

AMTRAK SPECIFICATION - AED-1

**PROCEDURES AND DESIGN CRITERIA TO BE
EMPLOYED BY ELECTRIFICATION CONSULTANTS
ENGAGED IN THE DESIGN OF
ELECTRIFICATION FACILITIES
ON THE
NATIONAL RAILROAD PASSENGER CORPORATION**

PREPARED BY:
AMTRAK - OFFICE OF THE DEPUTY CHIEF ENGINEER, E.T.
PHILADELPHIA, PA
(REVISED 7/2016)

TABLE OF CONTENTS

<u>CONTENTS</u>	<u>PAGE #</u>
I. QUALIFIED CONSULTANTS LIST.....	3
II. PROCEDURES.....	4
III. DESIGN DRAWINGS	5
IV. STRUCTURAL DESIGN CRITERIA.....	7
V. ELECTRICAL DESIGN CRITERIA	9
VI. CONSTRUCTION RELATED SERVICES.....	9
VII. RECORD DRAWINGS.....	10
VIII. APPROVALS	11

I. QUALIFIED CONSULTANTS LIST

- A. Amtrak maintains a list of “Qualified Electrification Consultants” for its own convenience and to facilitate the process of selecting firms to perform electrification design of Amtrak infrastructure. Consulting firms are included on Amtrak’s “Qualified” list based on the experience and knowledge of their key personnel, their past performance on electrification projects in general, and past performance on specific Amtrak projects from the prior year.
- B. **A Consultant may be removed from Amtrak’s “Qualified” List or restricted to a probationary status if the Consultant’s performance on Amtrak projects from the prior year is deemed inadequate or if it is determined that the Consultant no longer meets the requirements for inclusion as specified in paragraph “A” above.** Infractions resulting in a probationary status include design deficiencies, consistent inability to maintain schedule, and/or lack of Quality Control. Infractions resulting in removal from Amtrak’s “Qualified” List include design errors resulting in significant construction failures, consistent failure to take direction from Amtrak E.T., unethical management of Amtrak funds, and/or unsatisfactory performance during a probation year.
- C. A Consultant may be included on the “Qualified” list but restricted to a probationary status pending successful performance and completion of an Amtrak Electrification Project. Consultants in a probationary status are limited to the following types of electrification projects:
 - 1. Electrification modifications of Overhead Bridges
 - 2. Electrification modifications of New/Modified Passenger Stations
 - 3. Design of individual Catenary Structure Replacements/Repairs
 - 4. Line Design Support for Substations/Frequency Converters
 - 5. Other work as individually approved by Amtrak E.T.
- D. Refer to the Substation Design Qualified Consultants List for projects involving substations or frequency converters. All Right of Way structures carrying transmission, catenary, or signal power circuits included in substation or frequency converter projects will need to be designed by a consultant on the Electrification Qualified List.
- E. Application for inclusion on Amtrak’s “Qualified Electrification Consultants” list shall be submitted in writing and electronically to:

J. Pardini
Senior Manager, E.T. Design
National Railroad Passenger Corporation 30th Street Station, 4th Floor - South Tower
Philadelphia, PA 19104

Applications shall be in the form of a letter of interest and shall have attached the following information:

- 1. Key Personnel and their qualifications.
- 2. Past and current electrification projects (other than Amtrak) with the names and telephone numbers of their clients.

- 3. Past and current Amtrak electrification projects, including lessons learned from each.
- F. Consultants must re-apply for inclusion on Amtrak's Electrification Qualified List each calendar year. Submissions must be made prior to October 1st of the preceding year in order to be considered. Yearly submissions are not required for the Substation Design Qualified List.
- G. Consultants will be informed of their Acceptance or Removal in October of each year.

II. PROCEDURES

- A. Whenever the Term “Engineer” is used in this specification, it shall mean the Deputy Chief Engineer, E.T. of Amtrak or an authorized representative.
- B. Upon receipt of notice to proceed with design work, the Electrification Consultant shall so inform the Senior Manager, E.T. Design of Amtrak, and shall also provide the name of the Consultants Personnel responsible for the project management. Any changes in the Electrification Consultant’s key personnel shall be approved by the Senior Manager, E.T. Design.
- C. Consultant’s personnel, before entering Railroad property, shall complete Amtrak’s Contractor’s Safety Class.
- D. Prior to proceeding with the final design, the Consultant shall submit to Amtrak, for review and discussion, preliminary conceptual plans for the proposed electrification modifications. This is especially important in work involving changes to the catenary configuration, sectionalizing, transmission lines, and signal power lines. The plans shall indicate the preliminary design concepts in sufficient detail for Amtrak design personnel to provide definitive direction in which to proceed with the design.

In conjunction with the conceptual submission, a field meeting shall be held between representatives of the Electrification Consultant and Amtrak’s E.T. Design and Construction Departments to evaluate alternatives and establish an acceptable conceptual plan.

Following approval of the conceptual plans, submissions at the 30%, 60%, 90%, and final level, shall be provided for Amtrak’s review and comment per the agreed upon schedule of submissions. Design calculations shall be submitted at all levels of submissions. The Electrification Consultant shall also provide an electrification cost breakdown at the 60% level and upon submission of final plans. Unless otherwise directed, submittals shall be sent to the attention of the Engineer.

- E. It shall be the responsibility of the Consultant to verify the information contained on Amtrak record drawings pertaining to the project work by on-site inspection.
- F. It shall be the responsibility of the Electrification Consultant to perform exploratory trenching to establish all underground Amtrak facilities such as ducts, pipes, and footings in all areas that excavation is required by the design. Hand dug exploratory trenches shall be as described in Section IV of this specification.
- G. Final drawings, specifications, and calculations shall be submitted to Amtrak for approval prior to being issued for bidding or construction. Each drawing shall bear the stamp of a Professional Engineer, registered in the state in which the work will be performed.

- H. Unless otherwise instructed, the Consultant shall utilize the current standard Amtrak structural, catenary, and electrical details and materials in the design of the project.
- I. The Electrification Consultant shall be responsible for review of all shop and manufacturer's drawings for all structures, catenary material, and/or electrical equipment designed or specified by the Consultant in connection with the project.

III. DESIGN DRAWINGS

The design drawings prepared by the Consultant for the proposed electrification system modifications shall include, but not be limited to the following, and shall be arranged as described below.

- A. The first drawing of the design set shall be a location plan sheet. The drawing shall contain, in addition to a plan of construction limits (scale not less than 1" = 100') the following information:
 - 1) General notes - steel, concrete, excavation, etc.
 - 2) List of abbreviations used.
 - 3) Division of work and material supply schedule.
 - 4) List of reference drawings.
 - 5) List of design drawings in set.
 - 6) Construction sequence.
- B. The next plan sheet shall be a profile drawing indicating the modifications to existing overhead conductors (other than catenary) if required, and the relationship of the proposed construction to existing facilities. This profile drawing shall be drawn to a vertical scale 1" = 20' and a horizontal scale of 1" = 100'.
- C. The next plan sheets shall be wiring plan drawings indicating all existing and new information pertaining to the catenary system, its supporting structures and ancillary conductors. These wiring plan drawings shall be drawn to a scale 1" = 20', 1"=30' or 1"=40' (depending upon project size).
- D. The next plan sheets shall be the catenary profile drawings indicating the new and/or modifications to existing catenary wires and (if required) the relationship of the proposed construction to existing facilities. These profile drawings shall be drawn to a vertical scale 1" = 4' and a horizontal scale of 1" = 40'. Hanger tabulations may replace catenary profiles on mainline catenary. Profile drawings will be required for all new or modified crossovers and air breaks.
- E. The next group of design drawings shall present erection diagrams for all new permanent, temporary structures, and/or existing modified structures. Erection diagrams shall be drawn to a scale of 1" = 10, and shall be accompanied by a structure loading diagram (on the same drawing) drawn to a scale of 1" = 20, indicating all design loads (vertical, wind, side pull) applied to the structure. Erection diagrams shall also be presented to indicate the total or partial removal of existing structures and steps that may be required to accomplish the removal. Each erection diagram sheet shall contain a bill of material listing assembled items required per structure such as poles, crossbeams, sag braces, cross arms, insulator assemblies, guy anchors and foundation types. All listed items shall be marked and the drawings showing those details shall also be listed.

Modified structures must have erection diagrams that have all of the information from the original document transposed onto them. These drawings will supercede the original drawings. The drawings must be drawn so that existing and new material can be differentiated.

- F. Erection diagram sheets shall be followed by:
 - 1) Structural steel design detail drawings.
 - 2) Foundation and guy anchor design detail drawings.
 - 3) Hardware and insulator assembly details which shall have bills of material identifying the various assembly components, including the suggested manufacturers' name and Amtrak AMMS number.
 - 4) Wire sags and tension charts, as required.
 - 5) Miscellaneous details as required.
 - 6) Underground duct relocation plan, profile and detail drawings if required.
 - 7) Electrical design drawings.
 - 8) Master Bill of Material indicating mark number, Amtrak reference drawing number, AMMS number, description, manufacturer, unit of measurement, and ordering totals of the material being used.

- G. On overhead bridge projects, drawings shall be prepared in accordance with Amtrak standard drawings ET1120-C, ET-1446-D, and ET-1447-D. These drawings shall indicate the temporary and permanent bonding and grounding of the bridge and shall contain a plan of the bridge crossing and all necessary details, clearances and elevations required to clearly show all of the work involved. Warning signs shall also be indicated and shall conform to current Amtrak standards as to location, size, and type used. An itemized bill of material (including Amtrak AMMS number) shall be included for all Railroad work.

- H. Existing Amtrak structure bonding and ground plans, sectionalizing plans, and other related drawings shall be revised (where applicable) to indicate modifications and submitted in accordance with Section II of this specification.

- I. Final structural and catenary drawings shall be accompanied by a suggested construction procedure outlining a step-by-step sequence to be followed to accomplish the project. This suggested procedure will be prepared to minimize electrical outages, track occupations, interruptions to Railroad traffic, and to maintain the safety of the workmen and the integrity of the transmission, catenary and signal systems during the proposed construction. All construction activities related to the project shall be integrated into the sequence of construction.

- J. Unless otherwise directed, plan submissions prior to the final plan submittal shall contain all pertinent design documents in PDF file format. All submittals are to be sent to the Senior Manager, E.T. Design via a file share site maintained by the Consultant.

- K. Unless otherwise directed, after final plans are accepted and released for construction and material purchase, electronically submit one folder containing all drawings (in both PDF

and AutoCAD formats) and material list, and specifications in their original file formats. Submit a hard copy of one (1) signed and sealed half-size set of plans. Submittals shall be sent to the Senior Manager, E.T. Design.

IV. STRUCTURAL DESIGN CRITERIA

- A. All structural design shall be in accordance with the current Amtrak specifications for the Design of Catenary Supporting Structures with the following amendments:
- 1) Current AISC specifications shall be used for the design fabrication and the erection of structural steel, except that allowable stresses shall not be increased one-third above stress values given in specifications when produced by wind loading unless specifically approved by Amtrak.
 - 2) Current ACI Building Code Requirements for Reinforced Concrete shall be used for the design and construction of reinforced concrete structural elements of any structure.
 - 3) Soil boring information including location of borings shall be provided on the design drawings, preferably on the foundation drawings if possible. A soil boring shall be taken at each new foundation location of any modified or proposed new structure. When the number of foundations makes it impracticable to provide a boring for every foundation, a proposed boring plan must be submitted to the Engineer for approval. **Amtrak approval of a reduced boring program does not relieve the requirements for exploratory trenching at all new foundation locations.** Foundations shall be designed in accordance with allowable soil bearing values of materials encountered.
 - 4) All design drawings shall be done under the supervision of a Professional Engineer, registered in the state where the work will be performed, who shall seal drawings submitted for final approval.
- B. The Consultant is advised that the following criteria are to be included in the design and construction of all permanent and temporary facilities adjacent to Amtrak tracks:
- 1) On electrification projects involving modifications to existing facilities, a minimum of 12'-0" (plus curvature allowance) is to be maintained from centerline of track to face of any new pole or guy strand.
 - 2) On new electrification extensions or independent pole transmission lines a clearance of 18'-0" from centerline of track to face of pole or guy is required.
 - 3) New anchors and foundations shall be located and designed so that any temporary sheeting required for their construction will not be closer than toe of slope shown for standard track section (7'-5" is dimension from gage of rail to toe of ballast slope for tangent track; see dimension on Standard Plan No. 70003B for dimensions on curved track).

Note: Minimum clearances less than those stated above must be approved by the Deputy Chief Engineer, E.T. of Amtrak.

- 4) Exploratory trenches (3) three feet deep and fifteen (15) inches wide in the form of an “H” with outside dimensions matching the outside sheeting dimensions, are to be hand dug to determine the presence of any underground installation. The design drawings shall show an outline of the exploratory trenches. All work must be done in accordance with Amtrak requirements for temporary sheeting and shoring to support Amtrak’s facilities.
- 5) The following should be included in the general notes on all drawings for temporary sheeting, shoring and excavation to be performed adjacent to Amtrak’s tracks:
 - a) The Contractor (if applicable) is to provide a schedule of each operation and obtain approval of Amtrak so that it may be properly supervised by Amtrak personnel.
 - b) Exploratory trenches are to be hand dug to determine the presence of any underground installation. Before proceeding, these trenches are to be back filled and immediately compacted. This work must be done in the presence of a railroad inspector.
 - c) Absolute use of track is required while driving sheeting adjacent to running track.
 - d) Cavities created by driving of sheet piling shall be filled with sand and any disturbed ballast should be restored and tamped immediately.
 - e) Sheet piling shall be cut off at top of tie during construction and then, after construction, shall be cut off eighteen (18) inches below existing ground line or grade and left in place.
 - f) The excavation should be covered and ramped each night and barricades and warning lights provided as directed by Amtrak.
 - g) Final back filling shall be as required by specifications.
 - h) When support of track or tracks is necessary during construction of above-mentioned facilities, interlocking steel sheeting adequately braced and designed to carry E-80 live load plus 50% impact is required. Soldier piles and lagging will be permitted for supporting adjacent track or tracks only when required penetration of steel sheet piling cannot be obtained or when in the opinion of the Engineer, steel sheet piling would be impracticable to place.
- 6) All drawings for temporary sheeting and shoring shall be prepared and stamped by a Professional Engineer and shall be accompanied by complete design computations when submitted for approval. The need for a Consultant to include details of temporary sheeting on design drawings will be determined when reviewing drawings submitted to Amtrak for structural approval.
- 7) Particular care shall be taken to avoid erosion or filling of Railroad's drainage facilities. Erosion and sediment control in the vicinity of the Railroad shall be as approved by the

Engineer and the Railroad. Disrupted Railroad drainage facilities shall be corrected promptly as directed by the Engineer at the Contractor's sole expense.

V. ELECTRICAL DESIGN CRITERIA

- A. Electrical Clearances shall be in accordance with applicable, current Amtrak and AREMA specifications. Any deviation from the established Railroad standards must be approved by Amtrak. Vertical clearances between overhead electrical transmission lines and roadways must also meet state and local municipal requirements.
- B. The catenary gradient should be designed not to exceed the value $1/(5 \times \text{Speed})$ where practicable. As an alternate the catenary gradients specified in Chapter 33 of the AREMA Manual may be considered.

VI. CONSTRUCTION RELATED SERVICES

- A. The A/E shall provide Construction Related Services for the duration of the construction of the project. These services shall include, but are not limited to the following:
 - 1) Responding to Contractor's requests for information (R.F.I.'s).
 - 2) Evaluating Contractor's submittals.
 - 3) Reviewing shop drawings, calculations, and technical requirements.
 - 4) Preparing as-built drawings.
 - 5) Providing technical assistance during construction, testing and turnover.
 - 6) Attending project meetings.
 - 7) Participating in on-site inspections.
 - 8) Preparing revised design documents to clarify or modify drawings during construction.
 - 9) Assisting with preparation and resolution of punch list items.
 - 10) Other Construction Related Services as required.

The Consultant shall keep the Senior Manager, E.T. Design or appointed representative apprised of all transactions related to the above Construction Related Services.

VII. RECORD DRAWINGS

- A. Upon completion of the construction, the Consultant shall provide Amtrak with "as-built" or record drawings. This work will include the following.
- 1) Revisions to existing Amtrak drawings as required. These include, but are not limited to, erection diagrams, overhead bridge drawings, track maps, bonding and grounding plans, catenary sectionalizing plans, impedance diagrams, and transmission profiles.
 - 2) One (1) file folder containing all electronic documents (except plans) in their original file format. Plans shall be submitted in AutoCAD format.
 - 3) Unless otherwise directed, final "as-built" documents are to be sent to the following address:

J. Pardini

Senior Manager, E.T. Design

National Railroad Passenger Corporation

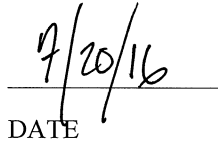
30th Street Station, 4th Floor South Tower

Philadelphia, Pa 19104

VIII. APPROVALS

Handwritten signature of J. Pardini in black ink, written over a horizontal line.

J. Pardini
Senior Manager, E.T. Design

Handwritten date 7/20/16 in black ink, written over a horizontal line.

DATE

Handwritten signature of E. Hornung in black ink, written over a horizontal line.

E. Hornung
Deputy Chief Engineer, E.T.

Handwritten date 7/20/16 in black ink, written over a horizontal line.

DATE