

SPECIFICATIONS

FOR

WIRELINE OCCUPANCY

OF

NORFOLK SOUTHERN CORPORATION

PROPERTY

INDEX

Page

1.0 GENERAL

1.1 Scope 1

1.2 Definitions 1

1.3 Application for Occupancy 1

1.4 Right of Entry 1

1.5 Site Inspection 2

1.6 Information Required for Submission... .. 2

1.7 Notification to Proceed with Construction 3

2.0 CONSTRUCTION REQUIREMENTS

2.1 Aerial Wirelines 3

2.2 Underground Wirelines 4

2.3 Method of Installation for Underground Wirelines 5

2.4 Longitudinal Occupations 7

2.5 Inductive Interference 8

2.6 Modification of Existing Facilities 8

2.7 Abandoned Facilities 8

2.8 Conflict of Specifications 8

2.9 Marker Signs 8

2.10 Warning Tape 9

2.11 Handholes 9

2.12 Safety Requirements 9

2.13 Blasting 9

2.14 Support of Excavation Adjacent to Track 9

2.15 Reimbursement of NS Costs 10

Publication Standards Sources 10

APPENDIX

PLATE I Conduit Data Sheet..... 11

PLATE II Aerial Crossing Plan View 12

PLATE III Aerial Crossing Profile View 13

PLATE IV Aerial Parallel Occupancy Plan View 14

PLATE V Aerial Parallel Occupancy Profile and Section Views 15

PLATE VI Conduit Crossing Plan View..... 16

PLATE VII Conduit Crossing Profile View 17

PLATE VIII Conduit Parallel Occupancy Plan and Profile Views 18

PLATE IX Conduit Parallel Occupancy Section View 19

PLATE X Conduit Plan and Section under Railway Bridge 20

PLATE XI Conduit Profile and Section on Highway over Railway 21

PLATE XII Signal Clearance Diagram for Mast Mounted Flashers 22

PLATE XIII Signal Clearance Diagram for Cantilever Mounted Flashers..... 23

PLATE XIV Vertical Clearance Requirements for Aerial Wires 24

Specifications for Wireline Occupancy of Norfolk Southern Property

1.0 GENERAL

1.1 Scope

- A. This specification shall apply to the design and construction of wirelines carrying power or communication cables over, under, across and along NS property and facilities. This specification shall also apply to tracks owned by others (sidings, industry tracks, etc.) over which NS operates its equipment.
- B. It is to be clearly understood that NS owns its property for the primary purpose of operating a railroad. All occupancies shall therefore be designed and constructed so that rail operations and facilities are not interfered with, interrupted or endangered. In addition, the proposed facility shall be located to minimize encumbrance to the property so that the railroad will have unrestricted use of its property for current and future operations.

1.2 Definitions

- A. NS - Norfolk Southern Corporation
- B. Contract Administration - NS's Contract Administration Department
- C. Owner (Applicant) - Individual, corporation or municipality desiring occupancy of NS property
- D. Professional Engineer - Engineer licensed in the state where the facilities are to be constructed
- E. Conduit - Pipe, 6-inches in diameter or less, used to transport a wireline
- F. Sidings or industry tracks - Tracks located off NS's property, serving an industry

1.3 Application for Occupancy

- A. Individuals, corporations or municipalities desiring occupancy of NS property by wireline occupations must agree, upon approval of the engineering and construction details by NS, to execute an appropriate NS occupational license agreement, pay any required fees and/or rentals outlined in the agreement, and meet all NS insurance requirements.
- B. The application for a wireline crossing occupancy shall be obtained at www.nscorp.com, then follow links for Real Estate > NS Services > Wire, Pipeline, and Fiber Optics Projects.
- C. All applications shall be accompanied with three (3) copies of all design and construction plans and one (1) copy of all specifications and engineering computations for the proposed occupancy. On extensive projects, only those plans involving work on, or affecting NS property and operations, shall be submitted. Included shall be a plan showing the extent of the total project upon which that portion of the work affecting NS is clearly defined.

1.4 Right of Entry

- A. No entry upon NS property for the purpose of conducting surveys, field inspections, obtaining soils information or any other purposes associated with the design and construction for the proposed

occupancy, will be permitted without a proper entry permit prepared by NS. The applicant must pay the associated fees and execute the entry permit.

- B. It is to be clearly understood that the issuance of an entry permit does not constitute authority to proceed with any construction. Construction can not begin until a formal agreement is executed by NS and the Owner receives permission, from the designated inspection agency of NS, to proceed with the work.
- C. The application for a Right Of Entry permit shall be obtained at www.nscorp.com, then follow links for Real Estate > NS Services > Access NS Property.

1.5 Site Inspection

- A. For longitudinal occupancy of NS property a site inspection along the proposed wireline route may be required before final design plans are prepared. When a site inspection is required, the applicant and/or his engineer must meet with representatives of NS to view the entire length of the proposed occupancy.
- B. Prior to the site inspection the applicant must submit the following information:
 - (1) A plan view of the proposed route showing all tracks, both NS property lines and all other facilities located on the property. The distance from the proposed pipeline to the adjacent track and to the property lines must be shown.
 - (2) Typical cross sections along the proposed route. (See Plate IX)
- C. Site inspections for wire crossings are not required unless, in the opinion of NS, the size and location of the facility warrant an inspection.
- D. See Section 2.4 for further details.

1.6 Information Required for Submission

- A. Plans for proposed wireline occupancies shall be submitted to and approved by NS prior to NS issuance of an agreement and start of construction.
- B. Plans shall be drawn to scale, dimensioned with US Customary Units, and shall include the following (See Plates I to IX):
 - (1) Plan view of proposed wireline in relation to all NS facilities and facilities immediately adjacent to NS including, but not limited to, tracks, buildings, signals, pole lines, other utilities and all other facilities that may affect or influence the wireline design and construction.
 - (2) The geographical coordinates (latitude and longitude) of the wire crossing including the distance, in feet, to the nearest highway grade crossing of the railroad and the DOT number posted at the highway grade crossing, if available.
 - (3) Profile of ground on centerline of pole or tower line showing clearances between top of high rail and bottom of sag, as well as clearances from bottom wire or cable to top wire or cable of NS's transmission, signal and communication lines, catenary, and third rail when present. If NS facilities listed above do not exist at the point of crossing, the plan should so state. Actual vertical clearance shall be shown. (See Section 2.1 and Plate XIV for the required overhead clearance.)

- (4) All NS property lines indicated by dimensions, in feet, to the centerline of adjacent track, as well as the overall width of the NS property. If the wireline is in a public highway, the limits of the dedicated highway property, as well as the limits of any paving, sidewalks etc., shall be defined, by dimensions in feet, from the centerline of the dedicated property.
 - (5) The angle of the crossing in relation to the centerline of the tracks(s).
- C. The plan must be specific, as to:
- (1) Base diameter, height, class and bury of poles.
 - (2) Number of, size, and material of all wires, as well as number of pairs/strand in communication cables.
 - (3) Nominal voltage of line and phase of circuit.
 - (4) Location, number of, size of, material or anchors and all guying for poles and arms.
 - (5) Conduit length across property lines.
 - (6) Areas of impact and/or vegetation removal.
- D. Once the application has been approved by NS, no variance from the plans, specifications, method of installation, and construction, etc., as approved in the occupancy document, will be considered or permitted without the payment to NS of additional fees for the re-processing of the application.
- E. Under special conditions, NS will give consideration to occupations on its bridge superstructures, substructures, pole line, and other subject to the approval of the VP-Engineering or designated representative, and NS policy governing such matters.
- F. At NS's request, all plans and computations associated with the work under the agreement shall be prepared by, and bear the seal of, a Professional Engineer and Professional Land Surveyor.
- G. Project specifications, for all work on and affecting the railroad property, shall be included with the submission. All pertinent requirements of this document shall be included.

1.7 Notification to Proceed with Construction

- A. After approval of the engineering plans, specifications, and execution of the occupational agreement, the Owner will be notified of the appropriate NS Division Engineer's Office that must be contacted prior to start of construction. The Division Engineer's Office will provide NS's inspection of the project and coordinate all other construction aspects of the project that relate to NS (flagging, track work, protection of signal cables, etc.)

2.0 CONSTRUCTION REQUIREMENTS

2.1 Aerial Wirelines

- A. Overhead power and communication lines shall be constructed in accordance with the National Electrical Safety code (current edition), Part 2, "Safety Rules for the Installation and Maintenance of Overhead Electric Supply and Communication Lines", except as outlined further in this section.

- B. Poles shall be set as close to NS property line as possible and in no instance closer than 18-feet from face of pole to centerline of nearest track. When necessary, however, each location will be analyzed to consider speed, traffic, etc.
- C. Double cross-arms are required on poles adjacent to track. Any tower or steel pole foundation design must be accompanied by engineering computations and data stamped by a registered professional engineer.
- D. Any tower or steel pole to be installed on NS property must meet or exceed the industry standards regarding design and usage.
- E. Vertical clearance from the top of rail to the bottom of sag of aerial wire crossing, measured at 60-degrees Fahrenheit, shall be as follows:

Guy wires, messenger cables, and telecommunication cables	Electric supply lines and neutral wires (voltage is measured phase-to-ground)*		
27-feet	Less than 750-V	750-V to 15-KV	15-KV to 50-KV
	30-feet	31-feet	33-feet

* For electric supply lines or neutral wires carrying greater than 50-KV, use a vertical clearance of 33-feet plus ½-inch per 1-KV above 50-KV.

- F. Vertical clearance between proposed aerial wire crossings and aerial Norfolk Southern communications lines shall be as follows:

Guy wires, messenger cables, and telecommunication cables	Electric supply lines and neutral wires (voltage is measured phase-to-ground)*		
2-feet	Less than 750-V	750-V to 15-KV	15-KV to 50-KV
	2-feet	4-feet	6-feet

* For electric supply lines or neutral wires carrying greater than 50-KV, use a vertical clearance of 33-feet plus ½-inch per 1-KV above 50-KV.

- G. Overhead power and communication lines shall be constructed in accordance with the Signal Clearance Diagrams as seen in Plate XII and XIII.

2.2 Underground Wirelines

- A. Underground installations carrying power or communication wires and cables shall be constructed and properly marked with signs, in accordance with American Railway Engineering Maintenance-of-Way Association (current edition), Chapter 1, Part 5, except as outlined further in this section.
- B. Conduits shall be located, where practicable, to cross tracks at approximate right angles to the track, but preferably at not less than 45-degrees.
- C. Conduits shall not be placed within a culvert, under railroad bridges, nor closer than 50-feet to any portion of any railroad bridge, building, or other important structure, except in special cases, and then by special design, as approved by NS Engineering.
- D. Conduits shall not be located within 10-feet of the limits of a turnout (switch) when crossing the track. The limits of the turnout extend from the point of the switch to the last long timber.
- E. Plastic conduit material includes thermoplastic and thermoset plastic conduits, such as PVC and HDPE.

F. Conduits shall maintain a minimum horizontal clearance of 4-feet, or if within 4-feet, a minimum vertical clearance of 10-feet from the base of any railroad signal apparatus.

G. Minimum Depth of Installation:

Material	Bore & Jack	HDD-A	HDD-B
Steel	5.5-feet	10-feet	5.5-feet
Plastic	15-feet*		
Parallel Occupancy	4-feet		

* Within 25-feet of centerline of the closest track and a minimum depth of 10-feet anywhere else on NS property.

H. Conduits under railroad tracks and across NS's property shall extend the greater of the following distances, measured at right angle to centerline of track:

- (1) Across the entire width of the NS property
- (2) 3-feet beyond ditch line
- (3) 2-feet beyond toe of slope
- (4) Beyond theoretical railroad embankment line. This line begins at a point, on existing grade, 14-foot horizontally from centerline track and extends downward on a 2 (H) to 1 (V) slope. (See Plate VII) The 14-foot is measured from 19-inches below the base of the rail.

2.3 Method of Installation for Underground Wirelines:

- A. Bored, jacked or tunneled installations shall have a bore hole essentially the same as the outside diameter of the conduit plus the thickness of the protective coating.
- B. The use of water or other liquids to facilitate conduit emplacement and spoil removal is prohibited, except as outlined in Section F.
- C. If during installation an obstruction is encountered which prevents installation of the conduit in accordance with this specification, the conduit shall be abandoned in place and immediately filled with grout. A new installation procedure and revised plans must be submitted to, and approved by, NS before work can resume.
- D. The project specifications must require the contractor to submit, to NS for approval, a complete construction procedure of the proposed operations. Included with the submission shall be the manufacturer's catalog information describing the type of equipment to be used.
- E. Bore and Jack (Steel Pipe)

This method consists of pushing the pipe into the earth with a boring auger rotating within the pipe to remove the spoil.

- (1) The boring operation shall be progressed on a 24-hour basis without stoppage (except for adding lengths of pipe) until the leading edge of the pipe has reached the receiving pit.
- (2) The front of the pipe shall be provided with mechanical arrangements or devices that will positively prevent the auger from leading the pipe so that no unsupported excavation is ahead of the pipe.

- (3) The auger and cutting head arrangement shall be removable from within the pipe in the event an obstruction is encountered. If the obstruction cannot be removed without excavation in advance of the pipe, procedures as outlined in Section 2.3.C must be implemented immediately.
- (4) The over-cut by the cutting head shall not exceed the outside diameter of the pipe by more than ½-inch. If voids should develop or if the bored hole diameter is greater than the outside diameter of the pipe (plus coating) by more than approximately 1-inch, grouting or other methods approved by NS, shall be employed to fill such voids.
- (5) The face of the cutting head shall be arranged to provide a reasonable obstruction to the free flow of soft or poor material.
- (6) Any method that employs simultaneous boring and jacking for conduits over 8-inches in diameter that does not have the above approved arrangement will not be permitted. For pipe 8-inches and less in diameter, auguring or boring without this arrangement may be considered for use only as approved by NS.

F. Directional Boring / Horizontal Directional Drilling Method “A”

This method consists of setting up specialized drilling equipment on existing grade (launching and receiving pits are not required) and boring a small diameter pilot hole on the desired vertical and horizontal alignment, using a mechanical cutting head with a high pressure fluid (bentonite slurry) to remove the cuttings. The drill string is advanced with bentonite slurry pumped through the drill string to the cutting head and then forced back along the outside of the drill string, carrying the cuttings back to the surface for removal. When the cutting head reaches the far side of the crossing, it is removed and a reamer (with a diameter greater than the cutting head) is attached to the lead end of the drill string. The conduit is attached to the reamer and the pilot hole is then back reamed while the conduit is pulled into place.

- (1) For steel conduits, the depth of cover must be greater than 10-feet below the base of the rail, or the bore is in rock.
- (2) For plastic conduits, the depth of cover must be greater than 15-feet below the base of the rail, or the bore is in rock.
- (3) Factors considered will be track usage, pipe size, contents of pipeline, soil conditions, etc.

G. Directional Boring / Horizontal Directional Drilling Method “B”

This method consists of using hydraulic jacking equipment to push a solid steel rod under the railroad from a launching pit to a receiving pit. At the receiving pit, a cone shaped “expander” is attached to the end of the rod and the conduit (casing pipe) is attached to the expander. The rod, expander and conduit are then pulled back from the launching pit until the full length of the conduit is in place.

- (1) This method may be used to place conduit (casing pipe), up to and including 6-inches in diameter, under the railroad.
- (2) For steel conduits, the depth of cover must be greater than 5.5-feet below the base of the rail, or the bore is in rock.
- (3) For plastic conduits, the depth of cover must be greater than 15-feet below the base of the rail, or the bore is in rock.

2.4 Longitudinal Occupations

- A. Conduits laid longitudinally on NS property shall be located as far as practicable from any tracks or other important structures and as close to the railroad property line as possible. Longitudinal conduits must not be located in earth embankments or within ditches located on the property.
- B. Feasibility proposals will be accepted for review. Applicant should furnish a letter requesting study along with a plan view showing the extent of the proposed occupation. This feasibility plan may be in the form of a local, county, USGS Map, or drawing, showing the railroad, streets, highways and other information identifying the location of the project.
- C. Arrangements will then be made to furnish the applicant with the appropriate NS valuation maps and a right of entry permit. There will be a “nominal charge” for the necessary valuation maps which depict the railroad property lines and other facilities. These are the best records we have and may be used for the feasibility proposal. However, NS does not warrant the accuracy of these maps and all pertinent information to the NS occupancy must be verified prior to final submission.
- D. Upon receipt of these documents, the applicant must execute the right of entry permit in order to access NS property. Such access would allow for the verification that the proposed pole locations are feasible and do not interfere with any NS facilities. At such a time, the applicant should stake out a few “key” points along with the occupation such as, crossings, alignment, radical changed in alignment, etc.
- E. Once this temporary stake out is completed, the applicant must submit to NS three (3) sets of preliminary plans showing the location of all proposed poles and other information as stated below. Arrangements will then be made for a site investigation by NS personnel. The proposed occupation will be field checked to insure compliance with and conformance to this specification. At that time; comments, recommendations, changes to, or approval of, all locations will be made.
- F. Wires and cables running longitudinally along NS’s property shall be constructed as close to property lines as possible. The following information must be submitted in addition to the detail of the pole top configuration as called for on Plate V of these specifications:
 - (1) Nominal voltage and phase of circuit(s) or number of pairs.
 - (2) Phase of electrical circuit(s).
 - (3) Number of electrical circuits.
 - (4) Size (AWG or CM) and material of wires or cables.
 - (5) Length of spans clearly indicated on drawing.
 - (6) Any intended future wires or cables.
- G. Any facilities overhanging or requiring a clear zone on NS property must have approval of the VP-Engineering or his designated representative; must confirm to the above specifications and are subject to the appropriate rental charges.
- H. Project specifications, for all work on and affecting the railroad property, shall be included with the submission. All pertinent requirements of this document shall be included.

2.5 Inductive Interference

- A. An inductive interference coordination study is required for all proposed longitudinal occupations. This study may also be required for any crossing other than 90-degrees with the track(s).
- B. All agreements covering crossings and longitudinal occupations will include provisions that the owner provide appropriate remedies, at his own expense, to correct any inductive interference with NS facilities.

2.6 Modification of Existing Facilities

- A. Any replacement or modification of an existing carrier pipe and/or casing shall be considered as a new installation, subject to the requirements of this specification.

2.7 Abandoned Facilities

- A. The owner of all abandoned conduit crossings and other occupancies shall notify NS in writing, of the intention to abandon.
- B. Abandoned conduits shall be completely filled with cement grout, compacted sand or other methods as approved by NS.
- C. Abandoned handholes and other structures shall be removed to a minimum distance of 2-feet below finished grade and completely filled with cement grout or compacted sand.

2.8 Conflict of Specifications

- A. Where laws or orders of public authority prescribe a higher degree of protection than specified herein, then the higher degree so prescribed shall be deemed a part of this specification.

2.9 Marker Signs

- A. Conduits (except those in streets where it would not be practical to do so) shall be prominently marked 15-feet from the centerline of nearest track and at property lines at points of entry/exit (on both sides of track for crossings) by durable, weatherproof signs located over the centerline of the pipe. Signs shall show the following:
 - (1) Name and address of owner
 - (2) Contents of conduit
 - (3) Conduit depth below grade at point of a sign
 - (4) Emergency telephone number in event of pipe rupture
- B. For conduits running longitudinally on NS property, signs shall be placed over the conduit (or offset and appropriately marked) at all changes in direction of the conduit. Such signs should also be located so that when standing at one sign the next adjacent marker in either direction is visible. In no event shall they be placed more than 500-feet apart unless otherwise specified by NS.
- C. The owner must maintain all signs on NS property as long as the occupational agreement is in effect.

2.10 Warning Tape

- A. All conduits installed by open cut and handholes installed on NS property shall have warning tape placed 2-feet directly above them.

2.11 Handholes and Manholes

- A. Handholes and manholes shall not be located on NS property where possible. At locations where this is not practical, including longitudinal occupancies, handholes and manholes on NS property shall have a minimum of 2-feet of cover and be designed to withstand passage of trucks. Handholes and manholes must be locatable from the surface.
- B. The distance from centerline of adjacent track to centerline of proposed handhole and manholes shall be shown on the plans.

2.12 Safety Requirements

- A. All operations shall be conducted so as not to interfere with, interrupt, or endanger the operation of trains or damage, destroy, or endanger the integrity of railroad facilities. All work on or near NS property shall be conducted in accordance with NS safety rules and regulations. The contractor shall secure and comply with the NS safety rules and shall give written acknowledgement to NS that they have been received, read, and understood by the contractor and its employees. Operations will be subject to NS inspection at any and all times.
- B. All cranes, lifts, or other equipment that will be operated in the vicinity of the railroad's electrification and power transmission facilities shall be electrically grounded as directed by NS.
- C. At all times when the work is being progressed, a field supervisor for the work with no less than twelve (12) months experience in the operation of the equipment being used shall be present. If boring equipment or similar machines are being used, the machine operator also shall have no less than twelve (12) months experience in the operation of the equipment being used.
- D. Whenever equipment or personnel are working closer than 15-feet from the centerline of an adjacent track, that track shall be considered as being obstructed. Insofar as possible, all operations shall be conducted no less than this distance. Operations closer than 15-feet from the centerline of a track shall be conducted only with the permission of, and as directed by, a duly qualified NS railroad employee present at the site of the work.
- E. Crossing of tracks at grade by equipment and personnel is prohibited except by prior arrangement with, and as directed by, NS.

2.13 Blasting

- A. Blasting will not be permitted.

2.14 Support of Excavation Adjacent to Track

- A. The location and dimensions of all pits or excavations shall be shown on the plans. The distance from centerline of adjacent track to face of pit or excavation shall be clearly labeled. Also, the elevation of the bottom of the pit or excavation must be shown on the profile.
- B. The face of all pits shall be located a minimum of 25-feet from centerline of adjacent track, **measured at right angles to track**, unless otherwise approved by NS.

- C. If the bottom of the pit excavation intersects the theoretical railroad embankment line (See Plate VII) interlocking steel sheet piling, driven prior to excavation, must be used to protect the track stability. The uses of trench boxes or similar devices are not acceptable in this area.
- (1) Design plans and computations for the pits, stamped by a Professional Engineer, and must be submitted by the Owner at time of application or by the contractor prior to start of construction. If the pit design is to be submitted by the contractor, the project specifications must require the contractor to obtain NS approval prior to beginning any work on or which may affect NS property.
 - (2) The sheeting shall be designed to support all lateral forces caused by the earth, railroad and other surcharge loads.
 - (3) After construction and backfilling, all sheet piling within 10-feet of centerline track must be cut off 18-inches below final grade and left in place.
- D. All excavated areas are to be illuminated (flashing warning lights not permitted), fenced and otherwise protected as directed by NS.

2.15 Reimbursement of NS Costs

- A. All NS costs associated with the wire installation (inspection, flagging, track work, protection of signal cables, etc.) shall be reimbursed to NS by the Owner of the facility.

PUBLICATION STANDARDS SOURCES

ANSI	American National Standards Institute, Inc. 1899 L Street, NW, 11th Floor Washington, DC 20036 Tel: 202.293.8020
AREMA	American Railway Engineering Maintenance-of-Way Association 4501 Forbes Blvd., Suite 130 Lanham, MD 20706 Tel: 301.459.3200
ASTM	American Society for Testing and Materials 100 Barr Harbor Drive, PO Box C700 West Conshohocken, PA 19428 Tel: 610.832.9500
NESC	National Electrical Safety Code 445 Hoes Lane Piscataway, NJ 08854-4141 USA Tel: 732.981.0060

NOTE: If other than ANSI, AREMA, ASTM or NESC specifications are referred to for design, materials or workmanship on the plans and specifications for the work, then copies of the applicable sections of such other specifications referred to shall accompany the plans and specifications for the work.

PLATE I - Conduit Data Sheet

(For Telecom and Power Conduits only, 6" in diameter or less)

	CONDUIT / CASING PIPE
NOMINAL SIZE OF PIPE	
MATERIAL*	
OUTSIDE DIAMETER	
INSIDE DIAMETER	
WALL THICKNESS - must be at least 0.188"	
TYPE OF COATING	

* **STEEL conduits required at least 10' depth below base of rail**
HDPE conduits will be considered at least 15' depth below base of rail

Proposed Method of Installation (Given sections refer to NSCE-8 Specification)

- Jack & Bore (Section 5.1.3)
- Directional Boring Method "A" (Section 5.1.6) – *must have at least 10' depth below base of rail*
- Directional Boring Method "B" (Section 5.1.6) – *only for casings 6 inches or less in diameter*
- Open Cut (Section 5.1.2) – *All installations directly under any track must be designed as a bored installation. Open cut installations will be considered on a case-by-case basis by Norfolk Southern's Division Superintendent at the time of installation.*
- Other – Please Specify: _____

MULTIPLE INNERDUCTS

NUMBER OF INNERDUCTS WITHIN CASING PIPE: _____

- Provide a detail or cross section of the casing pipe with innerducts (see below).
- Clearly mark the type of facility that will be installed within each innerduct. If innerduct will be left spare or empty, please identify as such.

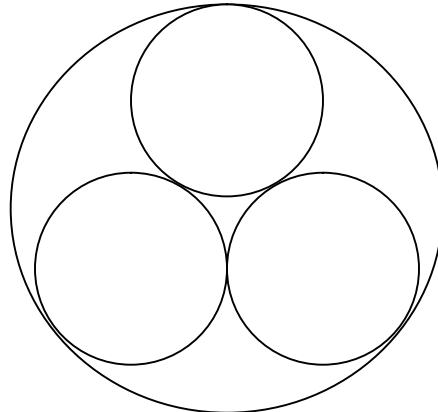


Plate II - Sample Aerial Wire Plan View

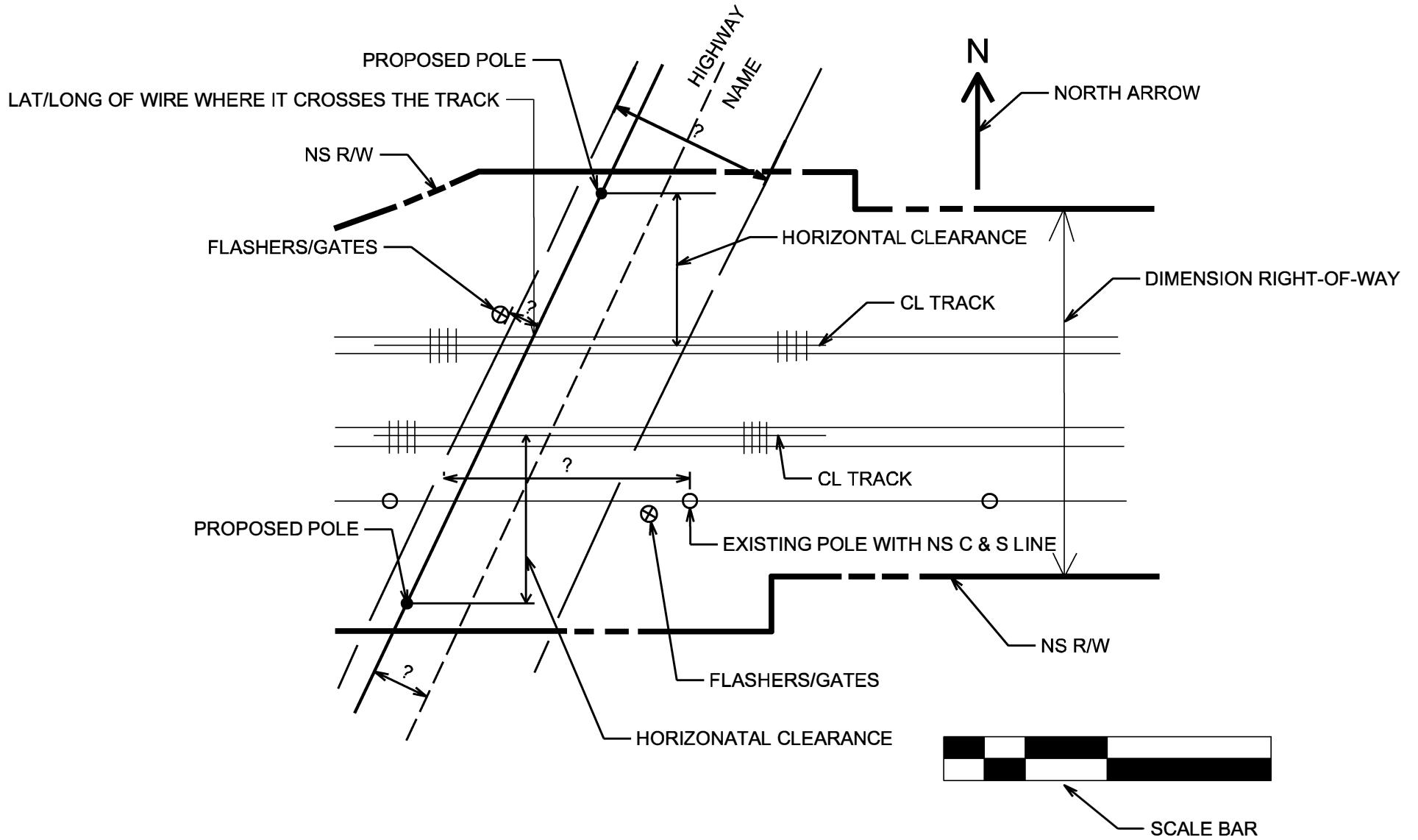


Plate III - Sample Aerial Wire Profile View

NUMBER OF WIRES IN PROPER PERSPECTIVE, VOLTAGE

POWER, GROUND AND NEUTRAL WIRES, ETC.

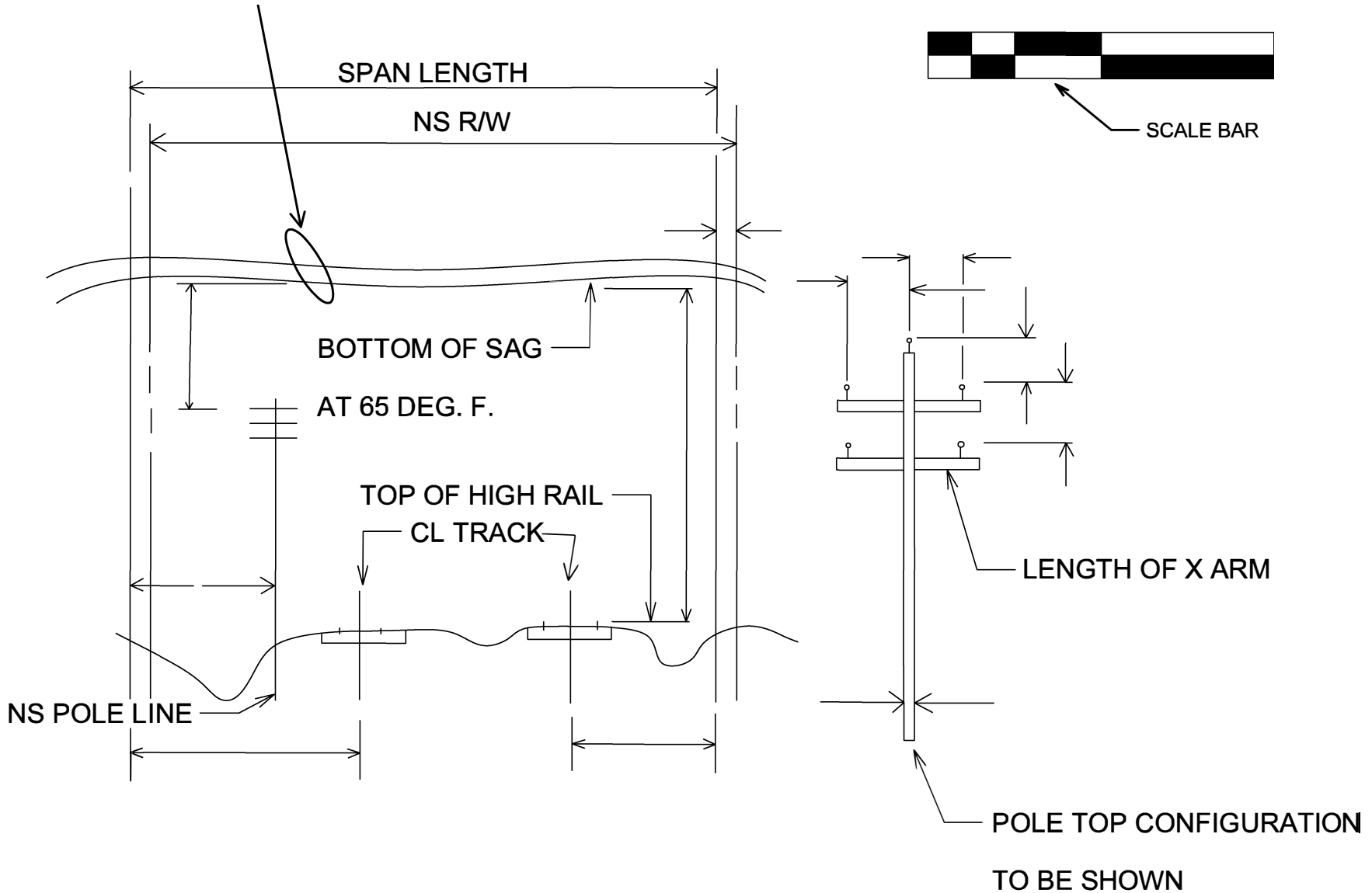


Plate IV - Sample Aerial Wire Parallel Plan View

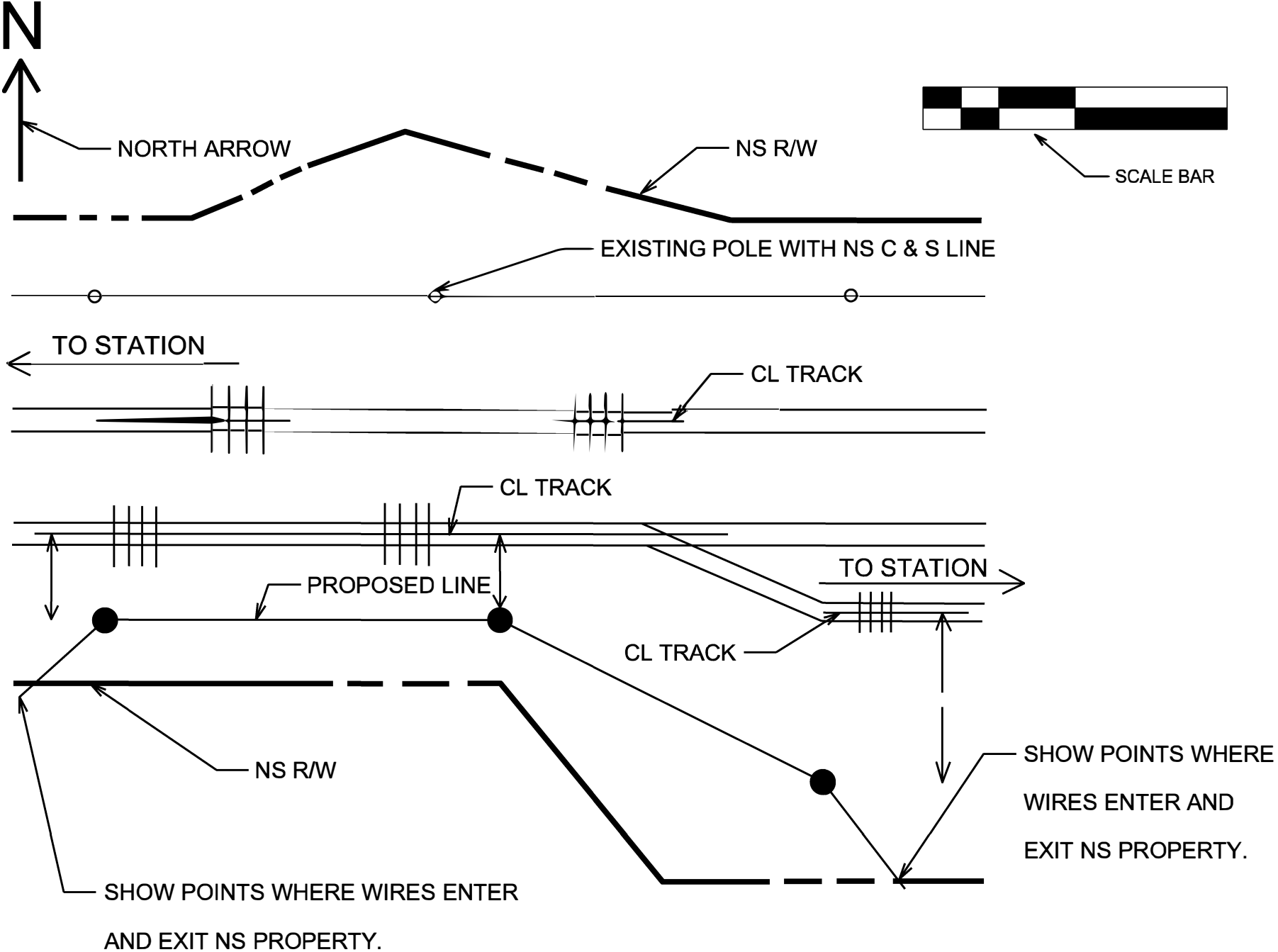
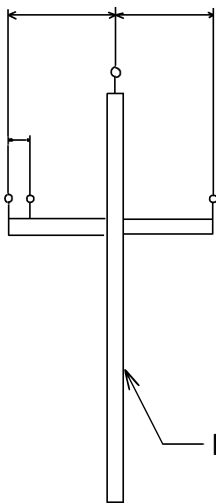
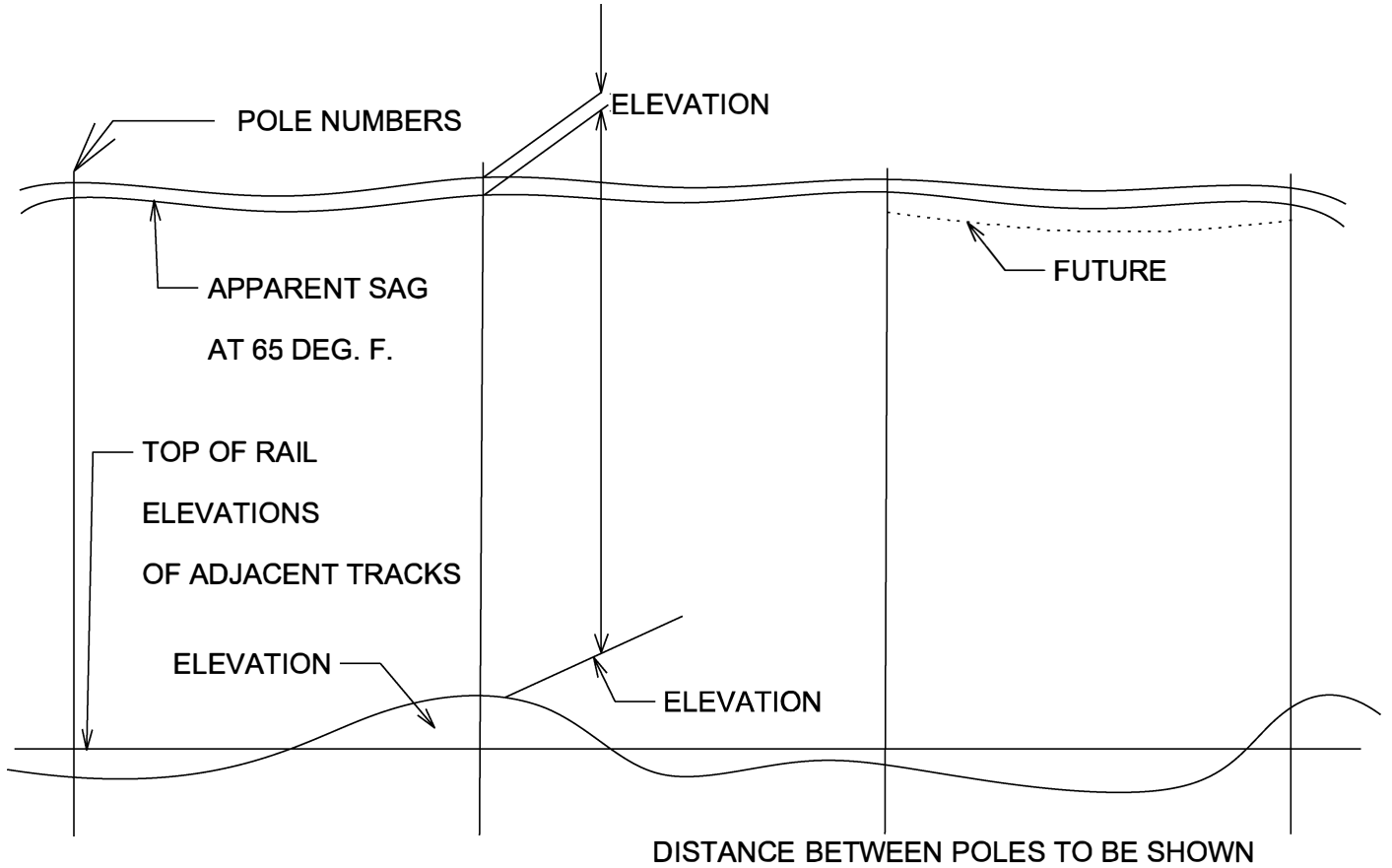


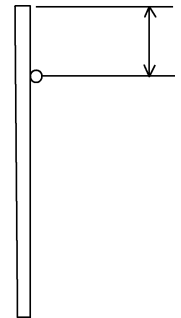
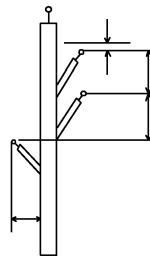
Plate V - Sample Aerial Wire Parallel Profile and Section Views



LENGTH OF X ARMS



SCALE BAR



POLE TOP CONFIGURATION TO BE SHOWN SIMILAR TO SAMPLES ABOVE

Plate VI - Sample Conduit Plan View

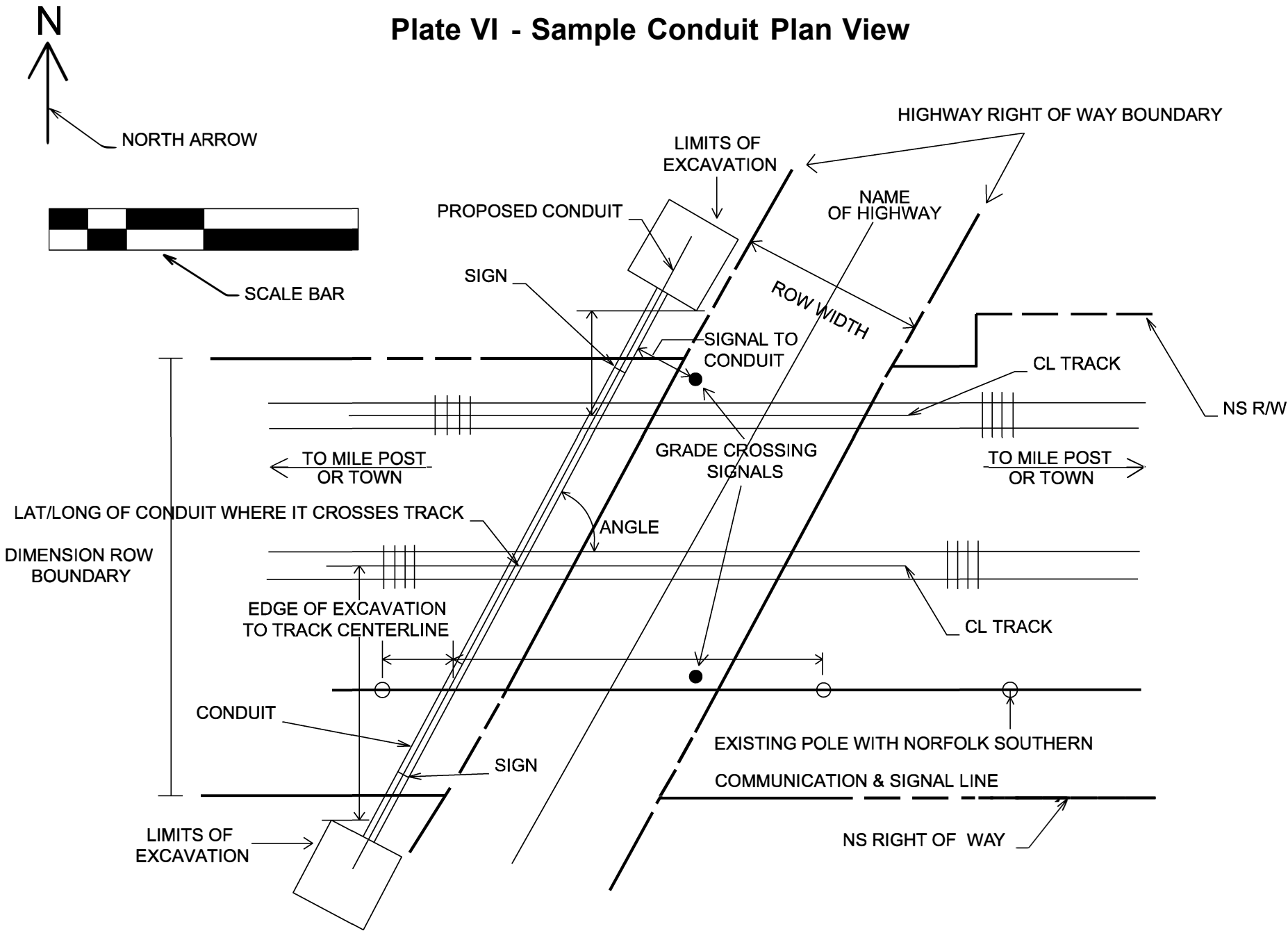
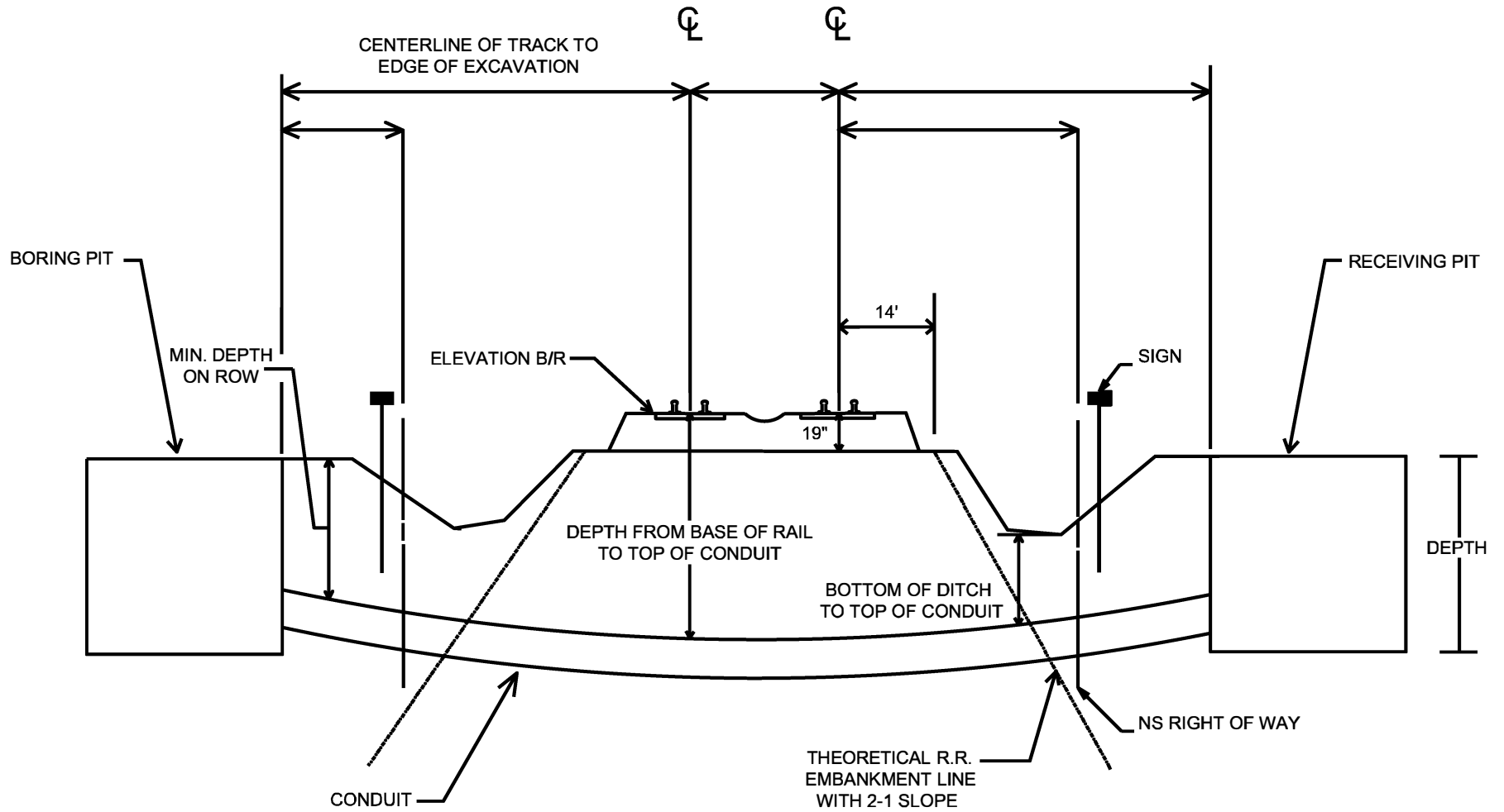
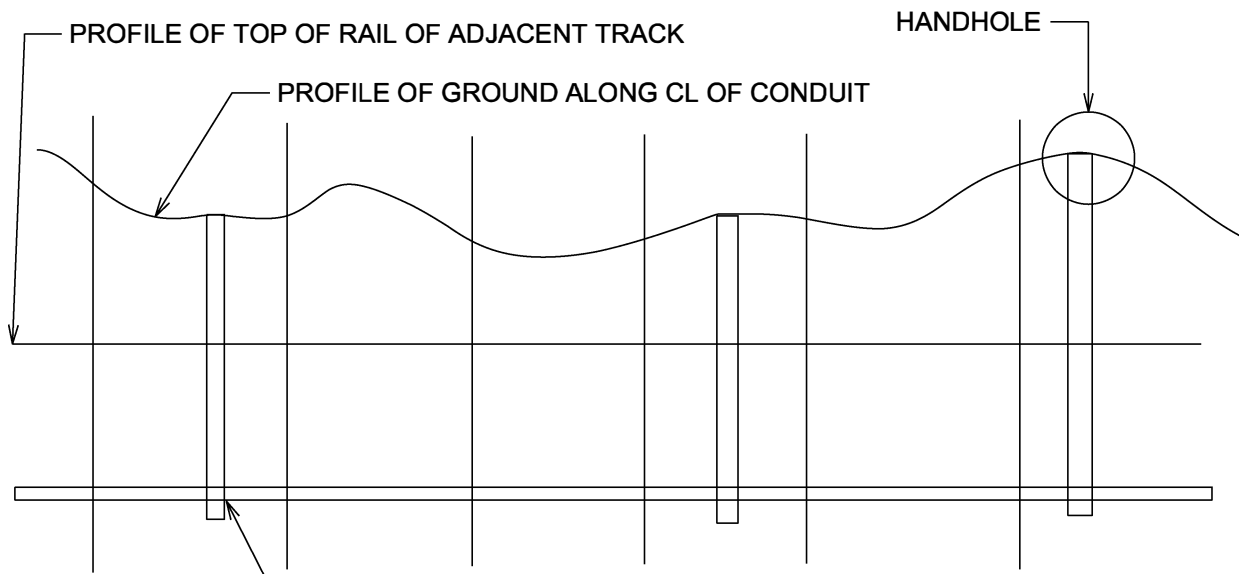
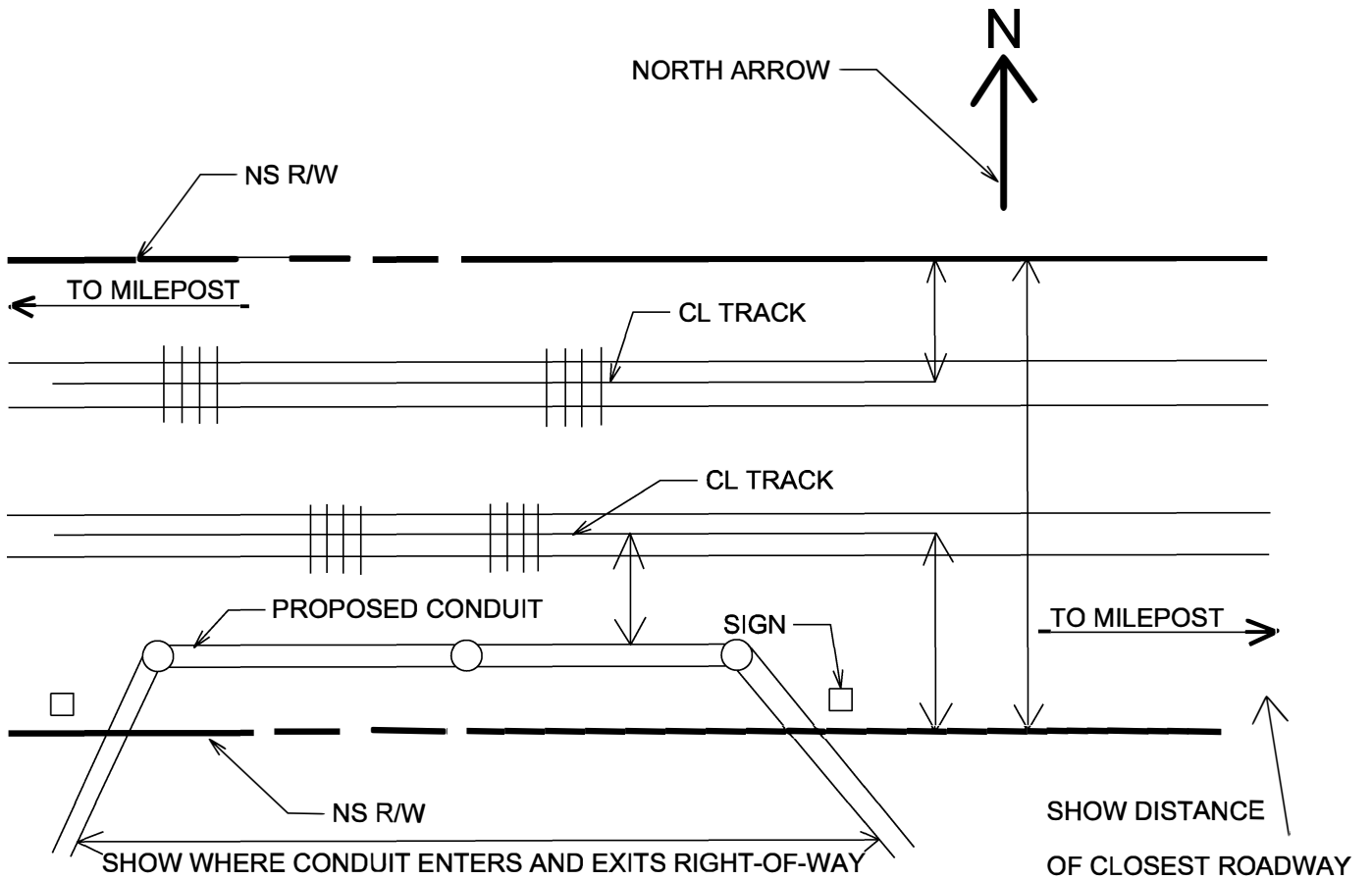


Plate VII - Sample Conduit Profile View



SCALE BAR

Plate VIII - Sample Conduit Parallel Plan and Profile Views



SCALE BAR

Plate IX - Sample Conduit Parallel Section View

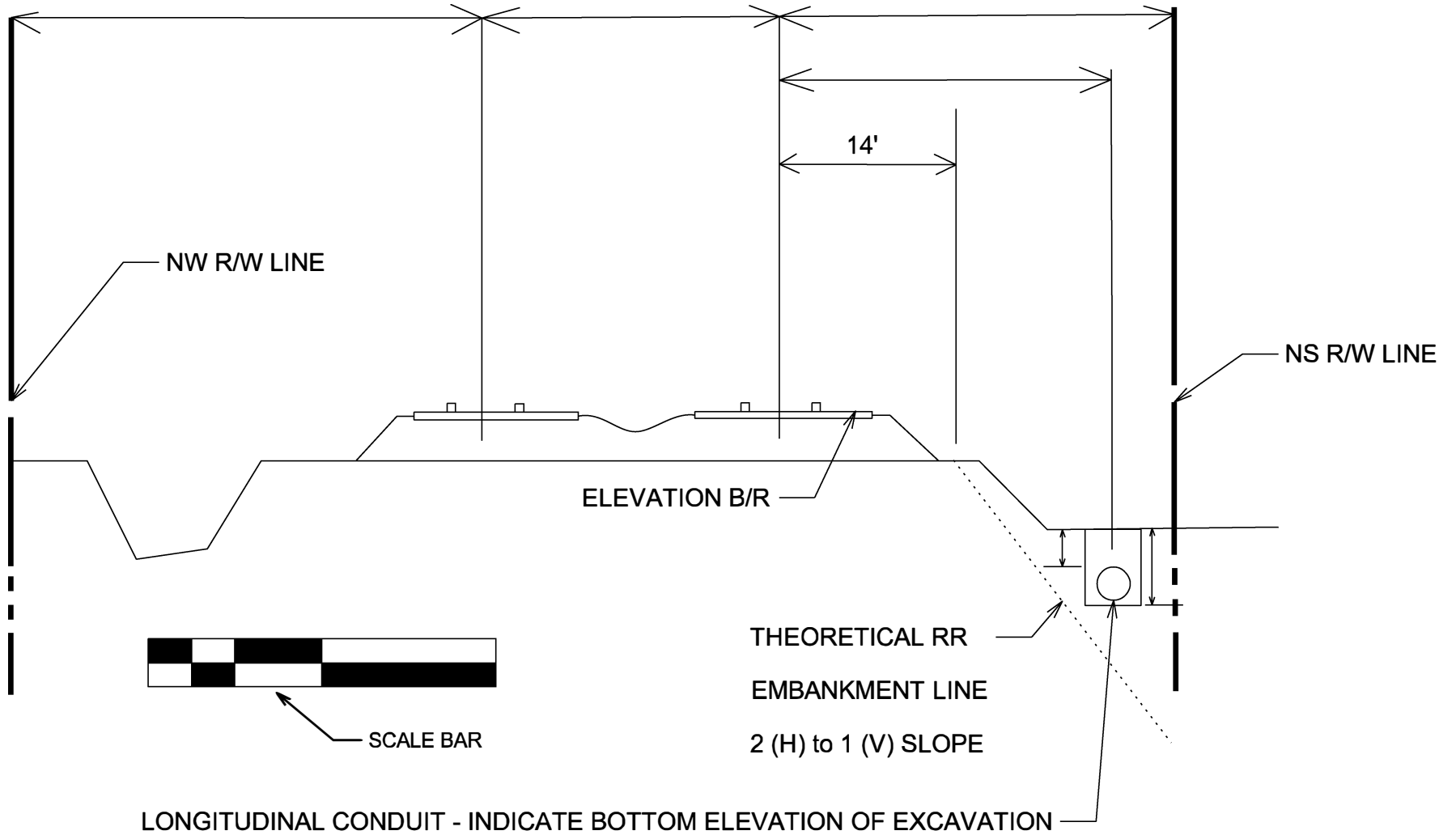


Plate X - Sample Conduit Plan and Section Under Railway Bridge

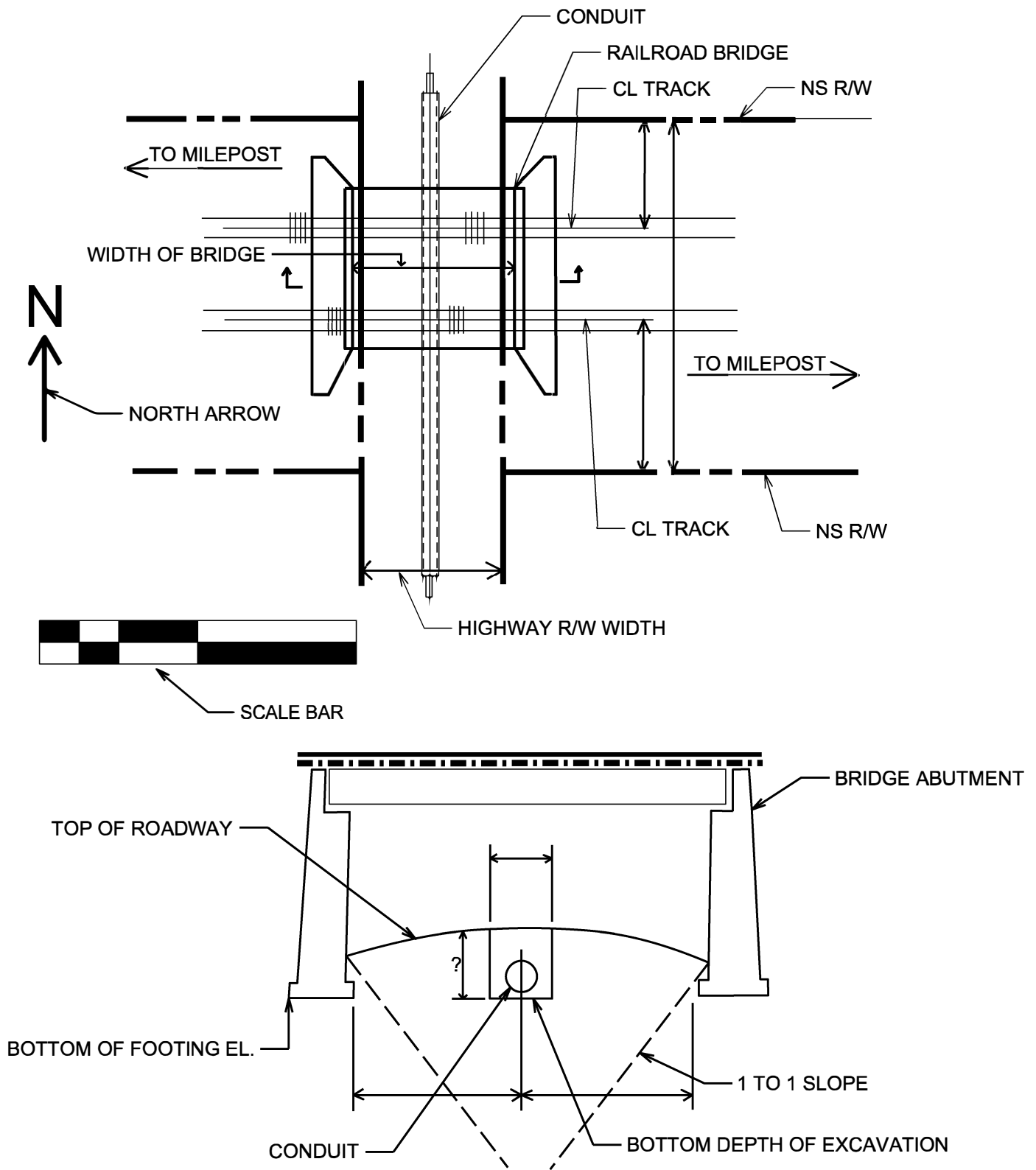
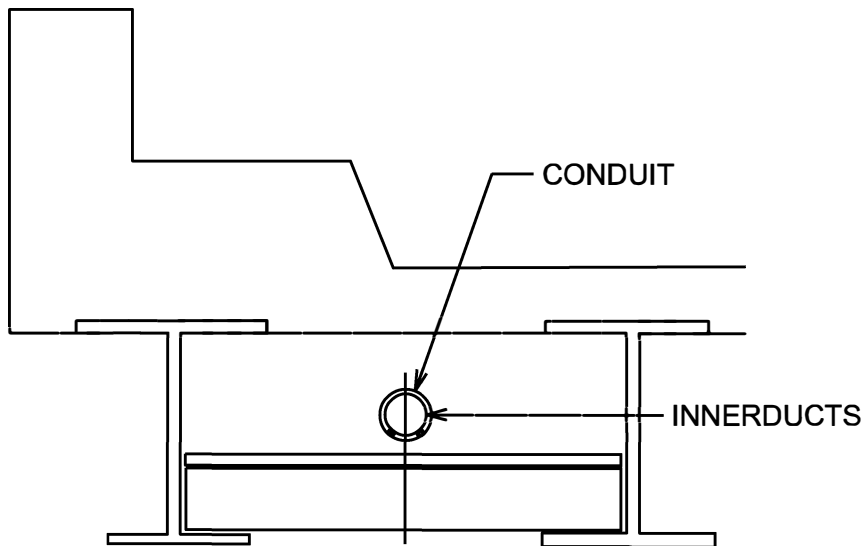
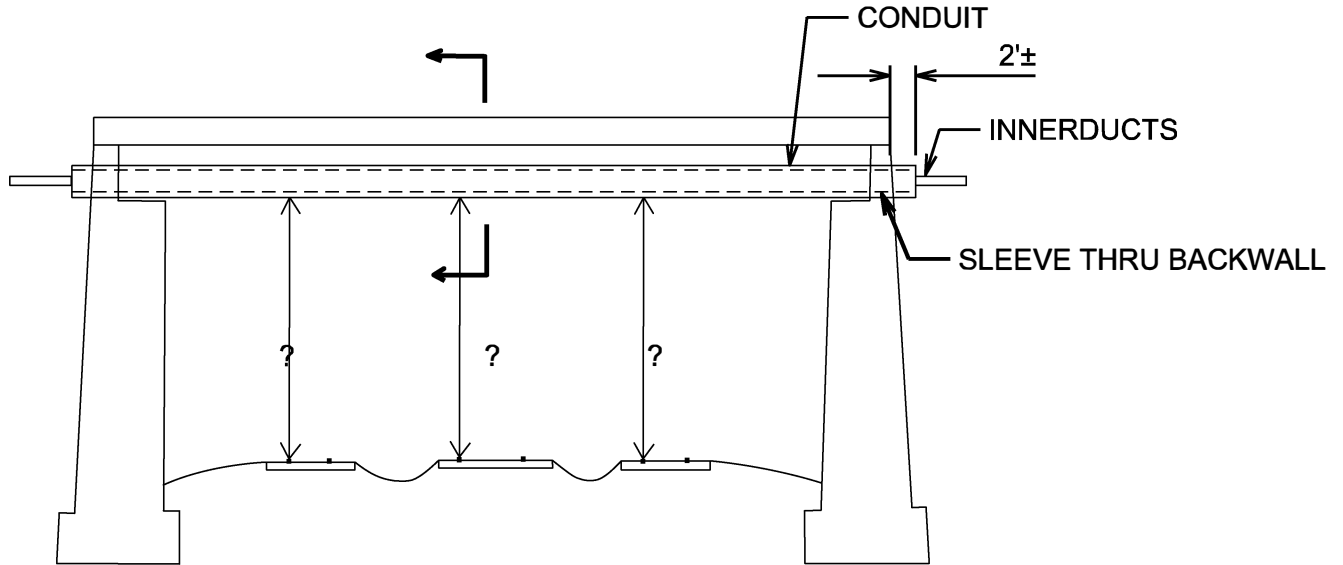
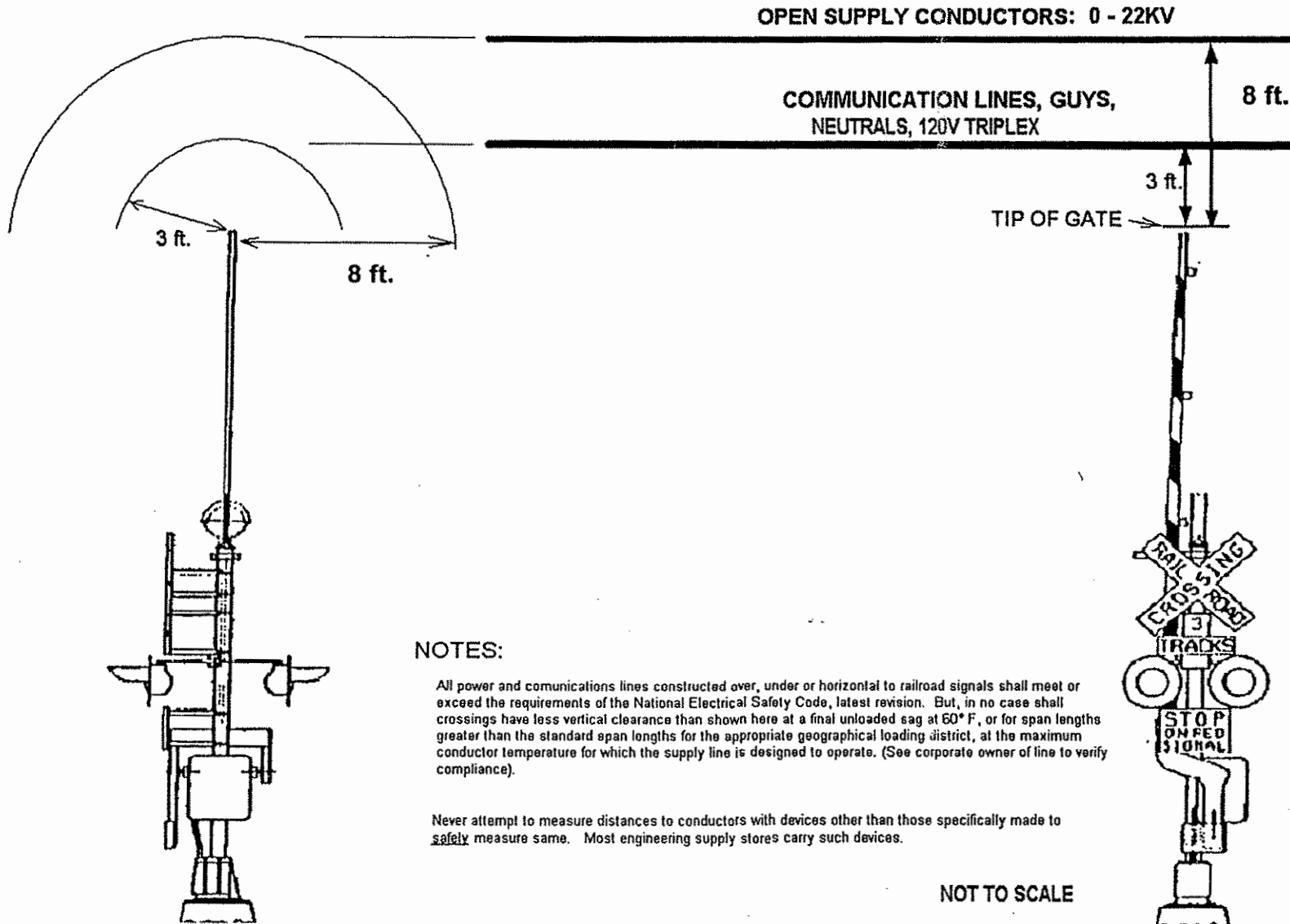


PLATE XI - Sample Conduit Profile and Section Views Pipe in Highway Over Railway



SCALE BAR

PLATE XII - Signal Clearance Diagram for Mast Mounted Flashers and Gates



NOTES:

All power and communications lines constructed over, under or horizontal to railroad signals shall meet or exceed the requirements of the National Electrical Safety Code, latest revision. But, in no case shall crossings have less vertical clearance than shown here at a final unloaded sag at 60° F, or for span lengths greater than the standard span lengths for the appropriate geographical loading district, at the maximum conductor temperature for which the supply line is designed to operate. (See corporate owner of line to verify compliance).

Never attempt to measure distances to conductors with devices other than those specifically made to safely measure same. Most engineering supply stores carry such devices.

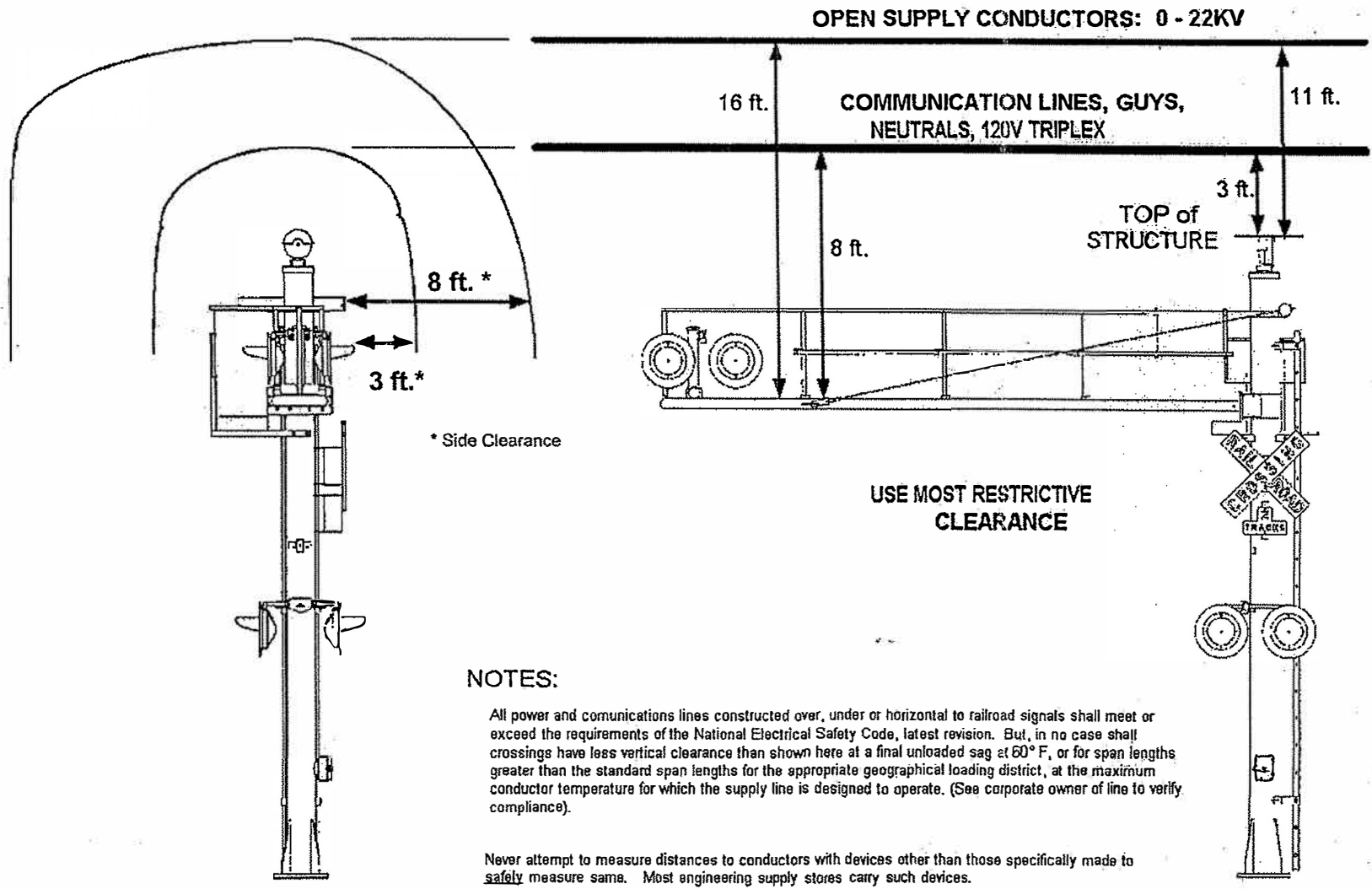
NOT TO SCALE

PLATE XIII - Signal Clearance Diagram for Cantilever Mounted Flashers and Gates

NS CORPORATION - C&S DEPARTMENT
STANDARDS & PROCEDURES MANUAL

(1)

SP-303-2



NOTES:

All power and communications lines constructed over, under or horizontal to railroad signals shall meet or exceed the requirements of the National Electrical Safety Code, latest revision. But, in no case shall crossings have less vertical clearance than shown here at a final unloaded sag at 60° F, or for span lengths greater than the standard span lengths for the appropriate geographical loading district, at the maximum conductor temperature for which the supply line is designed to operate. (See corporate owner of line to verify compliance).

Never attempt to measure distances to conductors with devices other than those specifically made to safely measure same. Most engineering supply stores carry such devices.

NOT TO SCALE

STANDARDS AND PROCEDURES
CLEARANCE DIAGRAM FOR UTILITIES ABOVE SIGNAL APPARATUS
Initial date 7/15/03

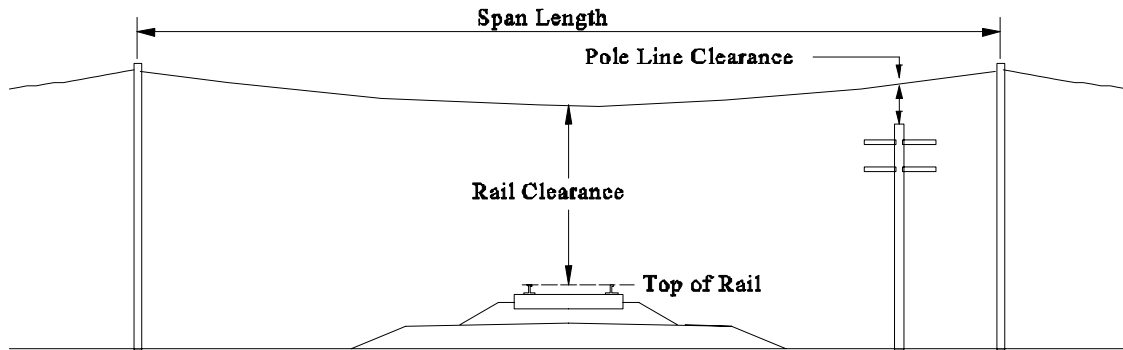
PLATE XIV - STANDARDS AND PROCEDURES

CLEARANCE REQUIREMENTS FOR CABLE AND WIRE CROSSINGS

Initial date 9/1/93 - Revised 3/24/06

Note: All power and communication lines constructed over, under or parallel to the railroad shall meet or exceed the requirements of the National Electric Safety Code (NESC), latest revision.

OVERHEAD CLEARANCE



In no case shall crossings have less vertical clearance than the following at a final unloaded sag at 60° F, or for span lengths greater than the standard span lengths for the appropriate geographic loading district, at the maximum conductor temperature for which the supply line is designed to operate.

Distance Above	Guys, Messenger, and Communications Spans	Open Supply Line or any Neutral (phase to ground voltage)		
		Less than 750 V	750 V to 15 KV	15 KV to 50 KV *
Rail	27 feet	30 feet	31 feet	33 feet
Pole Line	2 feet	2 feet	4 feet	6 feet

* Add 1/2 inch for each 1000 volts (phase to ground) above 50 KV.

Loading District	Standard Span Lengths
Heavy	175 feet
Medium	250 feet
Light	350 feet

Note - The applicant will furnish line design final sag data.