORTABLE WINCH LOWERING TOOL.....	27
ELECTRICAL WIRE AND CABLE.....	28
WOOD POLE FOR UTILITY SERVICE.....	28
ITS FIELD UPS (RACK MOUNTED UPS).....	29
GLOSSARY.....	31

GENERAL

The information included in this document is for reference as a convenience to the DBT. As stated in the ITS Design Concept document, it is the responsibility of the DBT to verify and adhere to all current KYTC requirements regarding standards and specifications. As in section 1 of the ITS Scope, any equipment, device or material not listed in this document must have appropriate documentation such as cut sheets and specifications submitted to KYTC and TRIMARC, and written approval obtained prior to purchase and installation.

LOWERING DEVICE

DESCRIPTION

The DBT will furnish and install Pole with lowering device and internal winch, in accordance with the approved ITS Design Plans, specifications and Standard Drawings and in adherence to the KYTC requirements. A typical drawing may be available to the DBT for reference. The Pole with lowering device shall be designed to support and lower/raise a CCTV camera, lens, housing, PTZ mechanism, cabling, connectors and other supporting field components without damage or causing degradation of camera operations. The lowering device and the pole are interdependent and thus, must be considered a single unit or system. The lowering device system shall consist of a pole, suspension contact unit, divided support arm, pole adapter for attachment to a pole top tenon, pole top junction box, and camera connection box. The lowering device to be furnished shall be the product of a manufacturer with a minimum of five years of experience in the manufacturing of such systems. The internal winch shall be made by Thurn and have a stainless steel drum with stainless steel hardware for improved corrosive resistance.

MATERIALS

LOWERING DEVICE

Lowering device shall be Camera and Lighting Lowering Systems model CDP6-16HDEP-xx-yySC (where xx is the mounting height cable length and yy is the signal cable length) or approved equal.

SUSPENSION CONTACT UNIT

The suspension contact unit shall have a load capacity 600 lbs. with a 4 to 1 safety factor. There shall be a locking mechanism between the fixed and moveable components of the lowering device. The movable assembly shall have a latching mechanism with a minimum of two latches. This latching mechanism shall securely hold the device and its mounted equipment. The latching mechanism shall operate by alternately raising and lowering the assembly using the winch and lowering cable. When latched, all weight shall be removed from the lowering cable. The fixed unit shall have a heavy duty cast tracking

guide and means to allow latching in the same position each time. The contact unit housing shall be weatherproof with a gasket provided to seal the interior from dust and moisture.

The prefabricated components of the lift unit support system shall be designed to preclude the lifting cable from contacting the power or video cabling. The only cable permitted to move within the pole or lowering device during lowering/raising shall be the stainless steel lowering cable. All other cables must remain stable and secure during lowering/raising operations.

The lowering device shall be equipped with electrical contact connectors designed so that either an Analog (Coax fed) camera or IP (CAT 5e/6 fed) camera or DUAL USE camera can be mounted thereto.

ANALOG BLOCK:

The analog connector block (male and female halves) shall be constructed of thermosetting synthetic rubber which meets all requirements for UL-94 VO rating. The female brass socket contacts and the male high conductivity brass pin contacts shall be permanently molded into the rubber body.

The current carrying male contacts shall be 1/8" in diameter. There shall be at least one male contact that is longer than all others which will allow such to make first and break last, providing optimum grounding performance. There shall be FIVE 1/8" diameter contacts rated for 1 volt peak-to-peak provided along with a separate coaxial video connector on the same block. The contacts which provide the coaxial signal shall be molded in the rubber body and constructed of a copper alloy for optimum durability and conductivity. The back ends of the video connector shall be designed to accept RG-59 Coaxial cable assemblies with standard connectors. The shield interface of the connector shall make contact on both the inside and outside surfaces of the contacts when mated providing a minimum of 1 square inch of surface contact. The 1/8" inch diameter center pin on the male video contact shall make contact with the inside of the mating female contact for a minimum depth of 0.31 inches.

The camera mounted thereto, shall be capable of performing all of its necessary functions using this configuration of contacts.

The current carrying female contacts are rated for 1 volt peak-to-peak and shall be 1/8" I.D. All of these contacts shall be recessed 1/8" from the face of the connector. Cored holes molded into the rubber face of the connector body, measuring 1/4" diameter and 1/8" deep, are centered on each contact to create rain-tight seals when mated with the male connector.

Each wire lead shall be mechanically crimped at the factory to both the male and female 1/8" diameter contacts, and then the actual contacts shall be permanently and integrally molded in the synthetic rubber body. The wires shall be identified by number and constructed of #18/1 AWG UL rubber jacketed wire. The 12 individual 1/8" contacts shall be self-wiping with a shoulder at the base of each male contact so that they will recess into the molded female receptacle body, thereby giving a rain-tight seal when mated.

ETHERNET –IP BLOCK:

The IP Contact Block shall consist of a female and male socket contact half and shall be made of a UL94, V-0 rated thermosetting synthetic rubber.

The female barrel contacts and the male pin contacts shall be encased in this material. All current carrying male pin contacts shall be gold-plated, beryllium copper and 0.09 inches in diameter at the contact area. All current carrying female barrel contacts shall also be gold-plated, beryllium copper and at least 0.09 inches I.D. at the contact area. Each individual female barrel contact shall have a stainless steel sleeve which prevents foreign matter from entering the contact area as well as preclude the possibility of the leaves of the female contact from opening beyond allowable limits and ensure a snug fit around the respective male pins. There shall be at least one female contact that is positioned closer to the face of the female connector body than all the others, which will allow it to make first and break last to provide optimum grounding performance.

Each IP Male/Female connector shall include (8) contacts mechanically crimped to CAT5 Wire and (4) contacts mechanically crimped to #18/1 UL lead wire, which may be used for additional camera requirements including but not limited to power, alarms or grounds. There shall be shoulders at the base of each male contact which enable individual sealing of the contact pins when mated. Each male contact and female barrel contact shall be individually soldered to its respective wire and encased in their respective Male and Female molded rubber blocks to provide optimum protection from moisture and the elements.

The IP CONTACT Block must be successfully tested and certified at the factory per the test protocol of 100BASE-T CAT5. Test reports shall be made available upon request.

The portable lowering device and pulleys for the lowering device shall have sealed, self lubricated bearings, oil tight bronze bearings, or sintered bronze bushings. The lowering cable shall be a minimum 1/8 inch diameter stainless steel aircraft cable with a minimum breaking strength of 1740 pounds and shall be 7 strands of 19 wire each.

All electrical and video connections between the fixed and moveable portion of the contact block shall be protected from exposure to the weather by a waterproof seal to prevent degradation of the electrical contacts. The electrical connections between the fixed and movable lowering device components shall be designed to conduct high frequency data bits, one volt peak-to-peak video signals, and power requirements for operation of dome environmental controls.

The interface and locking components shall be made of stainless steel or aluminum. All external components of the lowering device shall be made of corrosion resistant materials, powder-coated, galvanized, or otherwise protected from the environment by industry-accepted coatings to withstand exposure to a corrosive environment.

INSTALLATION

LOWERING DEVICE

This item includes all assembly, mounting hardware, wiring, grounding, and mechanical and electrical adjustments. Due to the electrical connections involved, the CCTV Assembly must be installed to properly test the lowering device. The DBT shall demonstrate to the Engineer the proper and repeated operation of the lowering device. Proper camera operation and electrical connections shall be verified after each lowering/raising cycle.

CAMERA BALANCING

The Camera shall be weighted and balanced to assure that the alignment of pins and connectors are proper for the camera support to be raised into position without binding. The lowering unit shall have sufficient weight to disengage the camera and its control components in order that it can be lowered properly.

CAMERA CONNECTIONS

The DBT shall be responsible for meeting the coaxial and power requirements for wireless antennas (if required), and camera (120 volt, 18 AWG minimum).

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Pole with lowering device will be measured for payment per unit each, complete and in place. This item includes all assembly, mounting hardware, wiring, grounding, and mechanical and electrical adjustments. Due to the electrical connections involved, the CCTV Assembly must be installed to properly test the lowering device. The DBT shall demonstrate to the Engineer the proper and repeated operation of the lowering device. Proper camera operation and electrical connections shall be verified after each lowering/raising cycle.

CCTV ASSEMBLY

DESCRIPTION

The DBT shall provide a CCTV Assembly at each site as shown in the approved ITS Design Plans in accordance with the manufactures specifications, and in adherence to the KYTC specifications and Standard Drawings and requirements.

MATERIALS

The CCTV ASSEMBLY shall be a **TREEHAVEN Technologies model number RVSHSD626/N** or approved equivalent.

Contact information:

Sales Contact:

Perry Wolfe

PTWolfe Associates, Inc.

Phone: 740.987.2550

Fax: 740.987.2477

Factory:

Joe Bowman

Treehaven Technologies, Inc.

3960-B Presidential Pkwy

Powell, OH 43065

Phone: 614.791.8843

Fax: 614.789.0252

Mobile: 614.578.4051

joe.bowman@treehavenvision.com

www.treehavenvision.com

The DBT shall obtain approval from the TRIMARC Engineer prior to installing an approved equivalent device, as the equivalent must be compatible with existing Honeywell **Diamond** control **protocol** used by TRIMARC. Proposed alternates shall be commercially available. The DBT shall identify to KYTC and the TRIMARC Engineer an installed site where the proposed CCTV Assembly has been operating for a period of at least one-year in a similar climate region.

The CCTV Assembly shall include the following:

FEATURES

- 1/2.8 inch Progressive scan CMOS imager
- Quad stream H.264, MPEG-2, MPEG-4 and MJPEG
- Image quality monitor and tamper detector
- 35x optical zoom/12x digital zoom
- Day/night with IR-cut filter/WDR/BLC • NEMA TS 2 certified
- Electronic image stabilization
- 400°/second preset targeting
- 360 degree continuous rotation
- 256 presets/8 programmable cruises

- Two-way audio; digital I/O
- Analog output/optical output options

High-speed dome

The RVSHSD626/N high-speed dome camera combines a 35x autofocus zoom lens with 12x digital zoom. Precision 400° per second pan and tilt drive technology offers almost instant preset positioning. This camera's robust feature set includes multiple sequences, cruises and autopan functions.

Image quality monitor and tampering alarm

The RVSHSD626/N is fitted with video analytics to check the health of the camera. This image quality monitor analyzes contrast, exposure, sharpness and noise. Camera tampering analytics detect any changes in the camera's position or field of view. The instant a camera is subject to failure or tampering, an alert can be raised.

Enhanced video quality

Modern flat LCD monitors show artifacts with standard PAL or NTSC video. Standard de-interlacing loses half of the vertical resolution. Siquira's sophisticated de-interlacing scheme optimizes vertical resolution resulting in superior video image without artifacts.

Open Streaming Architecture (OSA)

The RVSHSD626/N is designed with OSA offering standardized streaming video and remote control based on international standards and tested with different vendors. A comprehensive HTTP API gives access to all controls and makes integration easy. In addition, the RVSHSD626/N supports the unique Siquira® MXTM protocol.

Multistream/multicodec

The versatile RVSHSD626/N is capable of quad streaming, with dual H.264 streams simultaneous with two flexible encoding outputs which can provide MPEG-2, MPEG-4 or MJPEG streams. Each stream is optimized for its purpose. The H.264 implementation is based on dedicated hardware resulting in unparalleled video quality.

Day/night, backlight compensation and wide dynamic range

The RVSHSD626/N provides automatic day/night functionality, for use in low light situations. Backlight compensation enhances image visibility in difficult lighting situations. This ensures quality pictures at all times. Wide dynamic range solves the problem of overlit images by taking the better of two pictures with different light references

NEMA TS 2

The RVSHSD626/N has been tested and approved according to the NEMA TS 2 standard.

Audio, I/O contacts and analog output

By combining streaming video with duplex audio and I/O contacts over IP, the RVSHSD626/N provides all the interfaces necessary for any IP CCTV application. The RVSHSD626/N is a hybrid solution and can provide local video for a public view monitor or local DVR.

Image Stabilizer

When the camera is in its maximum zoom range, every small movement of the camera gives relatively large movement in the picture. The image stabilizer digitally compensates this movement for a stable picture. This feature is especially useful for pole-mounted cameras.

SFP interface accessory

The RVSHSD626/N comes with an SFP interface as an alternative to the RJ-45 Cat5 Ethernet connection. It supports the XSNet SFP range for Ethernet over fiber and the ECO-plug™ for Ethernet over coax.

The DBT shall obtain approval from Traffic Operations, Design Services and the TRIMARC Engineer prior to installing an approved equivalent device. Proposed alternates shall be commercially available. The DBT shall identify to KYTC and the TRIMARC Engineer an installed site, where the proposed CCTV Assembly has been operating for a period of at least one-year in a similar climate region.

INSTALLATION

CCTV Assemblies shall be installed on lowering device in accordance with the manufacturer's instructions. Requests for alternative mounting on shared infrastructure, bridges, etc. must be approved by KYTC and TRIMARC prior to installation. All materials shall be installed in a neat and professional manner. All installation services will comply with all warranty provisions and warranty contract maintenance services in accordance with these specifications. All installation services shall comply with all local, state and federal building, electrical and construction codes, and Motorola R-56 requirements. All wiring entry to the CCTV Assembly shall use watertight fittings. All wiring entry and exits shall be made at the side or underneath components; no exposed top entry or exits are permitted. This requirement extends to all enclosures, junction boxes, or any other externally exposed devices. The CCTV assembly shall include a method of connecting CCTV keyboard controller for field testing of camera functions. All CCTV assemblies will be primarily installed on lowering devices and shall be installed as designated by the KYTC and TRIMARC Engineers on field visits. As mentioned in the POLE BASE section, field sightings by the KYTC and TRIMARC Engineers are required to verify anchor bolt placement to ensure the proper angle position of the lowering arm when that assembly is mounted to the pole. This will ensure the optimum CCTV view when the camera is in the fixed position at the top of the pole.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

The CCTV Assembly will be measured for payment per unit each complete and in place and after passing component and subsystem testing. This price includes the color camera, zoom lenses, environmental enclosure, pan/tilt unit, housing, dome, parapet mount, and all mounting hardware, connections, and incidentals necessary to complete the work.

CCTV CAMERA OUTDOOR WEATHERSEAL

DESCRIPTION

The DBT shall furnish and install a CCTV Camera Outdoor Weatherseal at each site as shown in the approved ITS Design Plans in accordance with the manufactures specifications, and in adherence to the KYTC specifications and Standard Drawings and requirements.

MATERIALS

The CCTV CAMERA OUTDOOR WEATHERSEAL shall be a **Treehaven Technologies model RVSCOWS** or approved equivalent.

Contact information:

TREEHAVEN Technologies, INC.
3960-B Presidential Pkwy
Powell, OH 43065
614-791-8843

CCTV Camera Outdoor Weatherseal shall be compatible with CCTV Assembly. CCTV Camera Outdoor Weatherseal shall provide an environmental epoxy seal to prevent water, dust, salt and varmints from entering the camera through the camera mount. The CCTV Camera Outdoor Weatherseal shall utilize membrane vents to provide passage of gases and vapors allowing camera ventilation while blocking water, salt and other particles. The weatherseal shall be wired according to the TRIMARC engineers directions. The weatherseal shall exchange air at 1200 ml per minute at 1.0 PSI and be IP67 rated. The weatherseal shall operate at a temperature range of -40°C to +125°C. All connectors, terminators, fittings, etc. are incidental to the cost of installing the CCTV camera composite cable and no separate payment will be made.

INSTALLATION

CCTV Camera Outdoor Weatherseal shall be installed between the camera junction box of the pole lowering device and the CCTV camera assembly. Connectors shall be installed as necessary and shall match the connector interface requirements for the equipment being connected.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

CCTV Camera Outdoor Weatherseal will be measured for payment per unit. The Department will make payment for complete, functioning, inspected, and accepted quantities. The Department will consider payment as full compensation for all work required under this section.

CCTV FIELD CONTROLLER

DESCRIPTION

The DBT shall furnish and install a CCTV Field Controller at each site as shown in the approved ITS Design Plans in accordance with the manufactures specifications, and in adherence to the KYTC specifications and Standard Drawings and requirements. This device is required with each CCTV installation to provide power to the camera, encode the video in an IP format and provide for local troubleshooting in the field.

MATERIALS

The CCTV FIELD CONTROLLER assembly shall be a **Treehaven Technologies model RVSFB120RNET** or approved equivalent.

Contact information:

TREEHAVEN Technologies, INC.
3960-B Presidential Pkwy
Powell, OH 43065
614-791-8843

The DBT shall obtain approval from the TRIMARC Engineer prior to installing an approved equivalent device, as the equivalent must be compatible with existing Honeywell control protocols used by TRIMARC. Proposed alternates shall be commercially available. The DBT shall identify to KYTC an installed site where the proposed CCTV FIELD CONTROLLER has been operating for a period of at least one-year in a similar climate region.

The CCTV FIELD CONTROLLER assembly shall include the following features:

- Embedded AXIS Video Server
 - Video Compression - H.264 (MPEG-4 Part 10/AVC) Motion JPEG
 - Resolutions – 176x120 to 720x576
 - H.264 Frame Rate – 30/25 (NTSC/PAL) fps in all resolutions
 - M JPEG Frame Rate – 30/25 (NTSC/PAL) fps in all resolutions
 - Video Streaming – Multi-stream H.264 and Motion JPEG: 3 simultaneous individually configured streams in max resolution at 30/25 fps; more

- streams if identical or limited in frame rate/resolution. Controllable frame rate and bandwidth VBR/CBR H.264
- Image Settings – Compression, color, brightness, contrast. Rotation at 90, 180 and 270 degrees. Aspect ratio correction. Mirroring of images. Text and image overlay, privacy mask and enhanced deinterlace filter.
 - Pan/Tilt/Zoom -- 100 presets, guard tour, PTZ control queue.
 - Supported Protocols – IPv4/v6, HTTP, HTTPS, QoS layer 3 DiffServ, FTP, SMTP, Bonjour, UPnP, SNMPv1/v2c/v3, SNMPv1/v2c/v3(MIB-II), DNS, DynDNS, NTP, RSTP, RTP, TCP, UDP, IGMP, RTCP, ICMP, DHCP, ARP, SOCKS
 - Front panel ultra bright LED backlit color LCD display readable in direct sunlight
 - Front panel indicators for 5V, REMOTE and LOCAL PTZ and Network
 - Provides camera power, 24VAC
 - Provides lightning protection for all inputs and outputs
 - Embedded 4 Port Managed Switch
 - Simple plug & play operation – automatic learning, negotiation and crossover detection
 - RSTP (802.1W) and Enhanced Rapid Spanning Tree (eRSTP) network fault recovery (<5ms)
 - Quality of Service (802.1q) for real-time traffic
 - VLAN (802.1q) with double tagging and GVRP support
 - Link aggregation (802.3ad)
 - Snooping and multicast filtering
 - Port Rate Limiting and Broadcast Storm Limiting
 - Port configuration, status, statistics, mirroring, security
 - SNTP time synchronization
 - Multi-level user passwords
 - SSH/SSL encryption
 - Enable/disable ports, MAC based port security
 - Port based network access control (802.1x)
 - VLAN (802.1q) to segregate and secure network traffic
 - Radius centralized password management
 - SNMPv3 encrypted authentication and access security
 - Web-based, Telnet, CLI management interfaces
 - SNMP v1/v2/v3
 - Remote Monitoring (RMON)
 - Rich Set of diagnostics with logging and alarms
 - Powerful Marvel 886097F switch fabric
 - Wire-speed non-blocking, store and forward switching
 - Full ROS feature set including eRSTP for fast network fault recovery
 - Colfire 5272 management CPU engine (66Mhz, 16 MB RAM)
 - System status
 - Loss of video
 - Network status
 - Power

- Heater/Blower
- Text on video (OSD)
- Local PTZ control via front panel control buttons and/or plug-in joystick
- Operating temperature – -34°C to 60°C
- Humidity – 5% to 95% non-condensing humidity
- Dimensions: 19” W x 3.5” H x 12” D
- Data connections: RS-422 (joystick) RS-232 (laptop)
- Remote Diagnostics
- Text overlay to report system health status and other system parameters. Text overlay can be turned ON and OFF remotely using a predefined PreSet command
- Heater current and power factor detection. Reports heater failure and displays status on video image
- Video loss detection. Reports video loss and generates sync signal with “Loss of Video” message on blue screen
- Loss of data detection. Reports loss of PTZ data and displays status on video image
- Surge suppression on data, video and power connections
- Plug in connection for local joystick controller
- Plug in connection for laptop computer providing PTZ control and camera setup and configuration
- Auto-sensing of joystick, serial and remote data connections
- Video connection for local test monitor

CCTV Field Controller shall be compatible with CCTV Assembly. All connectors, terminators, fittings, etc. are incidental to the cost of and no separate payment will be made.

INSTALLATION

The DBT will install a CCTV Field Controller for each CCTV location. The unit will be mounted in the equipment cabinet, usually a model 334 enclosure, adjacent to the CCTV pole. Any wiring or connectors used and installed are incidental to this item and no separate payment will be made. The DBT will install all items as necessary and shall match the connector interface requirements for the equipment being connected. Adapters are not acceptable. The CCTV Field Controller shall be located in said equipment such that they are easily accessible for maintenance activities.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

CCTV FIELD CONTROLLER will be measured for payment per unit each. The Department will make payment for complete, functioning, inspected, and accepted quantities. The Department will consider payment as full compensation for all work required under this section.

CCTV CAMERA COMPOSITE CABLE

DESCRIPTION

The DBT shall furnish and install CCTV Camera Composite Cable at each site as shown in the approved ITS Design Plans in accordance with the manufactures specifications, and in adherence to the KYTC specifications and Standard Drawings and requirements.

MATERIALS

The CCTV CAMERA COMPOSITE CABLE shall be a **Treehaven Technologies model RVSCOMCAB2H1-X*** (* = Length in Feet) or approved equivalent.

Contact information:

TREEHAVEN Technologies, INC.
24 Village Pointe Drive
Powell, OH 43065
614-791-8843

CCTV Camera Composite Cable shall be compatible with CCTV Assembly. CCTV Camera Composite Cables shall be a composite cable consisting of one RG59 coax video cable, three (3) 14 AWG stranded wires (Power), two (2) 22 AWG shielded pairs (Camera Data), eight (8) 24 AWG 4 Pair Solid Copper (CAT 5E Rated) Blue Jacket and eight (8) 24 AWG 4 Pair Solid Copper (CAT 5E Rated) Black Jacket. Cable shall meet all applicable specifications of UL/NEC/CEC CATV or CM. Cable shall be flame resistant per UL 1581 Vertical Tray. All connectors, terminators, fittings, etc. are incidental to the cost of installing the CCTV camera composite cable and no separate payment will be made.

INSTALLATION

CCTV Camera Composite Cable shall be provided on spools of 1000 feet (nominal). The cable shall be of suitable length to allow installation between equipment without exceeding the minimum bend radius as specified by the manufacturer. Connectors shall be installed as necessary and shall match the connector interface requirements for the equipment being connected. Adapters are not acceptable. At the completion of the project, partial spools with a minimum of 50 feet of cable shall become the property of the KYTC.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

CCTV Camera Composite Cable will be measured for payment per unit each 1000 feet spool. The Department will make payment for complete, functioning, inspected, and accepted quantities. The Department will consider payment as full compensation for all work required under this section.

CCTV KEYBOARD CONTROLLER

DESCRIPTION

The DBT shall furnish three CCTV Keyboard Controllers as shown in the approved ITS Design Plans in accordance with the manufactures specifications, and in adherence to the KYTC specifications and Standard Drawings and requirements. These items are required for the DBT to complete installation tests and verify operational control during installation of CCTV assemblies, etc.

MATERIALS

The CCTV Keyboard Controller shall meet the following minimum requirements:

- **Firmware:** The CCTV Keyboard Controller shall contain firmware that is compatible with the CCTV Camera. All camera control receiver functions controlled by the keyboard described herein shall be supported.
- **Enclosure:** The CCTV Keyboard Controller shall be constructed of high-impact plastic or aluminum.
- **CCTV Camera Control:** The CCTV Keyboard Controller shall be capable of addressing and controlling up to 512 camera control receivers. The CCTV Keyboard Controller shall include a joystick for controlling the cameras.
- **Display:** The CCTV Keyboard Controller shall include an LCD for displaying camera ID and video output device designation.
- **CCTV Test Jack:** The CCTV Keyboard Controller shall include an RJ-45 jack, which shall serve as the primary interface between the CCTV Keyboard Controller and the Camera Interface.
- **Control Cable:** An RJ-45 cable shall be supplied with each controller for connection to the Camera Interface. The mating RJ-45 connector on the controller shall be wired in accordance with the manufacturer's recommendations.

INSTALLATION

No installation is required. The DBT shall furnish the CCTV Keyboard Controller and associated equipment to configure and test cameras. Upon completion of the Project, CCTV Keyboard Controllers shall be delivered to KYTC/TRIMARC, fully functional and in like-new condition, at a location directed by the TRIMARC Engineer.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

CCTV Keyboard Controller will be measured for payment per unit each. The Department will make payment for complete, functioning, inspected, and accepted quantities. The Department will consider payment as full compensation for all work required under this section.

ELECTRICAL CONDUIT

DESCRIPTION

The DBT will furnish and install Electrical Conduit in accordance with the approved ITS Design Plans, in accordance with the manufactures specifications, and in adherence to the KYTC specifications and Standard Drawings and requirements.

MATERIALS

Conduit shall be rigid steel, schedule 80 PVC, or flexible, non-metallic conduit as specified. This item includes fittings, connectors, clamps, caps and other materials necessary for proper installation. The DBT shall submit to material testing at the discretion of the Engineer.

INSTALLATION

All conduit installed above ground or below ground under pavement shall be rigid steel. All conduit installed below ground, not under pavement shall be PVC. All conduits installed below ground shall be a minimum of 24 inches below the surface. Flexible, non-metallic conduit shall be used as required for transitions. Unused conduits shall be capped on both ends. Conduit containing wire or cable shall be sealed with duct seal putty. All conduits shall be accessible inside junction boxes. All above ground, exposed attachment hardware shall be galvanized or stainless steel.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Rigid Steel and PVC Conduit will be measured for payment per unit linear foot. The Department will make payment for complete, functioning, inspected, and accepted quantities. The Department will consider payment as full compensation for all work required under this section. A direct measurement will not be made for flexible, non-metallic conduit. All flexible, non-metallic conduit shall be incidental to the project

ELECTRICAL SERVICE

DESCRIPTION

The DBT will furnish, install and test the Electrical Service in accordance with the approved ITS Design Plans, in accordance with the manufactures specifications, and in adherence to the KYTC specifications and Standard Drawings and requirements.

MATERIALS

The DBT shall coordinate with the local power company to determine the exact materials for the service. This includes but is not limited to conduit, meter base, stainless steel disconnect, fused cutout, ground rod, wire, connectors, fittings and all associated hardware required to construct the service. All connections shall be coated with Nolox or similar to prevent corrosion.

INSTALLATION

The DBT shall coordinate with the local power company for the exact location of the service. This item also includes all electrical inspection and other fees required to provide electrical service.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Electrical Service will be measured for payment per unit each. The Department will make payment for complete, functioning, inspected, and accepted quantities. The Department will consider payment as full compensation for all work required under this section.

MODEL 334 AND 336 ENCLOSURES

DESCRIPTION

The DBT will furnish and install Enclosures at each site indicated in the approved ITS Design Plans, in accordance with the manufactures specifications, and in adherence to the KYTC specifications and Standard Drawings and requirements. A typical drawing is available to the DBT for reference.

MATERIALS

The two types of enclosures are Model 336 (36" H x 24" W x 22" D) and Model 334 (66" H x 24" W x 30" D). All enclosures used on this project shall be one of the two models and as specified in the approved plans. The enclosures shall include: all mounting accessories, front and back access doors, ventilation, locking system, handles, door stops, rack assembly, light(s), shelves, drawer, and all required peripherals per the requirements of the contract documents and per the equipment submitted by the DBT. **The DBT shall provide a cabinet, wiring, and all components that are approved as an assembly. This approved assembly shall be incidental to this item. Verification that the cabinet, wiring, and all components are an approved assembly shall be submitted to Central Office Traffic Operations and TRIMARC.**

This item includes all excavation and any special equipment required to install the enclosure on a pole or structure for a Model 336 enclosure or construct the concrete base for a Model 334 enclosure.

The DBT shall ensure that **all components/devices fit properly** in the respective cabinets and that the closing of doors is not impeded, prior to purchase.

The DBT shall provide a terminal facility harness by means of mating "MS" type connectors for interconnections of the field equipment specified. All cabinets of the same type shall be identical in size, shape and quality. In addition, the cabinets shall be equipped internally as specified herein and as required to suit the specific equipment specified on the plans.

Cabinets shall be of welded construction, using 0.125" minimum thickness 5052H32 or equivalent sheet aluminum. The equipment design shall utilize the latest available techniques, minimum number of different parts, subassemblies, circuits, cards and/or modules to maximize standardization and commonality.

Cabinets shall be provided with fully wired back and side panels with all necessary terminal boards, wiring harnesses, connectors and attachment hardware. All equipment shall be shelf or 19" rack mounted. Terminals and panel facilities shall be installed on the lower portion of the cabinet walls below all shelves.

Each field cabinet shall, at a minimum, be supplied with the following:

- Fan and Thermostat
- Left Side Power Distribution Panel
- Air Filter
- Adjustable Shelves (1-4 as needed for equipment submitted by the DBT)
- Back Panel
- Right Side Panel
- Locking System
- Ground Bus (2)
- Terminal Blocks
- Duplex power outlet
- Drawer that slides out for supporting a laptop computer
- External heat shields
- All necessary installation and mounting hardware

All external screws, nuts and locking washers shall be stainless steel; no self-tapping screws are permitted unless specifically approved by the Engineer. All screws, nuts and locking washers used internally shall be manufactured from corrosion resistant materials.

All parts of the cabinet shall be cleaned, smoothed and free from flaws, cracks, dents and other imperfections. The cabinet shall be rigidly constructed to provide vibration free operation of the field equipment when installed. The cabinets shall be dust and rain tight and capable of maintaining a dry internal condition when subject to rain and wind gusts.

All components shall be made of corrosion resistant materials such as plastic, stainless steel, aluminum or brass; or shall be treated with corrosion resistance such as cadmium plating or galvanizing. All materials shall be resistant to fungus growth and moisture deterioration.

Individual cabinet components shall be pre-assembled upon installation in the cabinet such that the components can be easily replaced in the field. Modules of unlike function shall be mechanically keyed to prevent insertion into the wrong socket or connector.

Panels shall be designed to mount in the cabinet on mounting studs. It shall not be necessary to remove the panel to replace any panel-mounted equipment. The panels shall be capable of supporting specified equipment mounted on the panel. A lower input termination panel shall be provided to terminate all input field wires.

Electronic components shall meet the requirements contained herein and shall, at a minimum, comply with EIA Specifications. No component shall be of such design, fabrication, nomenclature or other identification as to preclude the purchase of said component from a wholesale electronics distributor or from the component manufacturer.

Components shall be down-rated by 50 percent with regard to ambient temperature, applied voltage, and power dissipation. All circuits shall be designed for reliability and maximum performance.

The design life of all components, under continuous operating conditions in their circuit application, shall be a minimum of ten years.

Each component shall meet all of its specified performance requirements when the input power is AC, 60 Hz, single phase, 120 volts +/- 20 volts. The equipment shall be designed such that the failure of a particular piece of equipment will not cause the failure of any other.

The cabinets shall be furnished with a power distribution panel mounted on the lower left hand inside wall when facing the front of the cabinet. This panel shall include a 115 VAC, convenience, dual outlet with integral ground fault interrupt protected by a circuit breaker. The left panel shall have:

- Circuit Breaker(s)
- Radio Interference Suppressor
- Power Cable Input and Junction Terminals

Circuit breakers shall be approved and listed by UL. Each cabinet shall have, at a minimum, a circuit breaker to protect the lamp, vent fan, and dual outlet. In addition, a properly rated equipment circuit breaker(s) shall be provided for the equipment shown on the plans. At each cabinet that houses VMS control equipment, a 220 VAC circuit breaker, sized to suit the cables that provide power to the VMS pixels shall be furnished and installed. Breakers shall have a minimum interrupt capacity of 50 amperes.

Each cabinet shall be equipped with a radio interference suppressor installed at the circuit breaker. The suppressor shall provide a minimum attenuation of 50 dB over a frequency range of 200 kHz to 75 MHz. The suppressor shall be hermetically sealed in a case filled with a suitable insulation compound.

The suppressor terminals shall be nickel-plated, with brass studs of sufficient external length to provide space for connection of two appropriately sized conductors and shall be mounted such that the terminals cannot be turned in the case. The suppressors shall be designed for operation at the proper current ampere rating as determined by the DBT per the equipment specified on the plans and shall be approved by UL and EIA.

Power distribution blocks suitable for use as a power feed and junction points shall be furnished and installed for two and three wire circuits. The line side of each circuit shall be capable of handling the specified number of and size of all wires.

Each cabinet shall include a fully wired equipment panel mounted on the lower rear inside of the wall of the cabinet. The back panel shall be utilized to distribute and properly interconnect all cabinet wiring related to the specific equipment. Each piece of equipment specified shall have its cable harness properly connected at terminal boards on the back panel. All functions available at the equipment connector shall be carried in the connector cable harness to a terminal board point on the back panel.

Wiring shall be provided for the equipment specified. All cabinet wiring, where connected to terminal strips, switches, radio interference suppressor, etc., shall be identified by the use of insulated pre-printed sleeving (wire markers) slipped over the wire before attachment of the lug or terminating the connection. The wire markers shall have a text label with sufficient detail so that a translating sheet is not required.

All wires shall be cut to the proper length before assembly. No wires shall be doubled back to take up slack. Wires shall be neatly secured with nylon lacing or cable ties. Cables shall be secured with nylon cable clamps.

The grounded side of the electric service shall be carried throughout the cabinet to the ground bus without a break.

All electrical connections in the cabinet shall have sufficient clearance between each terminal and the cabinet to prevent a leakage path or physical contact under stress. Where these distances cannot be maintained, barriers must be provided. All equipment grounds shall run directly and independently to the ground bus. The lay of the interconnect cable between the components must be such that when the door is closed, it does not press against the cables or force the cables against the various components inside the cabinet. Sufficient length of cable harnesses shall be provided to easily reach the electronic equipment placed anywhere on the shelves.

All wiring containing line voltage AC shall be routed and bundled separately and/or shielded from all low voltage (i.e. control) circuits. All conductors and live terminals or parts, which could be hazardous to maintenance personnel, shall be covered with suitable insulating materials.

All conductors used in the cabinet wiring shall be 22 AWG or larger with a minimum of 19 strands. The insulation shall have a minimum thickness of 10 MILS. All wiring containing line voltage shall be 14 AWG or larger.

The AC+, AC-, and equipment ground wiring shall be electrically isolated from the other by an insulation resistance of at least 10 Megohms when measured at 250 VAC. Return and equipment grounding wiring shall be color-coded white and green respectively.

Terminal blocks located on the panels shall be accessible such that it shall not be necessary to remove the electronic equipment from the cabinet to make a connection or perform an inspection.

Terminal blocks shall be two-position, multiple-pole, and barrier type. Shorting bars, along with integral marking strip, shall be provided. Terminal blocks shall be arranged such that

they do not impede the entrance, training, or connection of incoming field conductors. All terminals shall be identified by legends permanently attached to the terminal blocks. Not more than three conductors shall be brought to any one terminal screw. No electrically live parts shall extend beyond the protection afforded by the barriers. All terminal blocks shall be located below the shelves.

AC terminal blocks shall be Underwriter's Laboratory approved for 600 volts AC minimum and shall be suitable for outdoor use. Terminals used for field connections or interwiring connections shall secure conductors by means of a nickel or cadmium plated brass binder head screw.

All connections to and from the electronic equipment shall terminate at an interwiring block. These blocks shall act as intermediate connection points for all electronic equipment inputs and outputs.

A varistor shall be installed across the thermostat used to control the fan to act as a surge and transient noise suppressor. The varistor shall be GE VI5OLAIOA, Stetron 250NRO7-1, Siemens SIOK150, or approved equal.

MOUNTING

Model 336 cabinets shall be pole mounted or mounted to an existing concrete wall as specified. Model 334 cabinets shall be mounted on a poured concrete base or on existing concrete surfaces as specified. All holes drilled into existing concrete surfaces shall penetrate the concrete no more than 4 inches unless otherwise approved by the Engineer. Bolts inserted into any concrete surface shall be properly secured and epoxied, per manufacturer's recommendations. Prefabricated fiberglass bases used in lieu of poured concrete bases must be approved by the Engineer. Cabinet installation shall conform to the details shown. All cabinets shall be furnished with stainless steel mounting plates, nuts, bolts, washers and all other necessary hardware to mount the cabinet as shown or described.

DOORS

All cabinets shall be provided with doors in the front and back. Doors shall have secure gaskets to prevent the entrance of dust and moisture. Doors shall be sized to encompass the full area of the cabinet opening. Doors shall be provided with two stop positions to hold the door open at 90 degrees and 135 degrees. The stops shall hold the door securely open until released manually. The front door shall be hinged on the right-hand side by means of three butt hinges with 1/4" minimum stainless steel hinge pins.

VENTILATION

Cabinets shall be furnished with louvers properly designed to provide natural ventilation to the interior. The louver area shall be of sufficient size to permit the free flow of air corresponding to the rated capacity of the associated cabinet fan. A pleated media fiber filter shall be provided and shall cover all louvers.

Cabinets shall be furnished with an electric, thermostatically-controlled ventilation fan or fans mounted in the cabinet. The fan(s) shall have a rated capacity of at least 200 cubic feet per minute. The fan and cabinet ventilation louvers shall be located with respect to each

other so as to direct the bulk of the air flow throughout the entire cabinet and, in particular, over the field equipment units. The thermostat shall be adjustable to turn on between 90 degrees and 120 degrees Fahrenheit.

LOCKING SYSTEM

Each door shall be furnished with a 3-point positive locking system. The lock for the door shall be a self-locking, heavy-duty, five-pin tumbler cylinder rim type. The handles shall be made of stainless steel and shall be provided with a padlock feature. Locks shall be keyed identically to Corbin #2. Two keys shall be provided for each cabinet.

LIGHT

A fluorescent light shall be provided in front for all cabinets and also in the back for Model 334 cabinets. A panel mounted 40-Watt weatherproof incandescent lamp with an on-off switch shall be positioned to provide light to the face of the equipment installed in the cabinet.

SHELF/DRAWER/RACK

A removable 19" EIA rack shall be provided for mounting sub-assemblies in Model 334 cabinet. Adjustable shelves shall be provided to hold the equipment. Vertical shelf adjustment intervals shall be 2" maximum. The shelves shall be positioned from the top of the cabinet in accordance with the actual equipment configuration of the particular cabinet. All devices/sub-assemblies shall be mounted on the rack if possible. Otherwise, they shall be placed on the shelves.

A sliding drawer shall be provided in each cabinet. The drawer shall be installed below the shelves in a suitable position for placement of a laptop computer. The drawer shall have a nominal depth of 1" and a hinged lid.

LABELING

The letters "KYTC ITS" shall be permanently displayed along the top of each door on the outside of each cabinet. The letters shall be a minimum of 1" tall. The letters shall be die-cut or engraved into the metal before galvanizing and shall be readable after galvanizing. All excess galvanizing shall be brushed off. The location and description of the label must be shown on the shop plan submittal for the cabinets. Stenciling with paint or other markers is not permitted. If required information is placed on a steel plate, the plate must match the surface profile of the cabinet. The plate must then be welded completely around the plate before galvanizing.

QUALITY ASSURANCE PROVISIONS

The following water spray test shall be performed on each empty cabinet: Water shall be sprayed from a point directly overhead at an angle of 60° from the vertical axis of the cabinet. This procedure shall be repeated for each of eight equally spaced positions around the cabinet for a period of not less than five minutes in each position. The water shall be sprayed using a domestic type-sprinkling nozzle at a rate of not less than one gallon per minute per square foot of the cabinet's surface area. The cabinet shall then be inspected for leakage. Evidence of water leakage shall be cause for rejection.

A manufacturer's certification of successful completion of the water spray test and that the cabinet conforms to these specifications shall be the basis of acceptance of the cabinet. Separate submission of test cabinets shall not be required.

MAINTENANCE

All components and assemblies shall be clearly identified with name, model number, serial number and any other pertinent information required to facilitate equipment maintenance.

All equipment shall be designed for ease of installation and maintenance. Location, accessibility, serviceability and features that will lead to simplified maintenance shall be a prime consideration. All component parts shall be readily accessible for inspection and maintenance. The only tools and test instruments required by maintenance personnel shall be simple hand tools and basic meters.

After the wiring is complete, all conduit penetrations into the cabinets shall be sealed in such a manner as to prevent rodents and insects from entering the cabinet. The conduit sealants and insect traps used shall be approved by the Engineer prior to installation.

DOCUMENTATION

Each field cabinet shall be supplied with three copies of the final cabinet wiring diagram. One copy shall be placed in a clear plastic envelope and left in the cabinet drawer. Two copies of Mylar reproductions shall be delivered to the Engineer.

INSTALLATION

Model 334 Enclosure shall be installed in accordance with the approved design plans and specifications and in adherence to KYTC requirements. The Advanced Grounding System shall be installed at each site location requiring a 334 Enclosure or CCTV pole and pole base. The DBT shall stake all proposed enclosure locations during the field visits by the DBT, TRIMARC Engineer and a representative from the KYTC Division of Traffic Operations, Design Services Branch or the Engineer and shall obtain approval of staked locations before excavation. The DBT shall have all utilities marked in the field prior to requesting field visits with KYTC and TRIMARC. The DBT shall allow two weeks to schedule this location visits and approval with KYTC and TRIMARC. KYTC and TRIMARC approval of field device locations does not relieve the DBT from his responsibility to repair any damage incurred during construction. Enclosures located behind guardrail shall have minimum 5 foot spacing from edge of pole to face of guardrail. Otherwise, enclosures shall be located as specified and a minimum of 30' from all driving lanes. All materials shall be installed in a neat and professional manner. The DBT shall grade and re-seed all disturbed areas to the satisfaction of the Engineer.

The DBT will provide a standard equipment layout drawing for each type of cabinet to be approved by the Engineer prior to installation.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Model 334 Enclosure will be measured for payment per unit each. The Department will make payment for complete, functioning, inspected, and accepted quantities. The Department will consider payment as full compensation for all work required under this section.

JUNCTION BOX

DESCRIPTION

The DBT will furnish and install JUNCTION BOX as indicated in the approved ITS Design Plans, in accordance with the manufactures specifications, and in adherence to the KYTC specifications and Standard Drawings and requirements.

MATERIALS

Junction box shall meet or exceed ANSI/SCTE 77-2002, tier 22. Junction box covers shall be marked "KYTC ITS COMM. Or "KYTC ITS ELEC" Covers shall be attached with a minimum of two 3/8" stainless steel hex bolts.

INSTALLATION

Where required, junction box shall be oriented such that the dimensions comply with the NEC. Junction boxes used as pull boxes along a conduit run shall be spaced at a maximum of 250'. Junction boxes shall not be placed in ditch lines or in areas where standing water may accumulate. Junction box covers shall be flush with the finished surface. All conduits shall be marked in the junction box to show the directions (to device or to service). The DBT shall restore and reseed all disturbed areas to the satisfaction of the Engineer.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Junction Box will be measured for payment per unit each. The Department will make payment for complete, functioning, inspected, and accepted quantities. The Department will consider payment as full compensation for all work required under this section.

SURGE DEVICES

DESCRIPTION

The DBT shall furnish and install video surge device, data surge device, power surge device, and RF surge device at each equipment location in accordance with the approved ITS Design Plans, in accordance with the manufactures specifications, and in adherence to the KYTC specifications and Standard Drawings and requirements.

MATERIALS

GENERAL

Each surge device shall be compatible with the equipment it is protecting. Each surge device shall include cables, connectors, power supplies, and all incidentals required for operation.

VIDEO SIGNAL COAX CONDUCTOR SURGE DEVICE

Video Signal Coax Conductor Surge Device shall be EDCO CX12-BNC-Y or approved equal. This surge protector shall:

- Have a clamping voltage response time of less than one nanosecond
- Have a maximum clamping voltage of 12 volts when subjected to a 3 kA, 8x20 microsecond wave
- Have a peak surge current of 20kA with 8x20 microsecond wave
- Have BNC connectors
- Pass signals from DC to 80 MHz with less than 3 dB insertion losses
- Be UL 497B listed

DATA SIGNAL CONDUCTOR SURGE DEVICE

Data Signal Conductor Surge Device shall be for RS 422 and RS 485 Communication conductors shall be EDCO PC642C-015 or approved equal. This surge protector shall:

- Have a clamping voltage response time of less than one nanosecond
- Have a maximum clamping voltage of 12 volts when subjected to a 1 kA 8x20 microsecond wave
- Have a peak surge current per wire of 10 kA with 8x20 microsecond wave
- Have a maximum inline resistance of 6 ohms
- Have a maximum attenuation of -3db at 50MHz

RS 232 COMMUNICATION DATA SIGNAL CONDUCTOR SURGE DEVICE

Data Signal Conductor Surge Device for RS 232 Communication conductors shall be EDCO PC642C-015 or approved equal. This surge protector shall:

- Have a clamping voltage response time of less than one nanosecond
- Have a maximum clamping voltage of 30 volts when subjected to a 1 kA 8x20 microsecond wave
- Have a peak surge current per wire of 3kA with 8x20 microsecond wave

- Have a maximum inline resistance of 6 ohms
- Have a maximum attenuation of -3 db at 0.5 MHz

100 BASE-T AND 10 BASE-T COMMUNICATION DATA SIGNAL CONDUCTOR SURGE DEVICE

Data Signal Conductor Surge Device for 100BaseT and 10BaseT Communication conductors shall be EDCO LCDP-30 or approved equal. This surge protector shall:

- Have a clamping voltage response time of less than one nanosecond
- Have a maximum clamping voltage of 30 volts when subjected to a 0.5 kA 8x20 microsecond wave
- Have a peak surge current per wire shall be 1kA with 8x20 microsecond wave
- Have a maximum attenuation shall be -3db at 100 MHz
- Have a N.E.X.T. worst pair of better than -40 db at 100 MHz
- Have a maximum attenuation of -3db at 0.5 MHz

POWER CONDUCTOR SURGE DEVICE

Conductor Surge Device for power carrying conductors shall be EDCO SHA-1210 or approved equal. This surge protector shall meet or exceed the following specifications:

- Nominal Line Voltage 120 V
- Peak Current 20,000 Amps
- Clamp Voltage 280 volt typical @ 20kA
- Response time <5ns
- Continuous Service Current 10 Amps max. 120 VAC, 60 Hz

RF ANTENNA COAX CONDUCTOR SURGE DEVICE

RF Antenna Coax Conductor Surge Devices shall meet all manufacturer recommendations for the particular use of the radio antenna coax conductors.

INSTALLATION

The DBT shall supply surge devices in model 334/336 enclosures, VMS signs, on poles, and on sign trusses as specified on layout sheets. Surge devices shall be located in said equipment such that they are easily accessible for maintenance activities.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Surge Device will be measured for payment per unit each. The Department will make payment for complete, functioning, inspected, and accepted quantities. The Department will consider payment as full compensation for all work required under this section.

TRENCHING AND BACKFILLING

DESCRIPTION

The DBT shall perform Trenching and Backfilling in accordance with the approved ITS Design Plans, in accordance with the manufactures specifications, and in adherence to the KYTC specifications and Standard Drawings and requirements.

MATERIALS

All trenches shall be marked with underground utility warning tape. All trenches containing fiber optic conduit/cables must have an approved trace wire or similar device installed to facilitate future locating of the conduit and cables.

INSTALLATION

The DBT shall be responsible for locating all underground utilities prior to excavation. The DBT shall excavate the trench, place warning tape above the conduit, backfill the trench, reseed, and restore all disturbed areas to the satisfaction of the Engineer. Backfill material shall be placed and compacted in lifts of 9 inches or less. Incidental to this item is any Bore and jack under existing roadway.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Trenching and Backfilling will be measured for payment per unit linear foot. The Department will make payment for complete, inspected, and accepted quantities. The Department will consider payment as full compensation for all work required under this section.

PORTABLE WINCH LOWERING TOOL

DESCRIPTION

The DBT shall furnish and use during installation Portable Winch Lowering Tool in accordance with the approved ITS Design Plans, specifications and Standard Drawings and in adherence to KYTC requirements.

MATERIALS

Portable winch lowering tool shall be made of durable and corrosion resistant materials, powder coated, galvanized, or otherwise protected from the environment by industry-accepted coatings to withstand exposure to a corrosive environment. The tool shall consist of a lightweight metal frame and winch assembly with cable as described herein, a quick release cable connector, an adjustable safety clutch and a variable-speed, industrial-duty, electric drill motor. The tool shall be compatible with the winch accessible through the hand hole of the pole. When attached to the winch, the tool shall support itself and the load assuring raising/lowering operations and provide a means to prevent freewheeling when loaded. The tool shall have a reduction gear to reduce the manual effort required to operate the lifting handle to raise/lower a capacity load. The tool shall be provided with an adapter for operating the lowering device by a portable drill using a clutch mechanism. The tool shall be equipped with a positive locking mechanism to secure the cable reel during raising/lowering operations.

INSTALLATION

As long as internal winches are provided in the poles provide with this Project, this device is not required to be provided. Upon completion and acceptance of the CCTV site and Lowering Device, the Portable Winch Lowering Tools shall be delivered to TRIMARC. **Only Projects where new poles do not have a built in winch require a portable winch lowering tool be procured and delivered.**

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Portable Winch Lowering Tool will be measured for payment per unit each. The Department will make payment for complete, functioning, inspected, and accepted quantities. The Department will consider payment as full compensation for all work required under this section.

ELECTRICAL WIRE AND CABLE

DESCRIPTION

The DBT shall furnish and install Wire and Cable in accordance with the approved ITS Design Plans, in accordance with the manufactures specifications, and in adherence to the KYTC specifications and Standard Drawings and requirements.

MATERIALS

Unless otherwise specified, wire shall be stranded copper type USE. This item shall include all connectors, splicing and insulating hardware, ties, tape, labels and incidentals required for electrical connections. All connections shall be coated with NoloX to prevent corrosion. The DBT shall submit to material testing at the discretion of the Engineer.

INSTALLATION

The DBT shall install all cable or wire runs splice-free from the controller/service location to each cabinet, VMS sign, or CCTV camera the cable or wire is feeding. All wire shall be labeled inside cabinets and junction boxes. The DBT shall not use excessive force when pulling wire through duct. The DBT shall replace all wire damaged during installation. The Engineer may require testing of wiring for damaged insulation. Wire that does not pass an insulation resistance test of a minimum of 100 hundred megaohms to ground shall be replaced by the DBT at his cost.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Wire and cable will be measured for payment per unit linear foot. The Department will make payment for complete, functioning, inspected, and accepted quantities. The Department will consider payment as full compensation for all work required under this section.

WOOD POLE FOR UTILITY SERVICE

DESCRIPTION

The DBT will furnish and install Wood Poles as indicated in the approved ITS Design Plans, in accordance with the manufactures specifications, and in adherence to the KYTC specifications and Standard Drawings and requirements. Other service poles or pedestals required, or desired, to achieve aesthetic improvements will be considered by the Engineer as needed.

MATERIALS

Wood poles shall be 35' in height unless otherwise specified. This item includes furnishing and installing all hardware, messenger, clamps, guy guards, pole butt grounding system, and anchors required to back up service wires or spans.

INSTALLATION

The DBT shall stake all proposed pole base locations coordinated with LG&E in KY and Duke Energy in Southern Indiana, and shall obtain approval of staked locations before excavation. The KYTC or TRIMARC Engineer, will approve locations for all wood poles. The DBT shall have utilities marked in the field prior to requesting approval. The DBT shall allow two weeks to schedule this location approval. KYTC approval of field device location does not relieve the DBT from his responsibility to avoid utilities and repair any damage to buried infrastructure. Poles located behind guardrail shall have a minimum 5' spacing from edge of pole to face of guardrail. Otherwise, poles shall be located a minimum of 30' from all driving lanes. The DBT shall restore all disturbed areas to the satisfaction of the Engineer. Wood poles shall have a butt ground and 4 AWG solid copper ground wire installed. Ground wire shall extend 1 foot above pole. All metal conduits on pole shall be bonded to the ground wire with the proper connectors. Labor and equipment to install pole in any type of soil condition will be required for installation.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Wood Pole will be measured for payment per unit each. The Department will make payment for complete, functioning, inspected, and accepted quantities. The Department will consider payment as full compensation for all work required under this section.

ITS FIELD UPS (RACK MOUNTED UPS)

DESCRIPTION

The DBT shall furnish and install Rack Mounted UPS in accordance with the approved ITS Design Plans, in accordance with the manufactures specifications, and in adherence to the KYTC specifications and Standard Drawings and requirements.

MATERIALS

All Rack Mounted UPS shall be supplied from a single manufacturer. UPS equipment shall be APC Smart UPS 1500VA SMX1500RM2UNC including AP9631 or approved equal. For detail specifications go to this URL:

<https://www.apc.com/shop/us/en/products/APC-Smart-UPS-X-1500VA-Rack-Tower-LCD-120V/P-SMX1500RM2UNC>

The supplied UPS shall meet the following requirements:

- UPS
- Rack-mountable
- 1500 VA power capacity
- 1500 VA power capacity
- 5.8 min battery run time (up to)

- 1200 Watt power provided
- AC 120 V
- 3 year warranty
- Eight power and surge protected outlets
- Three switchable outlet groups for individual load management
- Pure sine wave output while on battery
- Ability to add external battery packs for extended runtime
- Preinstalled Network Management Card to remote manage the UPS
- \$150,000 equipment protection policy

Technical Specifications

Output

- Output Power Capacity: 1200 Watts / 1440VA
- Max Configurable Power: 1200 Watts / 1440VA
- Nominal Output Voltage: 120V
- Output Voltage Distortion: Less than 5% at full load
- Output Frequency (sync to mains): 50/60Hz +/- 3Hz (auto sensing)
- Topology: Line interactive
- Waveform Type: Sine Wave
- Output Connections: (8) NEMA 5-15R

Input

- Nominal Input Voltage: 120V
- Input Frequency: 50/60Hz +/- 3Hz (auto sensing)
- Input Connections: NEMA 5-15P
- Cord Length: 2.44 meters
- Input Voltage Range for Main Operations: 82 - 143V
- Input Voltage Adjustable Range for Mains Operation: 75 - 154V

Batteries & Runtime

- Battery Type: Maintenance-free sealed Lead-Acid battery with suspended electrolyte, leakproof
- Typical Recharge Time¹ : 3 hour(s)
- RBC Quantity: 1

Communications & Management

- Interface Port(s): RJ-45 Serial, USB
- Control Panel: Multi-function LCD status and control console
- Audible Alarm: Alarm when on battery, distinctive low battery alarm, overload continuous tone alarm

Surge Protection & Filtering

- Surge Energy Rating: 600 Joules
- Filtering: Full time multi-pole noise filtering, 5% IEEE surge let-through, zero clamping response time, meets UL 1449

INSTALLATION

The DBT shall install Rack Mounted UPS in all 334 and 336 Enclosures. All equipment shall be mounted within designated enclosures. The DBT shall coordinate with TRIMARC personnel for connection and setup.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Rack Mounted UPS will be measured for payment per unit each. The Department will make payment for complete, functioning, inspected, and accepted quantities. The Department will consider payment as full compensation for all work required under this section.

GLOSSARY

The following acronyms, abbreviations, and definitions shall govern this specification:

- AASHTO – American Association of State Highway and Transportation Officials
- ABS - Acrylonitrile Butadiene Styrene
- AC – Alternating Current
- AlInGaP – Aluminum Indium Gallium Phosphide (refers to the chemical composition of an LED).
- ANSI – American National Standards Institute
- ASCII – American Standard Code for Information Interchange
- ASN.1 – Abstract Syntax Notation 1
- ASTM – American Society for Testing and Materials
- AWG - American Wire Gauge
- AWS – American Welding Society
- BCD – Binary Coded Decimal
- B frames – Bi-directional Predicted Frames
- BGP – Border Gateway Protocol
- Bin – Group of LEDs categorized and sorted by intensity or color. Each bin has upper and lower intensity or color specifications and contains only LEDs that are measured to be within that range. LED manufacturers sort LEDs into bins to ensure consistent intensity and color properties.
- BOOTP – Bootstrap Protocol
- CALTRANS – California Department of Transportation
- CAN – Control Area Network
- CCTV – Closed Circuit Television
- CDPD – Cellular Digital Packet Data
- CLI – Command Line Interface
- CNC – Computer Network Control
- Control Computer – A desktop or laptop computer used in conjunction with VMS control software to communicate with VMS sign controllers. The control computer

can instruct a VMS sign controller to program and control the VMS, monitor VMS status, and run VMS diagnostic tests. A control computer can be used for remote control of one or more VMS, as well as for local control of a single VMS

- DBT – Design Build Team contract member or designate
- DC – Direct Current
- DHCP – Dynamic Host Configuration Protocol
- DMS – Dynamic Message Sign. An industry term that applies to various types of changeable sign technology
- DVI-D – Digital Visual Interface - Digital
- EIA – Electronic Industries Association
- ELFEXT – Equal Level Far End Crosstalk
- EPA – Effective Projected Area
- FCC – Federal Communications Commission
- FDA – Food and Drug Administration
- Font – The style and shape of alphanumeric characters that are displayed on the VMS matrix to create messages viewed by motorists and travelers
- Frame – see *Page*
- FSORS – Full, Standardized Object Range Support – an NTCIP term. See the NTCIP standards for additional information.
- GUI – Graphical User Interface
- HDPE – High Density Polyethylene
- HHR – Half Horizontal Resolution
- HTTP – Hypertext Transfer Protocol
- IEEE – Institute of Electrical and Electronic Engineers
- I frames – Intra-frames
- IC – Integrated Circuit
- IGMP - Internet Group Management Protocol
- InGaAlP – Indium Gallium Aluminum Phosphide
- I/O – Input/Output
- IP – Internet Protocol – in transceivers
- IRE – Institute of Radio Engineers
- ISO – International Organization for Standardization
- ITE – Institute of Transportation Engineers
- ITS – Intelligent Transportation System
- Kbps – Kilobits per second
- KYTC – Kentucky Transportation Cabinet
- LAN – Local Area Network
- LCD – Liquid Crystal Display
- LED – Light Emitting Diode
- MDPE – Medium Density Polyethylene
- Message – Information displayed on the VMS for the purpose of visually communicating with motorists. A VMS message can consist of one or more pages of data that are displayed consecutively

- MIB – Management Information Base
- Module – Assembly consisting of a two-dimensional LED pixel array, pixel drive circuitry, and mounting hardware. Modules are installed in the display adjacent to each other to form the display matrix.
- MTBF – Mean Time Between Failures
- MPEG – Moving Picture Experts Group
- NEC – National Electrical Code
- NEMA – National Electrical Manufacturers Association
- NESC – National Electrical Safety Code
- NEXT – Near End Crosstalk
- NCHRP – National Cooperative Highway Research Program
- NRZ – Non Return to Zero
- NRZI – Non Return to Zero Inverted
- NTCIP – National Transportation Communications for ITS Protocol
- NTSC - National Transmission Standards Committee
- Object – An NTCIP term referring to an element of data in an NTCIP-compatible device that can be manipulated to control or monitor the device.
- OER – Octet Encoding Rules
- OSHA – Occupational Safety and Health Administration
- OTDR – Optical Time Domain Reflectometer
- Page – An NTCIP term referring to the data that is displayed on the VMS display matrix at a given moment in time. Also referred to as a frame.
- P frames – Forward Predicted Frames
- PCB – Printed Circuit Board
- Pixel – Picture element. The smallest changeable (programmable) portion of a VMS display matrix
- PMPP – Point to Multi-Point Protocol
- PPP – Point to Point Protocol
- PSELFEXT – Power Sum Equal Level Far End Cross Talk
- PSNEXT – Power Sum Near End Crosstalk
- PTZ – Pan/Tilt/Zoom
- PVC – Polyvinyl Chloride
- PWM – Pulse Width Modulation
- QSIF – Quarter Source Input Format
- RAM – Random Access Memory
- RARP – Reverse Address Resolution Protocol
- RGB – Red-Green-Blue
- Schedule – A set of data that determines the time and date when a VMS sign controller will cause a stored message to be displayed on the VMS
- SDRAM – Synchronous Dynamic Random Access Memory
- SIF – Source Input Format
- SNMP – Simple Network Management Protocol
- STMP – Simple Transportation Management Framework

- Stroke – Refers to the vertical and horizontal width of the lines and curves of a display font. Single stroke denotes character segments that are one pixel wide. Double stroke denotes character segments that are two pixels wide.
- TFTP – Trivial File Transfer Protocol
- TIA - Telecommunications Industry Association
- TMA – Truck Mounted Attenuator
- TOC – Traffic Operations Center
- UL – Underwriters Laboratories
- UPS – Uninterruptible Power Supply
- USB – Universal Serial Bus
- VLAN – Virtual Local Area Network
- VMS – Variable Message Sign. A type of VMS that is fully programmable such that the content of its messages are fully changeable remotely and electronically.
- VMS Controller – A stand-alone computer that is located at a VMS site, which controls a single VMS. A sign controller receives commands from and sends information to a control computer
- WAN – Wide Area Network
- WYSIWYG – What You See Is What You Get. More specifically, what you see on the VMS control computer monitor is a scaled representation of how a message will appear when it is being displayed on the VMS. Similarly, after a pixel diagnostic test routine has been run, what you see on the control computer monitor is a scaled representation of the functional status of each pixel in the VMS display matrix.