RETURN WITH BID

State of _____)
) ss.
County of _____)

AFFIDAVIT

_____, of _____,
(name of affiant) *(bidder)*

being first duly sworn upon oath, states as follows:

1. That I am the _____ of _____
(Officer or position) *(Bidder)*
and have personal knowledge of the facts herein stated.
2. That, if selected under this bid proposal, _____ will
(Bidder)
maintain a business office in the State of Illinois which will be located in _____ County, Illinois.
3. That this business office will serve as the primary place of employment for any persons employed in the construction contemplated by this bid proposal.
4. That this Affidavit is given as a requirement of state law as provided in Section 30-22(8) of the Illinois Procurement Code.

_____
(Signature)

_____
(Printed name of Affiant)

This instrument was signed and attested before me on the _____ day of _____, 20 ___

by _____.
(Notary Public Name)

_____
(Notary Public Signature)

(NOTARY SEAL)

BID PROPOSAL INSTRUCTIONS

ABOUT IDOT PROPOSALS: All proposals are potential bidding proposals. Each proposal contains all certifications and affidavits, a proposal signature sheet and a proposal bid bond.

PREQUALIFICATION

Any contractor who desires to become pre-qualified to bid on work advertised by IDOT must submit the properly completed pre-qualification forms to the Bureau of Construction no later than 4:30 p.m. prevailing time twenty-one days prior to the letting of interest. This pre-qualification requirement applies to first time contractors, contractors renewing expired ratings, contractors maintaining continuous pre-qualification or contractors requesting revised ratings. To be eligible to bid, existing pre-qualification ratings must be effective through the date of letting.

WHO CAN BID ?

Bids will be accepted from only those companies that request and receive written Authorization to Bid from IDOT's Central Bureau of Construction.

REQUESTS FOR AUTHORIZATION TO BID

Contractors wanting to bid on items included in a particular letting must submit the properly completed "Request for Authorization to Bid/or Not For Bid Status" (BDE 124) and the ORIGINAL "Affidavit of Availability" (BC 57) to the proper office no later than 4:30 p.m. prevailing time, three (3) days prior to the letting date.

WHAT CONSTITUTES WRITTEN AUTHORIZATION TO BID?

When a prospective prime bidder submits a "Request for Authorization to Bid/or Not For Bid Status"(BDE 124) he/she must indicate at that time which items are being requested For Bidding purposes. Only those items requested For Bidding will be analyzed. After the request has been analyzed, the bidder will be issued an **Authorization to Bid or Not for Bid Report**, approved by the Central Bureau of Construction and the Chief Procurement Officer that indicates which items have been approved For Bidding. If **Authorization to Bid** cannot be approved, the **Authorization to Bid or Not for Bid Report** will indicate the reason for denial.

ABOUT AUTHORIZATION TO BID

Firms that have not received an Authorization to Bid or Not For Bid Report within a reasonable time of complete and correct original document submittal should contact the Department as to the status. Firms unsure as to authorization status should call the Prequalification Section of the Bureau of Construction at the number listed at the end of these instructions.

ADDENDA AND REVISIONS

It is the bidder's responsibility to determine which, if any, addenda or revisions pertain to any project they may be bidding. Failure to incorporate all relevant addenda or revisions may cause the bid to be declared unacceptable.

Each addendum or revision will be included with the Electronic Plans and Proposals. Addenda and revisions will also be placed on the Addendum/Revision Checklist and each subscription service subscriber will be notified by e-mail of each addendum and revision issued.

The Internet is the Department's primary way of doing business. The subscription service emails are an added courtesy the Department provides. It is suggested that bidders check IDOT's website at http://www.idot.illinois.gov/doing-business/procurements/construction-services/construction-bulletins/transportation-bulletin/index#TransportationBulletin before submitting final bid information.

IDOT IS NOT RESPONSIBLE FOR ANY E-MAIL FAILURES.

Addenda questions may be directed to the Contracts Office at (217)782-7806 or DOT.D&Econtracts@illlinois.gov

Technical questions about downloading these files may be directed to Tim Garman at (217)524-1642 or Timothy.Garman@illinois.gov.

STANDARD GUIDELINES FOR SUBMITTING BIDS

- All pages should be single sided.
- Use the Cover Page that is provided in the Bid Proposal (posted on the IDOT Web Site) as the first page of your submitted bid. It has the item number in large bold type in the upper left-hand corner and lines provided for your company name and address in the upper right-hand corner.
- Do not use report covers, presentation folders or special bindings and do not staple multiple times on left side like a book. Use only 1 staple in the upper left hand corner. Make sure all elements of your bid are stapled together including the bid bond or guaranty check (if required).
- Do not include any certificates of eligibility, your authorization to bid, Addendum Letters or affidavit of availability.
- Do not include the Subcontractor Documentation with your bid (pages i – iii and pages a – g). This documentation is required only if you are awarded the project.
- Use the envelope cover sheet (provided with the proposal) as the cover for the proposal envelope.
- Do not rely on overnight services to deliver your proposal prior to 10 AM on letting day. It will not be read if it is delivered after 10 AM.
- Do not submit your Substance Abuse Prevention Program (SAPP) with your bid. If you are awarded the contract this form is to be submitted to the district engineer at the pre-construction conference.

BID SUBMITTAL CHECKLIST

☐ **Cover page** (the sheet that has the item number on it) **–** This should be the first page of your bid proposal, **followed by your bid (the Schedule of Prices/Pay Items).** If you are using special software or CBID to generate your schedule of prices, do not include the blank pages of the schedule of prices that came with the proposal package.

☐ **Page 4 (Item 9)** – Check "YES" if you will use a subcontractor(s) with an annual value over $50,000. Include the subcontractor(s) name, address, general type of work to be performed and the dollar amount. If you will use subcontractor(s) but are uncertain who or the dollar amount; check "YES" but leave the lines blank.

☐ **After page 4 –** Insert the following documents: The I**llinois Office Affidavit** (Not applicable to federally funded projects) followed by Cost Adjustments for Steel, Bituminous and Fuel (if applicable) and the Contractor Letter of Assent (if applicable). The general rule should be, if you don't know where it goes, put it after page 4.

☐ **Page 10 (Paragraph J)** – Check "YES" or "NO" whether your company has any business in Iran.

☐ **Page 10 (Paragraph K)** – (Not applicable to federally funded projects) List the name of the apprenticeship and training program sponsor holding the certificate of registration from the US Department of Labor. If no applicable program exists, please indicate the work/job category. Do not include certificates with your bid. Keep the certificates in your office in case they are requested by IDOT.

☐ **Page 11 (Paragraph L)** – A copy of your State Board of Elections certificate of registration is no longer required with your bid.

☐ **Page 11 (Paragraph M)** – Indicate if your company has hired a lobbyist in connection with the job for which you are submitting the bid proposal.

☐ **Page 12 (Paragraph C)** – This is a work sheet to determine if a completed Form A is required. It is not part of the form and you do not need to make copies for each completed Form A.

☐ **Pages 14-17 (Form A)** – One Form A (4 pages) is required for each applicable person in your company. Copies of the forms can be used and only need to be changed when the information changes. The certification signature and date must be original for each letting. **Do not staple the forms together**. If you answered "NO" to all of the questions in Paragraph C (page 12), complete the first section (page 14) with your company information and then sign and date the Not Applicable statement on page 17.

☐ **Page 18 (Form B)** - If you check "YES" to having other current or pending contracts it is acceptable to use the phrase, "See Affidavit of Availability on file". **Ownership Certification** (at the bottom of the page) - Check N/A if the Form A(s) you submitted accounts for 100 percent of the company ownership. Check YES if any percentage of ownership falls outside of the parameters that require reporting on the Form A. Checking NO indicates that the Form A(s) you submitted is not correct and you will be required to submit a revised Form A.

☐ **Page 20 (Workforce Projection)** – Be sure to include the Duration of the Project. It is acceptable to use the phrase "Per Contract Specifications".

☐ **Proposal Bid Bond –** (Insert after the proposal signature page) Submit your proposal Proposal Bid Bond (if applicable) using the current Proposal Bid Bond form provided in the proposal package. The Power of Attorney page should be stapled to the Proposal Bid Bond. If you are using an electronic bond, include your bid bond number on the Proposal Bid Bond and attach the Proof of Insurance printed from the Surety's Web Site.

☐ **Disadvantaged Business Utilization Plan and/or Good Faith Effort –** The last items in your bid should be the DBE Utilization Plan (SBE 2026), followed by the DBE Participation Statement (SBE 2025) and supporting paperwork. If you have documentation of a Good Faith Effort, it is to follow the SBE Forms.

The Bid Letting is now available in streaming Audio/Video from the IDOT Web Site. A link to the stream will be placed on the main page of the current letting on the day of the Letting. The stream will not begin until 10 AM. The actual reading of the bids does not begin until approximately 10:30 AM.

Following the Letting, the As-Read Tabulation of Bids will be posted by the end of the day. You will find the link on the main Web page for the current letting.

QUESTIONS: pre-letting up to execution of the contract

Contractor pre-qualification	217-782-3413
Small Business, Disadvantaged Business Enterprise (DBE)	217-785-4611
Contracts, Bids, Letting process or Internet downloads	217-782-7806
Estimates Unit	217-785-3483
Aeronautics	217-785-8515
IDNR (Land Reclamation, Water Resources, Natural Resources)	217-782-6302

QUESTIONS: following contract execution

Subcontractor documentation, payments	217-782-3413
Railroad Insurance	217-785-0275

RETURN WITH BID

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Proposal Submitted By
Name
Address
City

Letting January 30, 15

NOTICE TO PROSPECTIVE BIDDERS
This proposal can be used for bidding purposes by only those companies that request and receive written AUTHORIZATION TO BID from IDOT's Central Bureau of Construction.
BIDDERS NEED NOT RETURN THE ENTIRE PROPOSAL

Notice to Bidders, Specifications, Proposal, Contract and Contract Bond

Illinois Department of Transportation

Springfield, Illinois 62764

Contract No. 62A43
KANE County
Section N/A
Various Routes
District 1 Other

PLEASE MARK THE APPROPRIATE BOX BELOW:

☐ A Bid Bond is included.

☐ A Cashier's Check or a Certified Check is included.

☐ An Annual Bid Bond is included or is on file with IDOT.

Prepared by

S

Checked by

(Printed by authority of the State of Illinois)

Page intentionally left blank

RETURN WITH BID

Illinois Department of Transportation

PROPOSAL

TO THE DEPARTMENT OF TRANSPORTATION

1. Proposal of _____

   _____

   Taxpayer Identification Number (Mandatory) _____

   For the improvement identified and advertised for bids in the Invitation for Bids as:

   Contract No. 62A43
   KANE County
   Section N/A
   Various Routes
   District 1 Other

This project consists of the final design, manufacture, documentation, delivery, demonstration, testing, and interface coordination for the signal system upgrades of two controlled signal locations on Metra's Milwaukee District - West Line near Big Timber.

2. The undersigned bidder will furnish all labor, material and equipment to complete the above described project in a good and workmanlike manner as provided in the contract documents provided by the Department of Transportation. This proposal will become part of the contract and the terms and conditions contained in the contract documents will govern performance and payments.

RETURN WITH BID

3. **ASSURANCE OF EXAMINATION AND INSPECTION/WAIVER.** The undersigned bidder further declares that he/she has carefully examined the proposal, plans, specifications, addenda, form of contract and contract bond, and special provisions, and that he/she has inspected in detail the site of the proposed work, and that he/she has familiarized themselves with all of the local conditions affecting the contract and the detailed requirements of construction, and understands that in making this bid proposal he/she waives all right to plead any misunderstanding regarding the same.

4. **EXECUTION OF CONTRACT AND CONTRACT BOND.** The undersigned bidder further agrees to execute a contract for this work and present the same to the department within fifteen (15) days after the contract has been mailed to him/her. The undersigned further agrees that he/she and his/her surety will execute and present within fifteen (15) days after the contract has been mailed to him/her contract bond satisfactory to and in the form prescribed by the Department of Transportation, in the penal sum of the full amount of the contract, or as specified in the special provisions, guaranteeing the faithful performance of the work in accordance with the terms of the contract.

5. **PROPOSAL GUARANTY.** Accompanying this proposal is either a bid bond on the department form, executed by a corporate surety company satisfactory to the department, or a proposal guaranty check consisting of a bank cashier's check or a properly certified check for not less than 5 per cent of the amount bid or for the amount specified in the following schedule:

Amount of Bid			Proposal Guaranty	Amount of Bid			Proposal Guaranty
Up to		$5,000	$150	$2,000,000	to	$3,000,000	$100,000
$5,000	to	$10,000	$300	$3,000,000	to	$5,000,000	$150,000
$10,000	to	$50,000	$1,000	$5,000,000	to	$7,500,000	$250,000
$50,000	to	$100,000	$3,000	$7,500,000	to	$10,000,000	$400,000
$100,000	to	$150,000	$5,000	$10,000,000	to	$15,000,000	$500,000
$150,000	to	$250,000	$7,500	$15,000,000	to	$20,000,000	$600,000
$250,000	to	$500,000	$12,500	$20,000,000	to	$25,000,000	$700,000
$500,000	to	$1,000,000	$25,000	$25,000,000	to	$30,000,000	$800,000
$1,000,000	to	$1,500,000	$50,000	$30,000,000	to	$35,000,000	$900,000
$1,500,000	to	$2,000,000	$75,000	over		$35,000,000	$1,000,000

Bank cashier's checks or properly certified checks accompanying bid proposals will be made payable to the Treasurer, State of Illinois.

If a combination bid is submitted, the proposal guaranties which accompany the individual bid proposals making up the combination will be considered as also covering the combination bid.

The amount of the proposal guaranty check is _____ $( ). If this proposal is accepted and the undersigned will fail to execute a contract bond as required herein, it is hereby agreed that the amount of the proposal guaranty will become the property of the State of Illinois, and shall be considered as payment of damages due to delay and other causes suffered by the State because of the failure to execute said contract and contract bond; otherwise, the bid bond will become void or the proposal guaranty check will be returned to the undersigned.

Attach Cashier's Check or Certified Check Here

In the event that one proposal guaranty check is intended to cover two or more bid proposals, the amount must be equal to the sum of the proposal guaranties which would be required for each individual proposal. If the guaranty check is placed in another bid proposal, state below where it may be found.

The proposal guaranty check will be found in the bid proposal for: Item _____

Section No. _____

County _____

Mark the proposal cover sheet as to the type of proposal guaranty submitted.

6. **COMBINATION BIDS.** The undersigned bidder further agrees that if awarded the contract for the sections contained in the following combination, he/she will perform the work in accordance with the requirements of each individual contract comprising the combination bid specified in the schedule below, and that the combination bid shall be prorated against each section in proportion to the bid submitted for the same. If an error is found to exist in the gross sum bid for one or more of the individual sections included in a combination, the combination bid shall be corrected as provided in the specifications.

When a combination bid is submitted, the schedule below must be completed in each proposal comprising the combination.

If alternate bids are submitted for one or more of the sections comprising the combination, a combination bid must be submitted for each alternate.

Schedule of Combination Bids

Combination No.	Sections Included in Combination	Combination Bid Dollars	Cents

7. **SCHEDULE OF PRICES.** The undersigned bidder submits herewith, in accordance with the rules and instructions, a schedule of prices for the items of work for which bids are sought. The unit prices bid are in U.S. dollars and cents, and all extensions and summations have been made. The bidder understands that the quantities appearing in the bid schedule are approximate and are provided for the purpose of obtaining a gross sum for the comparison of bids. If there is an error in the extension of the unit prices, the unit prices will govern. Payment to the contractor awarded the contract will be made only for actual quantities of work performed and accepted or materials furnished according to the contract. The scheduled quantities of work to be done and materials to be furnished may be increased, decreased or omitted as provided elsewhere in the contract.

8. **AUTHORITY TO DO BUSINESS IN ILLINOIS.** Section 20-43 of the Illinois Procurement Code (the Code) (30 ILCS 500/20-43) provides that a person (other than an individual acting as a sole proprietor) must be a legal entity authorized to transact business or conduct affairs in the State of Illinois prior to submitting the bid.

9. **EXECUTION OF CONTRACT**: The Department of Transportation will, in accordance with the rules governing Department procurements, execute the contract and shall be the sole entity having the authority to accept performance and make payments under the contract. Execution of the contract by the Chief Procurement Officer (CPO) or the State Purchasing Officer (SPO) is for approval of the procurement process and execution of the contract by the Department. Neither the CPO nor the SPO shall be responsible for administration of the contract or determinations respecting performance or payment there under except as otherwise permitted in the Code.

10. **The services of a subcontractor will be used.**

Check box Yes ☐
Check box No ☐

For known subcontractors with subcontracts with an annual value of more than $50,000, the contract shall include their name, address, general type of work to be performed, and the dollar allocation for each subcontractor. (30 ILCS 500/20-120)

_____

_____

RETURN WITH BID

Bid Tabulation

#	Description of Work	Percentage of Bid Price (BP)	Bid Price
A	The design upgrade for the Almora Interlocking location including: 1. A new relay signal house 2. Converting the location from a current solid state microprocessor to a new solid state microprocessor based location. 3. Positive Train Control (PTC) components incorporated into the upgrades. 4. A new remote signal house located at the east end of the Almora Interlocking near Signal 2L and 4L.	60% design = 10% (BP) 100% design = 10% (BP)	
B	The design upgrade for the Randall Holding Signal location including: 1. A new relay signal house 2. Converting the location from a hardwire relay based location, controlled by the existing Almora Interlocking, to a new solid state microprocessor based location. 3. Positive Train Control (PTC) components incorporated into the upgrades.	60% design = 10% (BP) 100% design = 10% (BP)	
C	The design upgrade for McLean Street Grade Crossing at MP 39.14 including: 1. Engineering to maintain the existing level of Grade Crossing operation 2. Materials/equipment to maintain the existing level of Grade Crossing operation	60% design = 10% (BP) 100% design = 10% (BP) All Materials 10% (BP)	

RETURN WITH BID

#	Description of Work	Percentage of Bid Price (BP)	Bid Price
D	The Almora Interlocking East Remote MP 39.70 signal equipment including: 1. 10'X14' (min.) signal house 2. One (1) three track signal bridge equipped with color light LED home signals with foundations 3. Two (2) mast mounted color light LED home signals with foundations 4. Five (5) low voltage Dual Control switch machines with biased neutral controller and ground layouts 5. Five (5) natural gas hot air snow melter layouts complete with all necessary ductwork, piping and hardware 6. Five (5) Solid State Coded Track Units 7. Local, express, power, hardwire and communication cables 8. ATCS Radio code system 9. Tilt down antenna tower with foundation 10. All PTC components	All Materials 10% (BP)	
E	The Almora Interlocking 39.70 signal equipment including: 1. 10X12 signal house (minimum) 2. One (1) three track signal bridge equipped with colorlight LED home signals with foundation 3. Five (5) low voltage Dual Control switch machines with biased neutral controller and ground layouts 4. Five (5) natural gas switch heater layouts complete with all necessary ductwork and hardware. 5. Solid State Coded Track Units 6. Local, express, power, hardwire and fiber optic communication cable 7. ATCS Radio code system 8. Tilt down antenna tower with foundation 9. All PTC components	All Materials 10% (BP)	

RETURN WITH BID

#	Description of Work	Percentage of Bid Price (BP)	Bid Price
F	The Randall Holding Signal 40.25 signal equipment including: 1. 10X12 signal house (minimum) 2. Two (2) mast mounted colorlight LED home signals with foundation 3. Solid State Coded Track Units 4. Local, express, power, hardwire and fiber optic communication cable 5. ATCS Radio code system 6. Tilt down antenna tower with foundation 7. All PTC components	All Materials 10% (BP)	
	VENDOR'S BID PRICE		
	ALLOWANCE FOR UNFORSEEN CONDITIONS		$150,000.00
	TOTAL BID PRICE (WITH ALLOWANCE)		

RETURN WITH BID

STATE REQUIRED ETHICAL STANDARDS GOVERNING CONTRACT PROCUREMENT: ASSURANCES, CERTIFICATIONS AND DISCLOSURES

I. GENERAL

A. Article 50 of the Code establishes the duty of all State CPOs, SPOs, and their designees to maximize the value of the expenditure of public moneys in procuring goods, services, and contracts for the State of Illinois and to act in a manner that maintains the integrity and public trust of State government. In discharging this duty, they are charged by law to use all available information, reasonable efforts, and reasonable actions to protect, safeguard, and maintain the procurement process of the State of Illinois.

B. In order to comply with the provisions of Article 50 and to carry out the duty established therein, all bidders are to adhere to ethical standards established for the procurement process, and to make such assurances, disclosures and certifications required by law. Except as otherwise required in subsection III, paragraphs J-M, by execution of the Proposal Signature Sheet, the bidder indicates that each of the mandated assurances have been read and understood, that each certification is made and understood, and that each disclosure requirement has been understood and completed.

C. In addition to all other remedies provided by law, failure to comply with any assurance, failure to make any disclosure or the making of a false certification shall be grounds for the CPO to void the contract, and may result in the suspension or debarment of the bidder or subcontractor. If a false certification is made by a subcontractor the contractor's submitted bid and the executed contract may not be declared void unless the contractor refuses to terminate the subcontract upon the State's request after a finding that the subcontractor's certification was false.

☐ I acknowledge, understand and accept these terms and conditions.

II. ASSURANCES

The assurances hereinafter made by the bidder are each a material representation of fact upon which reliance is placed should the Department enter into the contract with the bidder.

A. Conflicts of Interest

Section 50-13. Conflicts of Interest.

(a) Prohibition. It is unlawful for any person holding an elective office in this State, holding a seat in the General Assembly, or appointed to or employed in any of the offices or agencies of state government and who receives compensation for such employment in excess of 60% of the salary of the Governor of the State of Illinois, or who is an officer or employee of the Capital Development Board or the Illinois State Toll Highway Authority, or who is the spouse or minor child of any such person to have or acquire any contract, or any direct pecuniary interest in any contract therein, whether for stationery, printing, paper, or any services, materials, or supplies, that will be wholly or partially satisfied by the payment of funds appropriated by the General Assembly of the State of Illinois or in any contract of the Capital Development Board or the Illinois State Toll Highway Authority.

(b) Interests. It is unlawful for any firm, partnership, association or corporation, in which any person listed in subsection (a) is entitled to receive (i) more than 7 1/2% of the total distributable income or (ii) an amount in excess of the salary of the Governor, to have or acquire any such contract or direct pecuniary interest therein.

(c) Combined interests. It is unlawful for any firm, partnership, association, or corporation, in which any person listed in subsection (a) together with his or her spouse or minor children is entitled to receive (i) more than 15%, in the aggregate, of the total distributable income or (ii) an amount in excess of 2 times the salary of the Governor, to have or acquire any such contract or direct pecuniary interest therein.

(d) Securities. Nothing in this Section invalidates the provisions of any bond or other security previously offered or to be offered for sale or sold by or for the State of Illinois.

(e) Prior interests. This Section does not affect the validity of any contract made between the State and an officer or employee of the State or member of the General Assembly, his or her spouse, minor child or any combination of those persons if that contract was in existence before his or her election or employment as an officer, member, or employee. The contract is voidable, however, if it cannot be completed within 365 calendar days after the officer, member, or employee takes office or is employed. The current salary of the Governor is $177,412.00. Sixty percent of the salary is $106,447.20.

The bidder assures the Department that the award and execution of the contract would not cause a violation of Section 50-13, or that an effective exemption has been issued by the Board of Ethics to any individual subject to the Section 50-13 prohibitions pursuant to the provisions of Section 50-20 of the Code. Information concerning the exemption process is available from the Department upon request.

B. Negotiations

Section 50-15. Negotiations.

It is unlawful for any person employed in or on a continual contractual relationship with any of the offices or agencies of State government to participate in contract negotiations on behalf of that office or agency with any firm, partnership, association, or corporation with whom that person has a contract for future employment or is negotiating concerning possible future employment.

The bidder assures the Department that the award and execution of the contract would not cause a violation of Section 50-15, and that the bidder has no knowledge of any facts relevant to the kinds of acts prohibited therein.

C. Inducements

Section 50-25. Inducement.

Any person who offers or pays any money or other valuable thing to any person to induce him or her not to provide a submission to a vendor portal or to bid for a State contract or as recompense for not having bid on a State contract is guilty of a Class 4 felony. Any person who accepts any money or other valuable thing for not bidding for a State contract, not making a submission to a vendor portal, or who withholds a bid or submission to a vendor portal in consideration of the promise for the payment of money or other valuable thing is guilty of a Class 4 felony.

The bidder assures the Department that the award and execution of the contract would not cause a violation of Section 50-25, and that the bidder has no knowledge of any facts relevant to the kinds of acts prohibited therein.

D. Revolving Door Prohibition

Section 50-30. Revolving door prohibition.

CPOs, SPOs, procurement compliance monitors, their designees whose principal duties are directly related to State procurement, and executive officers confirmed by the Senate are expressly prohibited for a period of 2 years after terminating an affected position from engaging in any procurement activity relating to the State agency most recently employing them in an affected position for a period of at least 6 months. The prohibition includes, but is not limited to: lobbying the procurement process; specifying; bidding; proposing bid, proposal, or contract documents; on their own behalf or on behalf of any firm, partnership, association, or corporation. This Section applies only to persons who terminate an affected position on or after January 15, 1999.

The bidder assures the Department that the award and execution of the contract would not cause a violation of Section 50-30, and that the bidder has no knowledge of any facts relevant to the kinds of acts prohibited therein.

E. Reporting Anticompetitive Practices

Section 50-40. Reporting anticompetitive practices.

When, for any reason, any vendor, bidder, contractor, CPO, SPO, designee, elected official, or State employee suspects collusion or other anticompetitive practice among any bidders, offerors, contractors, proposers, or employees of the State, a notice of the relevant facts shall be transmitted to the Attorney General and the CPO.

The bidder assures the Department that it has not failed to report any relevant facts concerning the practices addressed in Section 50-40 which may involve the contract for which the bid or submission to a vendor portal is submitted.

F. Confidentiality

Section 50-45. Confidentiality.

Any CPO, SPO, designee, or executive officer who willfully uses or allows the use of specifications, competitive bid documents, proprietary competitive information, proposals, contracts, or selection information to compromise the fairness or integrity of the procurement, bidding, or contract process shall be subject to immediate dismissal, regardless of the Personnel code, any contract, or any collective bargaining agreement, and may in addition be subject to criminal prosecution.

The bidder assures the Department that it has no knowledge of any fact relevant to the practices addressed in Section 50-45 which may involve the contract for which the bid is submitted.

G. Insider Information

Section 50-50. Insider information.

It is unlawful for any current or former elected or appointed State official or State employee to knowingly use confidential information available only by virtue of that office or employment for actual or anticipated gain for themselves or another person.

The bidder assures the Department that it has no knowledge of any facts relevant to the practices addressed in Section 50-50 which may involve the contract for which the bid is submitted.

☐ I acknowledge, understand and accept these terms and conditions for the above assurances.

III. CERTIFICATIONS

The certifications hereinafter made by the bidder are each a material representation of fact upon which reliance is placed should the Department enter into the contract with the bidder. Section 50-2 of the Code provides that every person that has entered into a multi-year contract and every subcontractor with a multi-year subcontract shall certify, by July 1 of each fiscal year covered by the contract after the initial fiscal year, to the responsible CPO whether it continues to satisfy the requirements of Article 50 pertaining to the eligibility for a contract award. If a contractor or subcontractor is not able to truthfully certify that it continues to meet all requirements, it shall provide with its certification a detailed explanation of the circumstances leading to the change in certification status. A contractor or subcontractor that makes a false statement material to any given certification required under Article 50 is, in addition to any other penalties or consequences prescribed by law, subject to liability under the Whistleblower Reward and Protection Act for submission of a false claim.

A. Bribery

Section 50-5. Bribery.

(a) Prohibition. No person or business shall be awarded a contract or subcontract under this Code who:

(1) has been convicted under the laws of Illinois or any other state of bribery or attempting to bribe an officer or employee of the State of Illinois or any other state in that officer's or employee's official capacity; or

(2) has made an admission of guilt of that conduct that is a matter of record but has not been prosecuted for that conduct.

(b) Businesses. No business shall be barred from contracting with any unit of State or local government, or subcontracting under such a contract, as a result of a conviction under this Section of any employee or agent of the business if the employee or agent is no longer employed by the business and:

(1) the business has been finally adjudicated not guilty; or

(2) the business demonstrates to the governmental entity with which it seeks to contract, or which is signatory to the contract which the subcontract relates, and that entity finds that the commission of the offense was not authorized, requested, commanded, or performed by a director, officer, or high managerial agent on behalf of the business as provided in paragraph (2) of subsection (a) of Section 5-4 of the Criminal Code of 2012.

(c) Conduct on behalf of business. For purposes of this Section, when an official, agent, or employee of a business committed the bribery or attempted bribery on behalf of the business and in accordance with the direction or authorization of a responsible official of the business, the business shall be chargeable with the conduct.

(d) Certification. Every bid submitted to and contract executed by the State, and every subcontract subject to Section 20-120 of the Code shall contain a certification by the contractor or the subcontractor, respectively, that the contractor or subcontractor is not barred from being awarded a contract or subcontract under this Section and acknowledges that the CPO may declare the related contract void if any certifications required by this Section are false. A contractor who makes a false statement, material to the certification, commits a Class 3 felony.

The contractor or subcontractor certifies that it is not barred from being awarded a contract under Section 50-5.

B. Felons

Section 50-10. Felons.

(a) Unless otherwise provided, no person or business convicted of a felony shall do business with the State of Illinois or any State agency, or enter into a subcontract, from the date of conviction until 5 years after the date of completion of the sentence for that felony, unless no person held responsible by a prosecutorial office for the facts upon which the conviction was based continues to have any involvement with the business.

(b) Certification. Every bid submitted to and contract executed by the State and every subcontract subject to Section 20-120 of the Code and every vendor's submission to a vendor portal shall contain a certification by the bidder or contractor or subcontractor, respectively, that the bidder, contractor, or subcontractor is not barred from being awarded a contract or subcontract under this Section and acknowledges that the CPO may declare the related contract void if any of the certifications required by this Section are false.

C. Debt Delinquency

Section 50-11 and 50-12. Debt Delinquency.

The contractor or bidder or subcontractor, respectively, certifies that it, or any affiliate, is not barred from being awarded a contract or subcontract under the Code. Section 50-11 prohibits a person from entering into a contract with a State agency, or entering into a subcontract, if it knows or should know that it, or any affiliate, is delinquent in the payment of any debt to the State as defined by the Debt Collection Board. Section 50-12 prohibits a person from entering into a contract with a State agency, or entering into a subcontract, if it, or any affiliate, has failed to collect and remit Illinois Use Tax on all sales of tangible personal property into the State of Illinois in accordance with the provisions of the Illinois Use Tax Act. The bidder or contractor or subcontractor, respectively, further acknowledges that the CPO may declare the related contract void if this certification is false or if the bidder, contractor, or subcontractor, or any affiliate, is determined to be delinquent in the payment of any debt to the State during the term of the contract.

D. Prohibited Bidders, Contractors and Subcontractors

Section 50-10.5 and 50-60(c). Prohibited bidders, contractors and subcontractors.

The bidder or contractor or subcontractor, respectively, certifies in accordance with Section 50-10.5 that no officer, director, partner or other managerial agent of the contracting business has been convicted of a felony under the Sarbanes-Oxley Act of 2002 or a Class 3 or Class 2 felony under the Illinois Securities Law of 1953 or if in violation of Subsection (c) for a period of five years from the date of conviction. Every bid submitted to and contract executed by the State and every subcontract subject to Section 20-120 of the Code shall contain a certification by the bidder, contractor, or subcontractor, respectively, that the bidder, contractor, or subcontractor is not barred from being awarded a contract or subcontract under this Section and acknowledges that the CPO shall declare the related contract void if any of the certifications completed pursuant to this Section are false.

E. Section 42 of the Environmental Protection Act

Section 50-14 Environmental Protection Act violations.

The bidder or contractor or subcontractor, respectively, certifies in accordance with Section 50-14 that the bidder, contractor, or subcontractor, is not barred from being awarded a contract or entering into a subcontract under this Section which prohibits the bidding on or entering into contracts with the State of Illinois or a State agency, or entering into any subcontract, that is subject to the Code by a person or business found by a court or the Pollution Control Board to have committed a willful or knowing violation of Section 42 of the Environmental Protection Act for a period of five years from the date of the order. The bidder or contractor or subcontractor, respectively, acknowledges that the CPO may declare the contract void if this certification is false.

F. Educational Loan

Section 3 of the Educational Loan Default Act, 5 ILCS 385/3.

Pursuant to the Educational Loan Default Act no State agency shall contract with an individual for goods or services if that individual is in default on an educational loan.

The bidder, if an individual as opposed to a corporation, partnership or other form of business organization, certifies that the bidder is not in default on an educational loan as provided in Section 3 of the Act.

G. Bid-Rigging/Bid Rotating

Section 33E-11 of the Criminal Code of 2012, 720 ILCS 5/33E-11.:

(a) Every bid submitted to and public contract executed pursuant to such bid by the State or a unit of local government shall contain a certification by the prime contractor that the prime contractor is not barred from contracting with any unit of State or local government as a result of a violation of either Section 33E-3 or 33E-4 of this Article

(b) A contractor who makes a false statement, material to the certification, commits a Class 3 felony.

A violation of Section 33E-3 would be represented by a conviction of the crime of bid-rigging which, in addition to Class 3 felony sentencing, provides that any person convicted of this offense or any similar offense of any state or the United States which contains the same elements as this offense shall be barred for 5 years from the date of conviction from contracting with any unit of State or local government. No corporation shall be barred from contracting with any unit of State or local government as a result of a conviction under this Section of any employee or agent of such corporation if the employee so convicted is no longer employed by the corporation and: (1) it has been finally adjudicated not guilty or (2) if it demonstrates to the governmental entity with which it seeks to contract and that entity finds that the commission of the offense was neither authorized, requested, commanded, nor performed by a director, officer or a high managerial agent in behalf of the corporation.

The bidder certifies that it is not barred from contracting with the Department by reason of a violation of either Section 33E-3 or Section 33E-4.

H. International Anti-Boycott

Section 5 of the International Anti-Boycott Certification Act provides every contract entered into by the State of Illinois for the manufacture, furnishing, or purchasing of supplies, material, or equipment or for the furnishing of work, labor, or services, in an amount exceeding the threshold for small purchases according to the purchasing laws of this State or $10,000.00, whichever is less, shall contain certification, as a material condition of the contract, by which the contractor agrees that neither the contractor nor any substantially-owned affiliated company is participating or shall participate in an international boycott in violation of the provisions of the U.S. Export Administration Act of 1979 or the regulations of the U.S. Department of Commerce promulgated under that Act.

The bidder makes the certification set forth in Section 5 of the Act.

I. Drug Free Workplace

The Illinois "Drug Free Workplace Act" applies to this contract and it is necessary to comply with the provisions of the "Act" if the contractor is a corporation, partnership, or other entity (including a sole proprietorship) which has 25 or more employees.

The bidder certifies that if awarded a contract in excess of $5,000 it will provide a drug free workplace in compliance with the provisions of the Act.

J. Disclosure of Business Operations in Iran

Section 50-36 of the Code provides that each bid, offer, or proposal submitted for a State contract shall include a disclosure of whether or not the Company acting as the bidder, offeror, or proposing entity, or any of its corporate parents or subsidiaries, within the 24 months before submission of the bid, offer, or proposal had business operations that involved contracts with or provision of supplies or services to the Government of Iran, companies in which the Government of Iran has any direct or indirect equity share, consortiums or projects commissioned by the Government of Iran, or companies involved in consortiums or projects commissioned by the Government of Iran and either of the following conditions apply:

(1) More than 10% of the Company's revenues produced in or assets located in Iran involve oil-related activities or mineral-extraction activities; less than 75% of the Company's revenues produced in or assets located in Iran involve contracts with or provision of oil-related or mineral-extraction products or services to the Government of Iran or a project or consortium created exclusively by that government; and the Company has failed to take substantial action.

(2) The Company has, on or after August 5, 1996, made an investment of $20 million or more, or any combination of investments of at least $10 million each that in the aggregate equals or exceeds $20 million in any 12-month period, which directly or significantly contributes to the enhancement of Iran's ability to develop petroleum resources of Iran.

The terms "Business operations", "Company", "Mineral-extraction activities", "Oil-related activities", "Petroleum resources", and "Substantial action" are all defined in the Code.

Failure to make the disclosure required by the Code may cause the bid, offer or proposal to be considered not responsive. The disclosure will be considered when evaluating the bid or awarding the contract. The name of each Company disclosed as doing business or having done business in Iran will be provided to the State Comptroller.

Check the appropriate statement:

/___/ Company has no business operations in Iran to disclose.

/___/ Company has business operations in Iran as disclosed on the attached document.

K. Apprenticeship and Training Certification (Does not apply to federal aid projects)

In accordance with the provisions of Section 30-22 (6) of the Code, the bidder certifies that it is a participant, either as an individual or as part of a group program, in the approved apprenticeship and training programs applicable to each type of work or craft that the bidder will perform with its own forces. The bidder further certifies for work that will be performed by subcontract that each of its subcontractors submitted for approval either (a) is, at the time of such bid, participating in an approved, applicable apprenticeship and training program; or (b) will, prior to commencement of performance of work pursuant to this contract, begin participation in an approved apprenticeship and training program applicable to the work of the subcontract. The Department, at any time before or after award, may require the production of a copy of each applicable Certificate of Registration issued by the United States Department of Labor evidencing such participation by the contractor and any or all of its subcontractors. Applicable apprenticeship and training programs are those that have been approved and registered with the United States Department of Labor. The bidder shall list in the space below, the official name of the program sponsor holding the Certificate of Registration for all of the types of work or crafts in which the bidder is a participant and that will be performed with the bidder's forces. Types of work or craft work that will be subcontracted shall be included and listed as subcontract work. The list shall also indicate any type of work or craft job category that does not have an applicable apprenticeship or training program. **The bidder is responsible for making a complete report and shall make certain that each type of work or craft job category that will be utilized on the project as reported on the Construction Employee Workforce Projection (Form BC-1256) and returned with the bid is accounted for and listed.**

Additionally, Section 30-22 of the Code requires that the bidder certify that an Illinois office be maintained as the primary place of employment for persons employed for this contract.

_____

_____

_____

The requirements of these certifications and disclosures are a material part of the contract, and the contractor shall require these certification provisions to be included in all approved subcontracts. In order to fulfill this requirement, it shall not be necessary that an applicable program sponsor be currently taking, or that it will take applications for apprenticeship, training or employment during the performance of the work of this contract.

L. Political Contributions and Registration with the State Board of Elections

Sections 20-160 and 50-37 of the Code regulate political contributions from business entities and any affiliated entities or affiliated persons bidding on or contracting with the state. Generally under Section 50-37, any business entity, and any affiliated entity or affiliated person of the business entity, whose current year contracts with all state agencies exceed an awarded value of $50,000, are prohibited from making any contributions to any political committees established to promote the candidacy of the officeholder responsible for the awarding of the contracts or any other declared candidate for that office for the duration of the term of office of the incumbent officeholder or a period 2 years after the termination of the contract, whichever is longer. Any business entity and affiliated entities or affiliated persons whose state contracts in the current year do not exceed an awarded value of $50,000, but whose aggregate pending bids and proposals on state contracts exceed $50,000, either alone or in combination with contracts not exceeding $50,000, are prohibited from making any political contributions to any political committee established to promote the candidacy of the officeholder responsible for awarding the pending contract during the period beginning on the date the invitation for bids or request for proposals or any other procurement opportunity is issued and ending on the day after the date of award or selection if the entity was not awarded or selected. Section 20-160 requires certification of registration of affected business entities in accordance with procedures found in Section 9-35 of The Election Code.

By submission of a bid, the contractor business entity acknowledges and agrees that it has read and understands Sections 20-160 and 50-37 of the Code, and that it makes the following certification:

The undersigned bidder certifies that it has registered as a business with the State Board of Elections and acknowledges a continuing duty to update the registration in accordance with the above referenced statutes. If the business entity is required to register, the CPO shall verify that it is in compliance on the date the bid or proposal is due. The CPO shall not accept a bid or proposal if the business entity is not in compliance with the registration requirements.

These requirements and compliance with the above referenced statutory sections are a material part of the contract, and any breach thereof shall be cause to void the contract under Section 50-60 of the Code. This provision does not apply to Federal-aid contracts.

M. Lobbyist Disclosure

Section 50-38 of the Code requires that any bidder or offeror on a State contract that hires a person required to register under the Lobbyist Registration Act to assist in obtaining a contract shall:

(i) Disclose all costs, fees, compensation, reimbursements, and other remunerations paid or to be paid to the lobbyist related to the contract,

(ii) Not bill or otherwise cause the State of Illinois to pay for any of the lobbyist's costs, fees, compensation, reimbursements, or other remuneration, and

(iii) Sign a verification certifying that none of the lobbyist's costs, fees, compensation, reimbursements, or other remuneration were billed to the State.

This information, along with all supporting documents, shall be filed with the agency awarding the contract and with the Secretary of State. The CPO shall post this information, together with the contract award notice, in the online Procurement Bulletin.

Pursuant to Subsection (c) of this Section, no person or entity shall retain a person or entity to attempt to influence the outcome of a procurement decision made under the Code for compensation contingent in whole or in part upon the decision or procurement. Any person who violates this subsection is guilty of a business offense and shall be fined not more than $10,000.

Bidder acknowledges that it is required to disclose the hiring of any person required to register pursuant to the Illinois Lobbyist Registration Act (25 ILCS 170) in connection with this contract.

☐ Bidder has not hired any person required to register pursuant to the Illinois Lobbyist Registration Act in connection with this contract.

Or

☐ Bidder has hired the following persons required to register pursuant to the Illinois Lobbyist Registration Act in connection with the contract:

Name and address of person: _____

All costs, fees, compensation, reimbursements and other remuneration paid to said person: _____

_____

_____

_____

☐ I acknowledge, understand and accept these terms and conditions for the above certifications.

IV. DISCLOSURES

A. The disclosures hereinafter made by the bidder are each a material representation of fact upon which reliance is placed should the Department enter into the contract with the bidder. The bidder further certifies that the Department has received the disclosure forms for each bid.

The CPO may void the bid, or contract, respectively, if it is later determined that the bidder or subcontractor rendered a false or erroneous disclosure. A contractor or subcontractor may be suspended or debarred for violations of the Code. Furthermore, the CPO may void the contract and the surety providing the performance bond shall be responsible for completion of the contract.

B. Financial Interests and Conflicts of Interest

1. Section 50-35 of the Code provides that all bids of more than $50,000 and all submissions to a vendor portal shall be accompanied by disclosure of the financial interests of the bidder. This disclosed information for the successful bidder, will be maintained as public information subject to release by request pursuant to the Freedom of Information Act, filed with the Procurement Policy Board, and shall be incorporated as a material term of the contract. Furthermore, pursuant to Section 5-5, the Procurement Policy Board may review a proposal, bid, or contract and issue a recommendation to void a contract or reject a proposal or bid based on any violation of the Code or the existence of a conflict of interest as provided in subsections (b) and (d) of Section 50-35.

The financial interests to be disclosed shall include ownership or distributive income share that is in excess of 5%, or an amount greater than 60% of the annual salary of the Governor, of the bidding entity or its parent entity, whichever is less, unless the contractor or bidder is a publicly traded entity subject to Federal 10K reporting, in which case it may submit its 10K disclosure in place of the prescribed disclosure. If a bidder is a privately held entity that is exempt from Federal 10K reporting, but has more than 100 shareholders, it may submit the information that Federal 10K companies are required to report, and list the names of any person or entity holding any ownership share that is in excess of 5%. The disclosure shall include the names, addresses, and dollar or proportionate share of ownership of each individual making the disclosure, their instrument of ownership or beneficial relationship, and notice of any potential conflict of interest resulting from the current ownership or beneficial interest of each individual making the disclosure having any of the relationships identified in Section 50-35 and on the disclosure form.
The current annual salary of the Governor is $177,412.00

In addition, all disclosures shall indicate any other current or pending contracts, proposals, leases, or other ongoing procurement relationships the bidding entity has with any other unit of state government and shall clearly identify the unit and the contract, proposal, lease, or other relationship.

2. Disclosure Forms. Disclosure Form A is attached for use concerning the individuals meeting the above ownership or distributive share requirements. A separate Disclosure Form A must be submitted with the bid for each individual meeting the above requirements. In addition, a second form (Disclosure Form B) provides for the disclosure of current or pending procurement relationships with other (non-IDOT) state agencies and a total ownership certification. **The forms must be included with each bid.**

C. Disclosure Form Instructions

Form A Instructions for Financial Information & Potential Conflicts of Interest

If the bidder is a publicly traded entity subject to Federal 10K reporting, the 10K Report may be submitted to meet the requirements of Form A. If a bidder is a privately held entity that is exempt from Federal 10K reporting, but has more than 100 shareholders, it may submit the information that Federal 10K companies are required to report, and list the names of any person or entity holding any ownership share that is in excess of 5%. If a bidder is not subject to Federal 10K reporting, the bidder must determine if any individuals are required by law to complete a financial disclosure form. To do this, the bidder should answer each of the following questions. A "YES" answer indicates Form A must be completed. If the answer to each of the following questions is "NO", then the NOT APPLICABLE STATEMENT on Form A must be signed and dated by an individual that is authorized to execute contracts for the bidding company. Note: These questions are for assistance only and are not required to be completed.

1. Does anyone in your organization have a direct or beneficial ownership share of greater than 5% of the bidding entity or parent entity? YES ___ NO ___
2. Does anyone in your organization have a direct or beneficial ownership share of less than 5%, but which has a value greater than 60% of the annual salary of the Governor? YES ___ NO___
3. Does anyone in your organization receive more than 60% of the annual salary of the Governor of the bidding entity's or parent entity's distributive income? YES ___ NO __

   (Note: Distributive income is, for these purposes, any type of distribution of profits. An annual salary is not distributive income.)

4. Does anyone in your organization receive greater than 5% of the bidding entity's or parent entity's total distributive income, but which is less than 60% of the annual salary of the Governor? YES ___ NO __

   (Note: Only one set of forms needs to be completed per individual per bid even if a specific individual would require a yes answer to more than one question.)

A "YES" answer to any of these questions requires the completion of Form A. The bidder must determine each individual in the bidding entity or the bidding entity's parent company that would cause the questions to be answered "Yes". Each form must be signed and dated by an individual that is authorized to execute contracts for your organization. The individual signing can be, but does not have to be, the individual for which the form is being completed. The bidder is responsible for the accuracy of any information provided.

If the answer to each of the above questions is "NO", then the NOT APPLICABLE STATEMENT of Form A must be signed and dated by an individual that is authorized to execute contracts for your company.

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Form B: Instructions for Identifying Other Contracts & Procurement Related Information

Disclosure Form B must be completed for each bid submitted by the bidding entity. *Note: Checking the NOT APPLICABLE STATEMENT on Form A does not allow the bidder to ignore Form B. Form B must be completed, checked, and dated or the bidder may be considered nonresponsive and the bid will not be accepted.*

The Bidder shall identify, by checking Yes or No on Form B, whether it has any pending contracts (including leases), bids, proposals, or other ongoing procurement relationship with any other (non-IDOT) State of Illinois agency. If "No" is checked, the bidder only needs to complete the check box on the bottom of Form B. If "Yes" is checked, the bidder must do one of the following:

Option I: If the bidder did not submit an Affidavit of Availability to obtain authorization to bid, the bidder must list all non-IDOT State of Illinois agency pending contracts, leases, bids, proposals, and other ongoing procurement relationships. These items may be listed on Form B or on an attached sheet(s). Do not include IDOT contracts. Contracts with cities, counties, villages, etc. are not considered State of Illinois agency contracts and are not to be included. Contracts with other State of Illinois agencies such as the Department of Natural Resources or the Capital Development Board must be included. Bidders who submit Affidavits of Availability are suggested to use Option II.

Option II: If the bidder is required and has submitted an Affidavit of Availability in order to obtain authorization to bid, the bidder may write or type "See Affidavit of Availability" which indicates that the Affidavit of Availability is incorporated by reference and includes all non-IDOT State of Illinois agency pending contracts, leases, bids, proposals, and other ongoing procurement relationships. For any contracts that are not covered by the Affidavit of Availability, the bidder must identify them on Form B or on an attached sheet(s). These might be such things as leases.

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ILLINOIS DEPARTMENT OF TRANSPORTATION

Form A
Financial Information & Potential Conflicts of Interest Disclosure

Contractor Name		
Legal Address		
City, State, Zip		
Telephone Number	Email Address	Fax Number (if available)

Disclosure of the information contained in this Form is required by Section 50-35 of the Code (30 ILCS 500). Vendors desiring to enter into a contract with the State of Illinois must disclose the financial information and potential conflict of interest information as specified in this Disclosure Form. This information shall become part of the publicly available contract file. This Form A must be completed for bids in excess of $50,000, and for all open-ended contracts. **A publicly traded company may submit a 10K disclosure (or equivalent if applicable) in satisfaction of the requirements set forth in Form A. See Disclosure Form Instructions.**

The current annual salary of the Governor is $177,412.00.

DISCLOSURE OF FINANCIAL INFORMATION

1. Disclosure of Financial Information. The individual named below has an interest in the BIDDER (or its parent) in terms of ownership or distributive income share in excess of 5%, or an interest which has a value of more than 60% of the annual salary of the Governor. **(Make copies of this form as necessary and attach a separate Disclosure Form A for each individual meeting these requirements)**

FOR INDIVIDUAL (type or print information)

NAME: _____

ADDRESS _____

_____

Type of ownership/distributable income share:

stock _____ sole proprietorship _____ Partnership _____ other: (explain on separate sheet):

% or $ value of ownership/distributable income share: _____

2. Disclosure of Potential Conflicts of Interest. Check "Yes" or "No" to indicate which, if any, of the following potential conflict of interest relationships apply. If the answer to any question is "Yes", please attach additional pages and describe.

(a) State employment, currently or in the previous 3 years, including contractual employment of services.
Yes ___No __

If your answer is yes, please answer each of the following questions.

1. Are you currently an officer or employee of either the Capitol Development Board or the Illinois State Toll Highway Authority? Yes ___No __

2. Are you currently appointed to or employed by any agency of the State of Illinois? If you are currently appointed to or employed by any agency of the State of Illinois, and your annual salary exceeds 60% of the annual salary of the Governor, provide the name the State agency for which you are employed and your annual salary. _____
_____

3. If you are currently appointed to or employed by any agency of the State of Illinois, and your annual salary exceeds 60% of the annual salary of the Governor, are you entitled to receive (i) more than 7 1/2% of the total distributable income of your firm, partnership, association or corporation, or (ii) an amount in excess of 100% of the annual salary of the Governor?
   Yes ___No __

4. If you are currently appointed to or employed by any agency of the State of Illinois, and your annual salary exceeds 60% of the annual salary of the Governor, are you and your spouse or minor children entitled to receive (i) more than 15 % in the aggregate of the total distributable income of your firm, partnership, association or corporation, or (ii) an amount in excess of two times the salary of the Governor? Yes ___No __

(b) State employment of spouse, father, mother, son, or daughter, including contractual employment for services in the previous 2 years.
Yes ___No __

If your answer is yes, please answer each of the following questions.

1. Is your spouse or any minor children currently an officer or employee of the Capitol Development Board or the Illinois State Toll Highway Authority? Yes ___No __

2. Is your spouse or any minor children currently appointed to or employed by any agency of the State of Illinois? If your spouse or minor children is/are currently appointed to or employed by any agency of the State of Illinois, and his/her annual salary exceeds 60% of the annual salary of the Governor, provide the name of your spouse and/or minor children, the name of the State agency for which he/she is employed and his/her annual salary. _____
   _____

3. If your spouse or any minor children is/are currently appointed to or employed by any agency of the State of Illinois, and his/her annual salary exceeds 60% of the annual salary of the Governor, are you entitled to receive (i) more than 71/2% of the total distributable income of your firm, partnership, association or corporation, or (ii) an amount in excess of 100% of the annual salary of the Governor? Yes ___No __

4. If your spouse or any minor children are currently appointed to or employed by any agency of the State of Illinois, and his/her annual salary exceeds 60% of the annual salary of the Governor, are you and your spouse or minor children entitled to receive (i) more than 15 % in the aggregate of the total distributable income of your firm, partnership, association or corporation, or (ii) an amount in excess of two times the salary of the Governor?
   Yes ___No __

(c) Elective status; the holding of elective office of the State of Illinois, the government of the United States, any unit of local government authorized by the Constitution of the State of Illinois or the statutes of the State of Illinois currently or in the previous 3 years. Yes ___No __

(d) Relationship to anyone holding elective office currently or in the previous 2 years; spouse, father, mother, son, or daughter. Yes ___No __

(e) Appointive office; the holding of any appointive government office of the State of Illinois, the United States of America, or any unit of local government authorized by the Constitution of the State of Illinois or the statutes of the State of Illinois, which office entitles the holder to compensation in excess of the expenses incurred in the discharge of that office currently or in the previous 3 years. Yes ___No __

(f) Relationship to anyone holding appointive office currently or in the previous 2 years; spouse, father, mother, son, or daughter. Yes ___No __

(g) Employment, currently or in the previous 3 years, as or by any registered lobbyist of the State government.
Yes ___No __

(h) Relationship to anyone who is or was a registered lobbyist in the previous 2 years; spouse, father, mother, son, or daughter. Yes ___ No __

(i) Compensated employment, currently or in the previous 3 years, by any registered election or reelection committee registered with the Secretary of State or any county clerk of the State of Illinois, or any political action committee registered with either the Secretary of State or the Federal Board of Elections. Yes ___ No __

(j) Relationship to anyone; spouse, father, mother, son, or daughter; who was a compensated employee in the last 2 years by any registered election or re-election committee registered with the Secretary of State or any county clerk of the State of Illinois, or any political action committee registered with either the Secretary of State or the Federal Board of Elections. Yes ___ No __

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3. Communication Disclosure.

Disclose the name and address of each lobbyist and other agent of the bidder or offeror who is not identified in Section 2 of this form, who is has communicated, is communicating, or may communicate with any State officer or employee concerning the bid or offer. This disclosure is a continuing obligation and must be promptly supplemented for accuracy throughout the process and throughout the term of the contract. If no person is identified, enter "None" on the line below:

Name and address of person(s): _____

_____

_____

_____

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4. Debarment Disclosure. For each of the persons identified under Sections 2 and 3 of this form, disclose whether any of the following has occurred within the previous 10 years: debarment from contracting with any governmental entity; professional licensure discipline; bankruptcies; adverse civil judgments and administrative findings; and criminal felony convictions. This disclosure is a continuing obligation and must be promptly supplemented for accuracy throughout the procurement process and term of the contract. If no person is identified, enter "None" on the line below:

Name of person(s): _____

Nature of disclosure: _____
_____
_____
_____

APPLICABLE STATEMENT

This Disclosure Form A is submitted on behalf of the INDIVIDUAL named on previous page. Under penalty of perjury, I certify the contents of this disclosure to be true and accurate to the best of my knowledge.

Completed by: ☐ _____ _____
Signature of Individual or Authorized Representative — Date

NOT APPLICABLE STATEMENT

Under penalty of perjury, I have determined that no individuals associated with this organization meet the criteria that would require the completion of this Form A.

This Disclosure Form A is submitted on behalf of the CONTRACTOR listed on the previous page.

☐ _____ _____
Signature of Authorized Representative — Date

The bidder has a continuing obligation to supplement these disclosures under Sec. 50-35 of the Code.

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ILLINOIS DEPARTMENT OF TRANSPORTATION

Form B
Other Contracts & Financial Related Information Disclosure

Contractor Name		
Legal Address		
City, State, Zip		
Telephone Number	Email Address	Fax Number (if available)

Disclosure of the information contained in this Form is required by Section 50-35 of the Code (30 ILCS 500). This information shall become part of the publicly available contract file. This Form B must be completed for all bids.

DISCLOSURE OF OTHER CONTRACTS AND PROCUREMENT RELATED INFORMATION

1. Identifying Other Contracts & Procurement Related Information. The BIDDER shall identify whether it has any pending contracts (including leases), bids, proposals, or other ongoing procurement relationship with any other State of Illinois agency: Yes ___ No __
If "No" is checked, the bidder only needs to complete the signature box on this page.

2. If "Yes" is checked. Identify each such relationship by showing State of Illinois agency name and other descriptive information such as bid or project number (attach additional pages as necessary). SEE DISCLOSURE FORM INSTRUCTIONS:

THE FOLLOWING STATEMENT MUST BE CHECKED

☐ _____ _____
Signature of Authorized Representative Date

OWNERSHIP CERTIFICATION

Please certify that the following statement is true if the individuals for all submitted Form A disclosures do not total 100% of ownership.

Any remaining ownership interest is held by individuals receiving less than $106,447.20 of the bidding entity's or parent entity's distributive income or holding less than a 5% ownership interest.

☐ Yes ☐ No ☐ N/A (Form A disclosure(s) established 100% ownership)

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SPECIAL NOTICE TO CONTRACTORS

The following requirements of the Illinois Department of Human Rights Act are applicable to bidders on all construction contracts advertised by the Illinois Department of Transportation:

CONSTRUCTION EMPLOYEE UTILIZATION PROJECTION

(a) All bidders on construction contracts shall complete and submit, along with and as part of their bids, a Bidder's Employee Utilization Form (Form BC-1256) setting forth a projection and breakdown of the total workforce intended to be hired and/or allocated to such contract work by the bidder including a projection of minority and female employee utilization in all job classifications on the contract project.

(b) The Department of Transportation shall review the Employee Utilization Form, and workforce projections contained therein, of the contract awardee to determine if such projections reflect an underutilization of minority persons and/or women in any job classification in accordance with the Equal Employment Opportunity Clause and Title 44, Illinois Administrative Code, Section 750.120. If it is determined that the contract awardee's projections reflect an underutilization of minority persons and/or women in any job classification, it shall be advised in writing of the manner in which it is underutilizing and such awardee shall be considered to be in breach of the contract unless, prior to commencement of work on the contract project, it submits revised satisfactory projections or an acceptable written affirmative action plan to correct such underutilization including a specific timetable geared to the completion stages of the contract.

(c) The Department of Transportation shall provide to the Department of Human Rights a copy of the contract awardee's Employee Utilization Form, a copy of any required written affirmative action plan, and any written correspondence related thereto. The Department of Human Rights may review and revise any action taken by the Department of Transportation with respect to these requirements.

RETURN WITH BID

Illinois Department of Transportation

Contract No. 62A43
KANE County
Section N/A
Various Routes
District 1 Other

PART I. IDENTIFICATION

Dept. of Human Rights #_____ Duration of Project: _____

Name of Bidder: _____

PART II. WORKFORCE PROJECTION

A. The undersigned bidder has analyzed minority group and female populations, unemployment rates and availability of workers for the location in which this contract work is to be performed, and for the locations from which the bidder recruits employees, and hereby submits the following workforce projection including a projection for minority and female employee utilization in all job categories in the workforce to be allocated to this contract:

TABLE A

TOTAL Workforce Projection for Contract													TABLE B: CURRENT EMPLOYEES TO BE ASSIGNED TO CONTRACT			
			MINORITY EMPLOYEES						TRAINEES							
JOB CATEGORIES	TOTAL EMPLOYEES		BLACK		HISPANIC		*OTHER MINOR.		APPREN-TICES		ON THE JOB TRAINEES		TOTAL EMPLOYEES		MINORITY EMPLOYEES	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
OFFICIALS (MANAGERS)																
SUPERVISORS																
FOREMEN																
CLERICAL																
EQUIPMENT OPERATORS																
MECHANICS																
TRUCK DRIVERS																
IRONWORKERS																
CARPENTERS																
CEMENT MASONS																
ELECTRICIANS																
PIPEFITTERS, PLUMBERS																
PAINTERS																
LABORERS, SEMI-SKILLED																
LABORERS, UNSKILLED																
TOTAL																

TABLE C

TOTAL Training Projection for Contract								
EMPLOYEES IN TRAINING	TOTAL EMPLOYEES		BLACK		HISPANIC		*OTHER MINOR.	
	M	F	M	F	M	F	M	F
APPRENTICES								
ON THE JOB TRAINEES								

FOR DEPARTMENT USE ONLY

* Other minorities are defined as Asians (A) or Native Americans (N).
Please specify race of each employee shown in Other Minorities column.

BC 1256 (Rev. 12/11/07)

Note: See instructions on page 2

RETURN WITH BID

Contract No. 62A43
KANE County
Section N/A
Various Routes
District 1 Other

PART II. WORKFORCE PROJECTION - continued

B. Included in "Total Employees" under Table A is the total number of **new hires** that would be employed in the event the undersigned bidder is awarded this contract.

The undersigned bidder projects that: (number) _____ new hires would be recruited from the area in which the contract project is located; and/or (number) _____ new hires would be recruited from the area in which the bidder's principal office or base of operation is located.

C. Included in "Total Employees" under Table A is a projection of numbers of persons to be employed directly by the undersigned bidder as well as a projection of numbers of persons to be employed by subcontractors.

The undersigned bidder estimates that (number) _____ persons will be directly employed by the prime contractor and that (number) _____ persons will be employed by subcontractors.

PART III. AFFIRMATIVE ACTION PLAN

A. The undersigned bidder understands and agrees that in the event the foregoing minority and female employee utilization projection included under **PART II** is determined to be an underutilization of minority persons or women in any job category, and in the event that the undersigned bidder is awarded this contract, he/she will, prior to commencement of work, develop and submit a written Affirmative Action Plan including a specific timetable (geared to the completion stages of the contract) whereby deficiencies in minority and/or female employee utilization are corrected. Such Affirmative Action Plan will be subject to approval by the contracting agency and the **Illinois Department of Human Rights**.

B. The undersigned bidder understands and agrees that the minority and female employee utilization projection submitted herein, and the goals and timetable included under an Affirmative Action Plan if required, are deemed to be part of the contract specifications.

Company _____ Telephone Number _____

_____

Address _____

NOTICE REGARDING SIGNATURE

The Bidder's signature on the Proposal Signature Sheet will constitute the signing of this form. The following signature block needs to be completed if revisions are required.

Signature: ☐ _____ Title: _____ Date: _____

Instructions: All tables must include subcontractor personnel in addition to prime contractor personnel.

Table A - Include both the number of employees that would be hired to perform the contract work and the total number currently employed (Table B) that will be allocated to contract work, and include all apprentices and on-the-job trainees. The "Total Employees" column should include all employees including all minorities, apprentices and on-the-job trainees to be employed on the contract work.

Table B - Include all employees currently employed that will be allocated to the contract work including any apprentices and on-the-job trainees currently employed.

Table C - Indicate the racial breakdown of the total apprentices and on-the-job trainees shown in Table A.

BC-1256 (Rev. 12/11/07)

RETURN WITH BID
Contract No. 62A43
KANE County
Section N/A
Various Routes
District 1 Other

PROPOSAL SIGNATURE SHEET

The undersigned bidder hereby makes and submits this bid on the subject Proposal, thereby assuring the Department that all requirements of the Invitation for Bids and rules of the Department have been met, that there is no misunderstanding of the requirements of paragraph 3 of this Proposal, and that the contract will be executed in accordance with the rules of the Department if an award is made on this bid.

Firm Name _____

(IF AN INDIVIDUAL) Signature of Owner _____

Business Address _____

_____

Firm Name _____

By _____

(IF A CO-PARTNERSHIP) Business Address _____

_____

Name and Address of All Members of the Firm:

_____ _____

_____ _____

Corporate Name _____

By _____

Signature of Authorized Representative

_____

Typed or printed name and title of Authorized Representative

(IF A CORPORATION)

Attest _____

Signature

(IF A JOINT VENTURE, USE THIS SECTION FOR THE MANAGING PARTY AND THE SECOND PARTY SHOULD SIGN BELOW) Business Address _____

_____

Corporate Name _____

By _____

Signature of Authorized Representative

_____

Typed or printed name and title of Authorized Representative

(IF A JOINT VENTURE)

Attest _____

Signature

Business Address _____

_____

If more than two parties are in the joint venture, please attach an additional signature sheet.

Illinois Department of Transportation

Return with Bid

Division of Highways
Annual Proposal Bid Bond

This Annual Proposal Bid Bond shall become effective at 12:01 AM (CDST) on _____ and shall be valid until _____ 11:59 PM (CDST).

KNOW ALL PERSONS BY THESE PRESENTS, That We _____

as PRINCIPAL, and _____

as SURETY, and held jointly, severally and firmly bound unto the STATE OF ILLINOIS in the penal sum of 5 percent of the total bid price, or for the amount specified in the bid proposal under "Proposal Guaranty" in effect on the date of the Invitation for Bids, whichever is the lesser sum, well and truly to be paid unto said STATE OF ILLINOIS, for the payment of which we bind ourselves, our heirs, executors, administrators, successors and assigns.

THE CONDITION OF THE FOREGOING OBLIGATION IS SUCH that whereas, the PRINCIPAL may submit bid proposal(s) to the STATE OF ILLINOIS, acting through the Department of Transportation, for various improvements published in the Transportation Bulletin during the effective term indicated above.

NOW, THEREFORE, if the Department shall accept the bid proposal(s) of the PRINCIPAL; and if the PRINCIPAL shall, within the time and as specified in the bidding and contract documents; and if, after award by the Department, the PRINCIPAL shall enter into a contract in accordance with the terms of the bidding and contract documents including evidence of the required insurance coverages and providing such bond as specified with good and sufficient surety for the faithful performance of such contract and for the prompt payment of labor and material furnished in the prosecution thereof; or if, in the event of the failure of the PRINCIPAL to enter into such contract and to give the specified bond, the PRINCIPAL pays to the Department the difference not to exceed the penalty hereof between the amount specified in the bid proposal and such larger amount for which the Department may contract with another party to perform the work covered by said bid proposal, then this obligation shall be null and void, otherwise, it shall remain in full force and effect.

IN THE EVENT the Department determines the PRINCIPAL has failed to comply with any requirement as set forth in the preceding paragraph, then Surety shall pay the penal sum to the Department within fifteen (15) days of written demand therefor. If Surety does not make full payment within such period of time, the Department may bring an action to collect the amount owed. Surety is liable to the Department for all its expenses, including attorney's fees, incurred in any litigation in which it prevails either in whole or in part.

In TESTIMONY WHEREOF, the said PRINCIPAL has caused this instrument to be signed by its officer
_____ day of _____ A.D., _____.

_____
(Company Name)

By _____
(Signature and Title)

Notary for PRINCIPAL

STATE OF _____
COUNTY OF _____

Signed and attested before me on _____ (date)

by _____
(Name of Notary Public)

(Seal)

_____
(Signature of Notary Public)

_____
(Date Commission Expires)

In TESTIMONY WHEREOF, the said SURETY has caused this instrument to be signed by its officer
_____ day of _____ A.D., _____.

_____
(Company Name)

By _____
(Signature of Attorney-in-Fact)

Notary for SURETY

STATE OF _____
COUNTY OF _____

Signed and attested before me on _____ (date)

by _____
(Name of Notary Public)

(Seal)

_____
(Signature of Notary Public)

_____
(Date Commission Expires)

In lieu of completing the above section of the Annual Proposal Bid Bond form, the Principal may file an Electronic Bid Bond. By signing the proposal(s) the Principal is ensuring the identified electronic bid bond has been executed and the Principal and Surety are firmly bound unto the State of Illinois under the conditions of the bid bond as shown above.

Electronic Bid Bond ID #	Company/Bidder Name	Signature and Title

This bond may be terminated, at Surety's request, upon giving not less than thirty (30) days prior written notice of the cancellation/termination of the bond. Said written notice shall be issued to the Illinois Department of Transportation, Chief Contracts Official, 2300 South Dirksen Parkway, Springfield, Illinois, 62764, and shall be served in person, by receipted courier delivery or certified or registered mail, return receipt requested. Said notice period shall commence on the first calendar day following the Department's receipt of written cancellation/termination notice. Surety shall remain firmly bound to all obligations herein for proposals submitted prior to the cancellation/termination. Surety shall be released and discharged from any obligation(s) for proposals submitted for any letting or date after the effective date of cancellation/termination.

Illinois Department of Transportation

Return with Bid

Division of Highways
Proposal Bid Bond

Item No. _____

Letting Date _____

KNOW ALL PERSONS BY THESE PRESENTS, That We _____

as PRINCIPAL, and _____

as SURETY, and held jointly, severally and firmly bound unto the STATE OF ILLINOIS in the penal sum of 5 percent of the total bid price, or for the amount specified in the bid proposal under "Proposal Guaranty" in effect on the date of the Invitation for Bids, whichever is the lesser sum, well and truly to be paid unto said STATE OF ILLINOIS, for the payment of which we bind ourselves, our heirs, executors, administrators, successors and assigns.

THE CONDITION OF THE FOREGOING OBLIGATION IS SUCH that whereas, the PRINCIPAL has submitted a bid proposal to the STATE OF ILLINOIS, acting through the Department of Transportation, for the improvement designated by the Transportation Bulletin Item Number and Letting Date indicated above.

NOW, THEREFORE, if the Department shall accept the bid proposal of the PRINCIPAL; and if the PRINCIPAL shall, within the time and as specified in the bidding and contract documents; and if, after award by the Department, the PRINCIPAL shall enter into a contract in accordance with the terms of the bidding and contract documents including evidence of the required insurance coverages and providing such bond as specified with good and sufficient surety for the faithful performance of such contract and for the prompt payment of labor and material furnished in the prosecution thereof; or if, in the event of the failure of the PRINCIPAL to enter into such contract and to give the specified bond, the PRINCIPAL pays to the Department the difference not to exceed the penalty hereof between the amount specified in the bid proposal and such larger amount for which the Department may contract with another party to perform the work covered by said bid proposal, then this obligation shall be null and void, otherwise, it shall remain in full force and effect.

IN THE EVENT the Department determines the PRINCIPAL has failed to comply with any requirement as set forth in the preceding paragraph, then Surety shall pay the penal sum to the Department within fifteen (15) days of written demand therefor. If Surety does not make full payment within such period of time, the Department may bring an action to collect the amount owed. Surety is liable to the Department for all its expenses, including attorney's fees, incurred in any litigation in which it prevails either in whole or in part.

In TESTIMONY WHEREOF, the said PRINCIPAL has caused this instrument to be signed by its officer
_____ day of _____ A.D., _____.

_____
(Company Name)

By _____
(Signature and Title)

Notary for PRINCIPAL

STATE OF _____
COUNTY OF _____

Signed and attested before me on _____ (date)
by _____
(Name of Notary Public)

(Seal)

_____
(Signature of Notary Public)

_____
(Date Commission Expires)

In TESTIMONY WHEREOF, the said SURETY has caused this instrument to be signed by its officer
_____ day of _____ A.D., _____.

_____
(Company Name)

By _____
(Signature of Attorney-in-Fact)

Notary for SURETY

STATE OF _____
COUNTY OF _____

Signed and attested before me on _____ (date)
by _____
(Name of Notary Public)

(Seal)

_____
(Signature of Notary Public)

_____
(Date Commission Expires)

In lieu of completing the above section of the Proposal Bid Bond form, the Principal may file an Electronic Bid Bond. By signing the proposal the Principal is ensuring the identified electronic bid bond has been executed and the Principal and Surety are firmly bound unto the State of Illinois under the conditions of the bid bond as shown above.

Electronic Bid Bond ID #	Company/Bidder Name	Signature and Title

Illinois Department of Transportation

DBE Utilization Plan

(1) Policy

It is public policy that disadvantaged businesses as defined in 49 CFR Part 26 and the Special Provision shall have the maximum opportunity to participate in the performance of contracts financed in whole or in part with Federal or State funds. Consequently the requirements of 49 CFR Part 26 apply to this contract.

(2) Obligation

The contractor agrees to ensure that disadvantaged businesses as defined in 49 CFR Part 26 and the Special Provision have the maximum opportunity to participate in the performance of contracts or subcontracts financed in whole or in part with Federal or State funds. The contractor shall take all necessary and reasonable steps in accordance with 49 CFR Part 26 and the Special Provision to ensure that said businesses have the maximum opportunity to compete for and perform under this contract. The contractor shall not discriminate on the basis of race, color, national origin or sex in the award and performance of contracts.

(3) Project and Bid Identification

Complete the following information concerning the project and bid:

Route _____ Total Bid _____

Section _____ Contract DBE Goal _____ _____

(Percent) (Dollar Amount)

Project _____

County _____

Letting Date _____

Contract No. _____

Letting Item No. _____

(4) Assurance

I, acting in my capacity as an officer of the undersigned bidder (or bidders if a joint venture), hereby assure the Department that on this project my company : (check one)

☐ Meets or exceeds contract award goals and has provided documented participation as follows:

Disadvantaged Business Participation _____ percent

Attached are the signed participation statements, forms SBE 2025, required by the Special Provision evidencing availability and use of each business participating in this plan and assuring that each business will perform a commercially useful function in the work of the contract.

☐ Failed to meet contract award goals and has included good faith effort documentation to meet the goals and that my company has provided participation as follows:

Disadvantaged Business Participation _____ percent

The contract goals should be accordingly modified or waived. Attached is all information required by the Special Provision in support of this request including good faith effort. Also attached are the signed participation statements, forms SBE 2025, required by the Special Provision evidencing availability and use of each business participating in this plan and assuring that each business will perform a commercially useful function in the work of the contract.

_____
Company

By _____

Title _____

Date _____

The "as read" Low Bidder is required to comply with the Special Provision.

Submit only one utilization plan for each project. The utilization plan shall be submitted in accordance with the special provision.

Bureau of Small Business Enterprises
2300 South Dirksen Parkway
Springfield, Illinois 62764

Local Let Projects
Submit forms to the
Local Agency

The Department of Transportation is requesting disclosure of information that is necessary to accomplish the purpose as outlined under State and Federal law. Disclosure of this information is **REQUIRED**. Failure to provide any information will result in the contract not being awarded. This form has been approved by the State Forms Manager Center.

Illinois Department of Transportation

DBE Participation Statement

Subcontractor Registration Number _____ Letting _____

Participation Statement Item No. _____

(1) Instructions Contract No. _____

This form must be completed for each disadvantaged business participating in the Utilization Plan. This form shall be submitted in accordance with the special provision and will be attached to the Utilization Plan form. If additional space is needed complete an additional form for the firm.

(2) Work:

Please indicate: J/V _____ Manufacturer _____ Supplier (60%) _____ Subcontractor _____ Trucking _____

Pay Item No.	Description	Quantity	Unit Price	Total
			Total	

(3) Partial Payment Items (For any of the above items which are partial pay items)
Description must be sufficient to determine a Commercially Useful Function, specifically describe the work and subcontract dollar amount:

(4) Commitment
When a DBE is to be a second-tier subcontractor, or if the first-tier DBE subcontractor is going to be subcontracting a portion of its subcontract, it must be clearly indicated on the DBE Participation Statement, and the details of the transaction fully explained.

In the event a DBE subcontractor second-tiers a portion of its subcontract to one or more subcontractors during the work of a contract, the prime must submit a DBE Participation Statement, with the details of the transaction(s) fully explained.

The undersigned certify that the information included herein is true and correct, and that the DBE firm listed below has agreed to perform a commercially useful function in the work of the contract item(s) listed above and to execute a contract with the prime contractor or 1st Tier subcontractor. The undersigned further understand that no changes to this statement may be made without prior approval from the Department's Bureau of Small Business Enterprises and that complete and accurate information regarding actual work performed on this project and the payment therefore must be provided to the Department.

_____
Signature for Contractor __ 1st Tier __ 2nd Tier

Title _____

Date _____

Contact Person _____

Phone _____

Firm Name _____

Address _____

City/State/Zip _____

_____
Signature for DBE Firm __ 1st Tier __ 2nd Tier

Title _____

Date _____

Contact Person _____

Phone _____

Firm Name _____

Address _____

City/State/Zip _____

E _____

WC _____

The Department of Transportation is requesting disclosure of information that is necessary to accomplish the statutory purpose as outlined under the state and federal law. Disclosure of this information is **REQUIRED**. Failure to provide any information will result in the contract not being awarded. This form has been approved by the State Forms Management Center.

PROPOSAL ENVELOPE

Illinois Department of Transportation

PROPOSALS

for construction work advertised for bids by the
Illinois Department of Transportation

Item No.	Item No.	Item No.

Submitted By:

Name:
Address:
Phone No.

Bidders should use an IDOT proposal envelope or affix this form to the front of a 10” x 13” envelope for the submittal of bids. If proposals are mailed, they should be enclosed in a second or outer envelope addressed to:

Engineer of Design and Environment - Room 326
Illinois Department of Transportation
2300 South Dirksen Parkway
Springfield, Illinois 62764

NOTICE

Individual bids, including Bid Bond and/or supplemental information if required, should be securely stapled.

CONTRACTOR OFFICE COPY OF CONTRACT SPECIFICATIONS

NOTICE

None of the following material needs to be returned with the bid package unless the special provisions require documentation and/or other information to be submitted.

Contract No. 62A43
KANE County
Section N/A
Various Routes
District 1 Other

Illinois Department of Transportation

SUBCONTRACTOR DOCUMENTATION

Public Acts 96-0795, 96-0920, and 97-0895 enacted substantial changes to the provisions of the Code (30 ILCS 500). Among the changes are provisions affecting subcontractors. The Contractor awarded this contract will be required as a material condition of the contract to implement and enforce the contract requirements applicable to subcontractors that entered into a contractual agreement with a total value of $50,000 or more with a person or entity who has a contract subject to the Code and approved in accordance with article 108.01 of the Standard Specifications for Road and Bridge Construction.

If the Contractor seeks approval of subcontractors to perform a portion of the work, and approval is granted by the Department, the Contractor shall provide a copy of the subcontract to the Illinois Department of Transportation's CPO upon request within 15 calendar days after execution of the subcontract.

Financial disclosures required pursuant to Sec. 50-35 of the Code must be submitted for all applicable subcontractors. The subcontract shall contain the certifications required to be made by subcontractors pursuant to Article 50 of the Code. This Notice to Bidders includes a document incorporating all required subcontractor certifications and disclosures for use by the Contractor in compliance with this mandate. The document is entitled State Required Ethical Standards Governing Subcontractors.

RETURN WITH SUBCONTRACT

STATE ETHICAL STANDARDS GOVERNING SUBCONTRACTORS

Article 50 of the Code establishes the duty of all State CPOs, SPOs, and their designees to maximize the value of the expenditure of public moneys in procuring goods, services, and contracts for the State of Illinois and to act in a manner that maintains the integrity and public trust of State government. In discharging this duty, they are charged by law to use all available information, reasonable efforts, and reasonable actions to protect, safeguard, and maintain the procurement process of the State of Illinois.

The certifications hereinafter made by the subcontractor are each a material representation of fact upon which reliance is placed should the Department approve the subcontractor. The CPO may terminate or void the contract approval if it is later determined that the bidder or subcontractor rendered a false or erroneous certification. If a false certification is made by a subcontractor the contractor's submitted bid and the executed contract may not be declared void unless the contractor refuses to terminate the subcontract upon the State's request after a finding that the subcontractor's certification was false.

Section 50-2 of the Code provides that every person that has entered into a multi-year contract and every subcontractor with a multi-year subcontract shall certify, by July 1 of each fiscal year covered by the contract after the initial fiscal year, to the responsible CPO whether it continues to satisfy the requirements of Article 50 pertaining to the eligibility for a contract award. If a contractor or subcontractor is not able to truthfully certify that it continues to meet all requirements, it shall provide with its certification a detailed explanation of the circumstances leading to the change in certification status. A contractor or subcontractor that makes a false statement material to any given certification required under Article 50 is, in addition to any other penalties or consequences prescribed by law, subject to liability under the Whistleblower Reward and Protection Act for submission of a false claim.

A. Bribery

Section 50-5. Bribery.

(a) Prohibition. No person or business shall be awarded a contract or subcontract under this Code who:

(1) has been convicted under the laws of Illinois or any other state of bribery or attempting to bribe an officer or employee of the State of Illinois or any other state in that officer's or employee's official capacity; or

(2) has made an admission of guilt of that conduct that is a matter of record but has not been prosecuted for that conduct.

(b) Businesses. No business shall be barred from contracting with any unit of State or local government, or subcontracting under such a contract, as a result of a conviction under this Section of any employee or agent of the business if the employee or agent is no longer employed by the business and:

(1) the business has been finally adjudicated not guilty; or

(2) the business demonstrates to the governmental entity with which it seeks to contract, or which is signatory to the contract to which the subcontract relates, and that entity finds that the commission of the offense was not authorized, requested, commanded, or performed by a director, officer, or high managerial agent on behalf of the business as provided in paragraph (2) of subsection (a) of Section 5-4 of the Criminal Code of 2012.

(c) Conduct on behalf of business. For purposes of this Section, when an official, agent, or employee of a business committed the bribery or attempted bribery on behalf of the business and in accordance with the direction or authorization of a responsible official of the business, the business shall be chargeable with the conduct.

(d) Certification. Every bid submitted to and contract executed by the State, and every subcontract subject to Section 20-120 of the Code shall contain a certification by the contractor or the subcontractor, respectively, that the contractor or subcontractor is not barred from being awarded a contract or subcontract under this Section and acknowledges that the CPO may declare the related contract void if any certifications required by this Section are false. A contractor who makes a false statement, material to the certification, commits a Class 3 felony.

The contractor or subcontractor certifies that it is not barred from being awarded a contract under Section 50-5.

B. Felons

Section 50-10. Felons.

Unless otherwise provided, no person or business convicted of a felony shall do business with the State of Illinois or any State agency, or enter into a subcontract, from the date of conviction until 5 years after the date of completion of the sentence for that felony, unless no person held responsible by a prosecutorial office for the facts upon which the conviction was based continues to have any involvement with the business.

Certification. Every bid submitted to and contract executed by the State and every subcontract subject to Section 20-120 of the Code shall contain a certification by the bidder or contractor or subcontractor, respectively, that the bidder, contractor, or subcontractor is not barred from being awarded a contract or subcontract under this Section and acknowledges that the CPO may declare the related contract void if any of the certifications required by this Section are false.

C. Debt Delinquency

Section 50-11 and 50-12. Debt Delinquency.

The contractor or bidder or subcontractor, respectively, certifies that it, or any affiliate, is not barred from being awarded a contract or subcontract under the Code. Section 50-11 prohibits a person from entering into a contract with a State agency, or entering into a subcontract, if it knows or should know that it, or any affiliate, is delinquent in the payment of any debt to the State as defined by the Debt Collection Board. Section 50-12 prohibits a person from entering into a contract with a State agency, or entering into a subcontract, if it, or any affiliate, has failed to collect and remit Illinois Use Tax on all sales of tangible personal property into the State of Illinois in accordance with the provisions of the Illinois Use Tax Act. The bidder or contractor or subcontractor, respectively, further acknowledges that the CPO may declare the related contract void if this certification is false or if the bidder, contractor, or subcontractor, or any affiliate, is determined to be delinquent in the payment of any debt to the State during the term of the contract.

D. Prohibited Bidders, Contractors and Subcontractors

Section 50-10.5 and 50-60(c). Prohibited bidders, contractors and subcontractors.

The bidder or contractor or subcontractor, respectively, certifies in accordance with 30 ILCS 500/50-10.5 that no officer, director, partner or other managerial agent of the contracting business has been convicted of a felony under the Sarbanes-Oxley Act of 2002 or a Class 3 or Class 2 felony under the Illinois Securities Law of 1953 or if in violation of Subsection (c) for a period of five years from the date of conviction. Every bid submitted to and contract executed by the State and every subcontract subject to Section 20-120 of the Code shall contain a certification by the bidder, contractor, or subcontractor, respectively, that the bidder, contractor, or subcontractor is not barred from being awarded a contract or subcontract under this Section and acknowledges that the CPO shall declare the related contract void if any of the certifications completed pursuant to this Section are false.

E. Section 42 of the Environmental Protection Act

The bidder or contractor or subcontractor, respectively, certifies in accordance with 30 ILCS 500/50-14 that the bidder, contractor, or subcontractor, is not barred from being awarded a contract or entering into a subcontract under this Section which prohibits the bidding on or entering into contracts with the State of Illinois or a State agency, or entering into any subcontract, that is subject to the Code by a person or business found by a court or the Pollution Control Board to have committed a willful or knowing violation of Section 42 of the Environmental Protection Act for a period of five years from the date of the order. The bidder or contractor or subcontractor, respectively, acknowledges that the CPO may declare the contract void if this certification is false.

The undersigned, on behalf of the subcontracting company, has read and understands the above certifications and makes the certifications as required by law.

_____
Name of Subcontracting Company

_____ _____
Authorized Officer Date

RETURN WITH SUBCONTRACT

SUBCONTRACTOR DISCLOSURES

I. DISCLOSURES

A. The disclosures hereinafter made by the subcontractor are each a material representation of fact upon which reliance is placed. The subcontractor further certifies that the Department has received the disclosure forms for each subcontract.

The CPO may void the bid, contract, or subcontract, respectively, if it is later determined that the bidder or subcontractor rendered a false or erroneous disclosure. A contractor or subcontractor may be suspended or debarred for violations of the Code. Furthermore, the CPO may void the contract.

B. Financial Interests and Conflicts of Interest

1. Section 50-35 of the Code provides that all subcontracts with a total value of $50,000 or more from subcontractors identified in Section 20-120 of the Code, shall be accompanied by disclosure of the financial interests of the subcontractor. This disclosed information for the subcontractor, will be maintained as public information subject to release by request pursuant to the Freedom of Information Act, filed with the Procurement Policy Board, and shall be incorporated as a material term of the Prime Contractor's contract. Furthermore, pursuant to this Section, the Procurement Policy Board may recommend to allow or void a contract or subcontract based on a potential conflict of interest.

The financial interests to be disclosed shall include ownership or distributive income share that is in excess of 5%, or an amount greater than 60% of the annual salary of the Governor, of the subcontracting entity or its parent entity, whichever is less, unless the subcontractor is a publicly traded entity subject to Federal 10K reporting, in which case it may submit its 10K disclosure in place of the prescribed disclosure. If a subcontractor is a privately held entity that is exempt from Federal 10K reporting, but has more than 100 shareholders, it may submit the information that Federal 10K companies are required to report, and list the names of any individual or entity holding any ownership share that is in excess of 5%. The disclosure shall include the names, addresses, and dollar or proportionate share of ownership of each individual making the disclosure, their instrument of ownership or beneficial relationship, and notice of any potential conflict of interest resulting from the current ownership or beneficial interest of each individual making the disclosure having any of the relationships identified in Section 50-35 and on the disclosure form.
The current annual salary of the Governor is $177,412.00.

In addition, all disclosures shall indicate any other current or pending contracts, subcontracts, proposals, leases, or other ongoing procurement relationships the subcontracting entity has with any other unit of state government and shall clearly identify the unit and the contract, subcontract, proposal, lease, or other relationship.

2. Disclosure Forms. Disclosure Form A is attached for use concerning the individuals meeting the above ownership or distributive share requirements. A separate Disclosure Form A must be submitted with the bid for each individual meeting the above requirements. In addition, a second form (Disclosure Form B) provides for the disclosure of current or pending procurement relationships with other (non-IDOT) state agencies and a total ownership certification. **The forms must be included with each bid.**

C. Disclosure Form Instructions

Form A Instructions for Financial Information & Potential Conflicts of Interest

If the subcontractor is a publicly traded entity subject to Federal 10K reporting, the 10K Report may be submitted to meet the requirements of Form A. If a subcontractor is a privately held entity that is exempt from Federal 10K reporting, but has more than 100 shareholders, it may submit the information that Federal 10K companies are required to report, and list the names of any individual or entity holding any ownership share that is in excess of 5%. If a subcontractor is not subject to Federal 10K reporting, the subcontractor must determine if any individuals are required by law to complete a financial disclosure form. To do this, the subcontractor should answer each of the following questions. A "YES" answer indicates Form A must be completed. If the answer to each of the following questions is "NO", then the NOT APPLICABLE STATEMENT on the second page of Form A must be signed and dated by an individual that is authorized to execute contracts for the subcontracting company. Note: These questions are for assistance only and are not required to be completed.

1. Does anyone in your organization have a direct or beneficial ownership share of greater than 5% of the bidding entity or parent entity? YES ___ NO ___
2. Does anyone in your organization have a direct or beneficial ownership share of less than 5%, but which has a value greater than 60% of the annual salary of the Governor? YES ___ NO
3. Does anyone in your organization receive more than 60% of the annual salary of the Governor of the subcontracting entity's or parent entity's distributive income? YES ___ NO __.

   (Note: Distributive income is, for these purposes, any type of distribution of profits. An annual salary is not distributive income.)
4. Does anyone in your organization receive greater than 5% of the subcontracting entity's or parent entity's total distributive income, but which is less than 60% of the annual salary of the Governor? YES ___ NO __

   (Note: Only one set of forms needs to be completed per individual per subcontract even if a specific individual would require a yes answer to more than one question.)

A "YES" answer to any of these questions requires the completion of Form A. The subcontractor must determine each individual in the subcontracting entity or the subcontracting entity's parent company that would cause the questions to be answered "Yes". Each form must be signed and dated by an individual that is authorized to execute contracts for your organization. The individual signing can be, but does not have to be, the individual for which the form is being completed. The subcontractor is responsible for the accuracy of any information provided.

If the answer to each of the above questions is "NO", then the NOT APPLICABLE STATEMENT on page 2 of Form A must be signed and dated by an individual that is authorized to execute contracts for your company.

RETURN WITH SUBCONTRACT

Form B: Instructions for Identifying Other Contracts & Procurement Related Information

Disclosure Form B must be completed for each subcontract submitted by the subcontracting entity. *Note: Checking the NOT APPLICABLE STATEMENT on Form A does not allow the subcontractor to ignore Form B. Form B must be completed, checked, and dated or the subcontract will not be approved.*

The Subcontractor shall identify, by checking Yes or No on Form B, whether it has any pending contracts, subcontracts, leases, bids, proposals, or other ongoing procurement relationship with any other (non-IDOT) State of Illinois agency. If "No" is checked, the subcontractor only needs to complete the check box on the bottom of Form B. If "Yes" is checked, the subcontractor must list all non-IDOT State of Illinois agency pending contracts, subcontracts, leases, bids, proposals, and other ongoing procurement relationships. These items may be listed on Form B or on an attached sheet(s). Contracts with cities, counties, villages, etc. are not considered State of Illinois agency contracts and are not to be included. Contracts or subcontracts with other State of Illinois agencies such as the Department of Natural Resources or the Capital Development Board must be included.

RETURN WITH SUBCONTRACT

ILLINOIS DEPARTMENT OF TRANSPORTATION

Form A Subcontractor: Financial Information & Potential Conflicts of Interest Disclosure

Subcontractor Name		
Legal Address		
City, State, Zip		
Telephone Number	Email Address	Fax Number (if available)

Disclosure of the information contained in this Form is required by Section 50-35 of the Code (30 ILCS 500). Subcontractors desiring to enter into a subcontract of a State of Illinois contract must disclose the financial information and potential conflict of interest information as specified in this Disclosure Form. This information shall become part of the publicly available contract file. This Form A must be completed for subcontracts with a total value of $50,000 or more, from subcontractors identified in Section 20-120 of the Code, and for all open-ended contracts. **A publicly traded company may submit a 10K disclosure (or equivalent if applicable) in satisfaction of the requirements set forth in Form A. See Disclosure Form Instructions.**

The current annual salary of the Governor is $177,412.00.

DISCLOSURE OF FINANCIAL INFORMATION

1. Disclosure of Financial Information. The individual named below has an interest in the SUBCONTRACTOR (or its parent) in terms of ownership or distributive income share in excess of 5%, or an interest which has a value of more than 60% of the annual salary of the Governor. **(Make copies of this form as necessary and attach a separate Disclosure Form A for each individual meeting these requirements)**

FOR INDIVIDUAL (type or print information)

NAME: _____

ADDRESS _____

_____

Type of ownership/distributable income share:

stock _____ sole proprietorship _____ Partnership _____ other: (explain on separate sheet):

% or $ value of ownership/distributable income share: _____

2. Disclosure of Potential Conflicts of Interest. Check "Yes" or "No" to indicate which, if any, of the following potential conflict of interest relationships apply. If the answer to any question is "Yes", please attach additional pages and describe.

(a) State employment, currently or in the previous 3 years, including contractual employment of services.
Yes ___No __

If your answer is yes, please answer each of the following questions.

1. Are you currently an officer or employee of either the Capitol Development Board or the Illinois State Toll Highway Authority? Yes ___No __

2. Are you currently appointed to or employed by any agency of the State of Illinois? If you are currently appointed to or employed by any agency of the State of Illinois, and your annual salary exceeds 60% of the annual salary of the Governor, provide the name the State agency for which you are employed and your annual salary. _____
_____

3. If you are currently appointed to or employed by any agency of the State of Illinois, and your annual salary exceeds 60% of the annual salary of the Governor, are you entitled to receive (i) more than 7 1/2% of the total distributable income of your firm, partnership, association or corporation, or (ii) an amount in excess of 100% of the annual salary of the Governor?
Yes ___No __

4. If you are currently appointed to or employed by any agency of the State of Illinois, and your annual salary exceeds 60% of the annual salary of the Governor, are you and your spouse or minor children entitled to receive (i) more than 15 % in the aggregate of the total distributable income of your firm, partnership, association or corporation, or (ii) an amount in excess of two times the salary of the Governor? Yes ___No __

(b) State employment of spouse, father, mother, son, or daughter, including contractual employment services in the previous 2 years.
Yes ___No __

If your answer is yes, please answer each of the following questions.

1. Is your spouse or any minor children currently an officer or employee of the Capitol Development Board or the Illinois Toll Highway Authority? Yes ___No __

2. Is your spouse or any minor children currently appointed to or employed by any agency of the State of Illinois? If your spouse or minor children is/are currently appointed to or employed by any agency of the State of Illinois, and his/her annual salary exceeds 60% of the annual salary of the Governor, provide the name of your spouse and/or minor children, the name of the State agency for which he/she is employed and his/her annual salary. _____
_____

3. If your spouse or any minor children is/are currently appointed to or employed by any agency of the State of Illinois, and his/her annual salary exceeds 60% of the annual salary of the Governor, as of 7/1/07) are you entitled to receive (i) more then 7 1/2% of the total distributable income of your firm, partnership, association or corporation, or (ii) an amount in excess of 100% of the annual salary of the Governor? Yes ___No __

4. If your spouse or any minor children are currently appointed to or employed by any agency of the State of Illinois, and his/her annual salary exceeds 60% of the annual salary of the Governor, are you and your spouse or minor children entitled to receive (i) more than 15 % in the aggregate of the total distributable income of your firm, partnership, association or corporation, or (ii) an amount in excess of two times the annual salary of the Governor?
Yes ___No __

(c) Elective status; the holding of elective office of the State of Illinois, the government of the United States, any unit of local government authorized by the Constitution of the State of Illinois or the statutes of the State of Illinois currently or in the previous 3 years. Yes ___No __

(d) Relationship to anyone holding elective office currently or in the previous 2 years; spouse, father, mother, son, or daughter. Yes ___No __

(e) Appointive office; the holding of any appointive government office of the State of Illinois, the United States of America, or any unit of local government authorized by the Constitution of the State of Illinois or the statutes of the State of Illinois, which office entitles the holder to compensation in excess of the expenses incurred in the discharge of that office currently or in the previous 3 years. Yes ___No __

(f) Relationship to anyone holding appointive office currently or in the previous 2 years; spouse, father, mother, son, or daughter. Yes ___No __

(g) Employment, currently or in the previous 3 years, as or by any registered lobbyist of the State government.
Yes ___No __

(h) Relationship to anyone who is or was a registered lobbyist in the previous 2 years; spouse, father, mother, son, or daughter. Yes ___ No __

(i) Compensated employment, currently or in the previous 3 years, by any registered election or reelection committee registered with the Secretary of State or any county clerk of the State of Illinois, or any political action committee registered with either the Secretary of State or the Federal Board of Elections.
Yes ___ No __

(j) Relationship to anyone; spouse, father, mother, son, or daughter; who was a compensated employee in the last 2 years by any registered election or re-election committee registered with the Secretary of State or any county clerk of the State of Illinois, or any political action committee registered with either the Secretary of State or the Federal Board of Elections.
Yes ___ No __

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3 Communication Disclosure.

Disclose the name and address of each lobbyist and other agent of the bidder or offeror who is not identified in Section 2 of this form, who is has communicated, is communicating, or may communicate with any State officer or employee concerning the bid or offer. This disclosure is a continuing obligation and must be promptly supplemented for accuracy throughout the process and throughout the term of the contract. If no person is identified, enter "None" on the line below:

Name and address of person(s): _____

_____

_____

_____

RETURN WITH SUBCONTRACT

4. Debarment Disclosure. For each of the persons identified under Sections 2 and 3 of this form, disclose whether any of the following has occurred within the previous 10 years: debarment from contracting with any governmental entity; professional licensure discipline; bankruptcies; adverse civil judgments and administrative findings; and criminal felony convictions. This disclosure is a continuing obligation and must be promptly supplemented for accuracy throughout the procurement process and term of the contract. If no person is identified, enter "None" on the line below:

Name of person(s): _____

Nature of disclosure: _____

_____

_____

_____

APPLICABLE STATEMENT

This Disclosure Form A is submitted on behalf of the INDIVIDUAL named on previous page. Under penalty of perjury, I certify the contents of this disclosure to be true and accurate to the best of my knowledge.

Completed by: ☐ _____ _____

Signature of Individual or Authorized Officer — Date

NOT APPLICABLE STATEMENT

Under penalty of perjury, I have determined that no individuals associated with this organization meet the criteria that would require the completion of this Form A.

This Disclosure Form A is submitted on behalf of the SUBCONTRACTOR listed on the previous page.

☐ _____ _____

Signature of Authorized Officer — Date

RETURN WITH SUBCONTRACT

ILLINOIS DEPARTMENT OF TRANSPORTATION

Form B
Subcontractor: Other Contracts & Financial Related Information Disclosure

Subcontractor Name		
Legal Address		
City, State, Zip		
Telephone Number	Email Address	Fax Number (if available)

Disclosure of the information contained in this Form is required by Section 50-35 of the Code (30 ILCS 500). This information shall become part of the publicly available contract file. This Form B must be completed for subcontracts with a total value of $50,000 or more, from subcontractors identified in Section 20-120 of the Code, and for all open-ended contracts.

DISCLOSURE OF OTHER CONTRACTS, SUBCONTRACTS, AND PROCUREMENT RELATED INFORMATION

1. Identifying Other Contracts & Procurement Related Information. The SUBCONTRACTOR shall identify whether it has any pending contracts, subcontracts, including leases, bids, proposals, or other ongoing procurement relationship with any other State of Illinois agency: Yes ___ No __
If "No" is checked, the subcontractor only needs to complete the signature box on this page.

2. If "Yes" is checked. Identify each such relationship by showing State of Illinois agency name and other descriptive information such as bid or project number (attach additional pages as necessary). SEE DISCLOSURE FORM INSTRUCTIONS:

THE FOLLOWING STATEMENT MUST BE CHECKED

☐ _____ _____
Signature of Authorized Representative Date

OWNERSHIP CERTIFICATION

Please certify that the following statement is true if the individuals for all submitted Form A disclosures do not total 100% of ownership

Any remaining ownership interest is held by individuals receiving less than $106,447.20 of the bidding entity's or parent entity's distributive income or holding less than a 5% ownership interest.

☐ Yes ☐ No ☐ N/A (Form A disclosure(s) established 100% ownership)

Illinois Department of Transportation

NOTICE TO BIDDERS

1. **TIME AND PLACE OF OPENING BIDS.** Sealed proposals for the improvement described herein will be received by the Department of Transportation. Electronic bids are to be submitted to the electronic bidding system (iCX-Integrated Contractors Exchange). Paper-based bids are to be submitted to the Chief Procurement Officer for the Department of Transportation in care of the Chief Contracts Official at the Harry R. Hanley Building, 2300 South Dirksen Parkway, in Springfield, Illinois until 10:00 a.m.January 30, 15 All bids will be gathered, sorted, publicly opened and read in the auditorium at the Department of Transportation's Harry R. Hanley Building shortly after 10:00 a.m.

2. **DESCRIPTION OF WORK**. The proposed improvement is identified and advertised for bids in the Invitation for Bids as:

   Contract No. 62A43
   KANE County
   Section N/A
   Various Routes
   District 1 Other

This project consists of the final design, manufacture, documentation, delivery, demonstration, testing, and interface coordination for the signal system upgrades of two controlled signal locations on Metra's Milwaukee District - West Line near Big Timber.

3. **INSTRUCTIONS TO BIDDERS**. (a) This Notice, the invitation for bids, proposal and letter of award shall, together with all other documents in accordance with Article 101.09 of the Standard Specifications for Road and Bridge Construction, become part of the contract. Bidders are cautioned to read and examine carefully all documents, to make all required inspections, and to inquire or seek explanation of the same prior to submission of a bid.

   (b) State law, and, if the work is to be paid wholly or in part with Federal-aid funds, Federal law requires the bidder to make various certifications as a part of the proposal and contract. By execution and submission of the proposal, the bidder makes the certification contained therein. A false or fraudulent certification shall, in addition to all other remedies provided by law, be a breach of contract and may result in termination of the contract.

4. **AWARD CRITERIA AND REJECTION OF BIDS**. This contract will be awarded to the lowest responsive and responsible bidder considering conformity with the terms and conditions established by the Department in the rules, Invitation for Bids and contract documents. The issuance of plans and proposal forms for bidding based upon a prequalification rating shall not be the sole determinant of responsibility. The Department reserves the right to determine responsibility at the time of award, to reject any or all proposals, to readvertise the proposed improvement, and to waive technicalities.

By Order of the
Illinois Department of Transportation

Erica J. Borggren,
Acting Secretary

METRA

SIGNAL SPECIFICATION

FOR

BONDSTRAND

SPECIFICATION NO. 0019

April 12, 2011

1.0 SCOPE

1.1 This Specification is for furnishing bondstrand cable. The unit(s) furnished on this Specification shall be of the most current design. The material, equipment and workmanship shall be of the highest commercial quality.

1.2 Failure to conform to the highest standards of the industry shall be cause for rejection.

1.3 Metra's Chief Engineering Officer or his duly authorized representative shall be the final authority for deciding as to whether a competitive item conforms to these requirements and complies with the intention of this Specification.

1.4 This Specification is intended to be descriptive, but not restrictive and is solely for the purpose of indicating the type and quality of articles that will meet the approval of Metra.

1.5 Capacities and dimensions listed herein shall be interpreted as minimums; variation from the values listed will be judged as to their effect and ability to perform the work intended.

1.6 It shall be the responsibility of the Manufacturer to make certain that all parts and components fit and function together properly.

1.7 Where brand, manufacturer or product names are indicated in this Specification, they are included only for the purpose of establishing identification and general descriptions of the item. Wherever such names appear, the term “or Metra approved equivalent” is considered to follow.

1.8 The article(s)/unit(s) submitted under this Specification must be in production and must have had a previous, satisfactory in-service performance record of at least two years on three Class I railroads. Proof of performance statement(s) shall be provided, upon request, with confirming statement(s) from previous purchaser(s). Failure to provide proof may be cause for rejection.

2.0 GENERAL REQUIREMENTS

2.1 Bondstrand cable shall meet the requirements established by the American Railway Engineering and Maintenance-of-Way (AREMA) Communications & Signals Manual of Recommended Practices, Part 10.3.12.

2.2 3/16 bondstrand cable shall have an outer diameter of bare cable of 0.1875 inches.

2.3 The maximum resistance per 1000 feet of cable at 20°C shall be 0.625 Ohms.

2.4 Conductor shall be cadmium bronze and steel galvanized wire.

2.5 The cable shall consist of 133 hard-drawn wires.

2.6 The completed cable shall be made up of seven 19-strand concentric wires.

2.7 The insulating jacket shall be black PVC with a thickness of 60 mils.

3.0 SUBMITTAL

Catalog cuts, drawings, descriptions, etc., of the Manufacturer's typical current production from which the submittal will be based shall be included with the quotation.

4.0 IDENTIFICATION AND SHIPPING

4.1 Bondstrand cable shall be plainly marked with Manufacturer’s references including serial and model numbers.

4.2 The product shall be assembled or packed as to permit convenient handling and to protect against loss or damage during shipment. Loose pieces shall be tightly taped or wired to the bondstrand or shipping pallet or, packed separately but firmly attached to the product.

4.3 A detailed list of packages and their contents shall be provided for all shipments. One copy will be included with shipment and one copy will be sent directly to Metra's Chief Engineering Officer. Metra Engineering's copy will be mailed not later than the shipping date of the equipment.

5.0 INSPECTION AT SHIPMENT

Metra will inspect the unit(s) after delivery and contact the Manufacturer listing any items not conforming to this Specification. The Manufacturer shall provide a timely schedule to furnish, deliver to destination and install or correct, without charge to Metra, such items. Failure to respond appropriately shall be cause for rejection with return of rejected units at the Manufacturer's total expense.

6.0 GUARANTEE

The Manufacturer shall replace (furnish, deliver to destination and install or correct) without charge, any part of material, which fails within a period of one year of date of installation from defects of material, design, manufacture and/or workmanship.

7.0 DEMONSTRATION

7.1 If requested prior to purchase, bidder shall arrange for inspection before one or more of Metra's representatives, of the basic unit to be furnished. Failure of a unit to be equal to or better than the quality herein specified by Metra shall be cause for rejection of Bid. Such inspection shall be performed at no cost to Metra within a distance of not more than 50 miles from Metra's headquarters at 547 West Jackson Boulevard, Chicago, unless otherwise agreed upon by Metra.

7.2 Metra or its Representative reserves the right to inspect all equipment at Manufacturer’s plant prior to shipment.

METRA

SIGNAL SPECIFICATION

FOR

SIGNAL FOUNDATIONS

SPECIFICATION NO. 0027

August 23, 2012

1.0 SCOPE

1.1 This Specification is for furnishing a signal foundation. The unit(s) furnished on this Specification shall be of the most current design. The material, equipment and workmanship shall be of the highest commercial quality.

1.2 Failure to conform to the highest standards of the industry shall be cause for rejection.

1.3 Metra's Chief Engineering Officer or his duly authorized representative shall be the final authority for deciding as to whether a competitive item conforms to these requirements and complies with the intention of this Specification.

1.4 This Specification is intended to be descriptive, but not restrictive and is solely for the purpose of indicating the type and quality of articles that will meet the approval of Metra.

1.5 Capacities and dimensions listed herein shall be interpreted as minimum; variation from the values listed will be judged as to their effect and ability to perform the work intended.

1.6 It shall be the responsibility of the Manufacturer to make certain that all parts and components fit and function together properly.

1.7 Where brand, manufacturer or product names are indicated in this Specification, they are included only for the purpose of establishing identification and general descriptions of the item. Wherever such names appear, the term “or Metra approved equivalent” is considered to follow.

1.8 The article(s)/unit(s) submitted under this Specification must be in production and must have had a previous, satisfactory in-service performance record of at least two years on three Class I railroads. Proof of performance statement(s) shall be provided, upon request, with confirming statement(s) from previous purchaser(s). Failure to provide proof may be cause for rejection.

2.0 GENERAL REQUIREMENTS

2.1 The foundations described in this Specification shall conform to the applicable portions of the American Railway Engineering and Maintenance-of-Way Association (AREMA) Communications & Signals Manual of Recommended Practices as follows:

Manual Parts:	14.4.1A		14.4.2A	14.4.2B
	14.4.3A	14.4.3B	14.4.3C	14.4.10A
	14.4.10B	14.4.10C	14.4.10D	14.4.10E
	14.4.11	15.1.4	15.1.5	15.3.1

2.2 Foundation Material

2.2.1 Precast concrete foundations shall conform to the applicable portions of the AREMA requirements for reinforcement, aggregate, mix, air entrapment, and compressive strength.

2.2.2 Steel foundations shall be fabricated from minimum 2-1/2 by 2-1/2 by 1/4-inch steel angle and minimum 1/4-inch steel plate welded together and be hot-dipped galvanized after all fabricating is completed as required.

2.3 Accessories

2.3.1 One bolt, nut and washer shall be furnished for each signal-mounting hole for foundations. The bolts, nuts, washers and all cast-in-place retaining fasteners shall be hot-dipped galvanized.

2.3.2 Accessories shall be constructed of the same materials as steel foundations and be hot-dipped galvanized after all fabrication is completed.

3.0 DESIGN

3.1 Shape

3.1.1 Precast concrete foundations shall generally conform to the typical arrangements in Figure 1 and Figure 2.

3.1.2 Metal foundations shall generally conform to the typical arrangements in Figure 2.

3.2 Signal Mounting

3.2.1 Signals shall be mounted on bolts that project through the top of the foundation. Bolt projection shall be at least 4-1/2 to 5 inches for gate or signal foundations and at least 9-1/2 inches for cantilever foundations. Bolt diameter shall be 1 inch for gate or signal foundations and 1-1/2 inches for single or double masted cantilever foundations. Bolt diameter shall be 1 inch for all four to seven foot foundations, 3/4-inch for all others.

3.2.2 Bolt spacing and arrangement shall not weaken the foundation.

3.3 Dimensions

3.3.1 Precast foundations shall have center pieces in maximum two-foot increments. The base and top shall make the foundations size as specified plus/minus two inches.

3.3.2 Foundation materials and dimensions shall be as shown in Table 1.

TABLE 1

FOUNDATION MATERIALS AND DIMENSIONS

TYPE	MATERIAL	BOLT SPACING	LENGTH
House	Galvanized Steel	None	48 in.
Pedestrian Crossing Flasher	Galvanized Steel	9-1/2" x 9-1/2"	3 ft.
Case	Galvanized Steel	18-1/2"	4 ft.
Crossing Flasher	Galvanized Steel	11-11/16" x 11-11/16"	4 ft.
Crossing Gate	Precast Concrete	11-11/16" x 11-11/16"	6 ft.-6 in.
Wayside Signal	Precast Concrete	11-11/16" x 11-11/16"	6 ft.-6 in.
Single Masted Walkout Cantilever	Precast Concrete	19" x 19"	5 ft.-6-1/2 in.
Double Masted Walkout Cantilever	Precast Concrete	19" x 19"	5 ft.-10 in.

3.4 Cable Outlet

3.4.1 A cable outlet or facility at least two inches in diameter shall be provided for dwarf signal or steel flasher foundations and at least three inches in diameter for larger foundations.

3.4.2 If the cable outlet includes a bend, it shall have a radius not less than 26 inches.

4.0 SUBMITTAL

4.1 Catalog cuts, drawings, descriptions, etc., of the Manufacturer's typical current production from which the submittal will be based shall be included with the quotation.

4.2 Detailed shop drawings of the signal foundation(s) are to be furnished within 15 days of the award of the contract, and be approved by Metra's Chief Engineering Officer before manufacture begins.

5.0 IDENTIFICATION AND SHIPPING

5.1 Foundation unit(s) shall be plainly marked with Manufacturer’s references including serial and model numbers.

5.2 The product shall be assembled or packed as to permit convenient handling and to protect against loss or damage during shipment. Loose pieces shall be tightly taped or wired to the signal foundation(s) or shipping pallet or, packed separately but firmly attached to the product.

5.3 A detailed list of packages and their contents shall be provided for all shipments. One copy will be included with shipment and one copy will be sent directly to Metra's Chief Engineering Officer. Metra Engineering's copy will be mailed not later than the shipping date of the equipment.

5.4 Manufacturer shall notify Metra of the shipping date 48 hours prior to shipment.

6.0 INSPECTION AT SHIPMENT

Metra will inspect the unit(s) after delivery and contact the Manufacturer listing any items not conforming to this Specification. The Manufacturer shall provide a timely schedule to furnish, deliver to destination and install or correct, without charge to Metra, such items. Failure to respond appropriately shall be cause for rejection with return of rejected units at the Manufacturer's total expense.

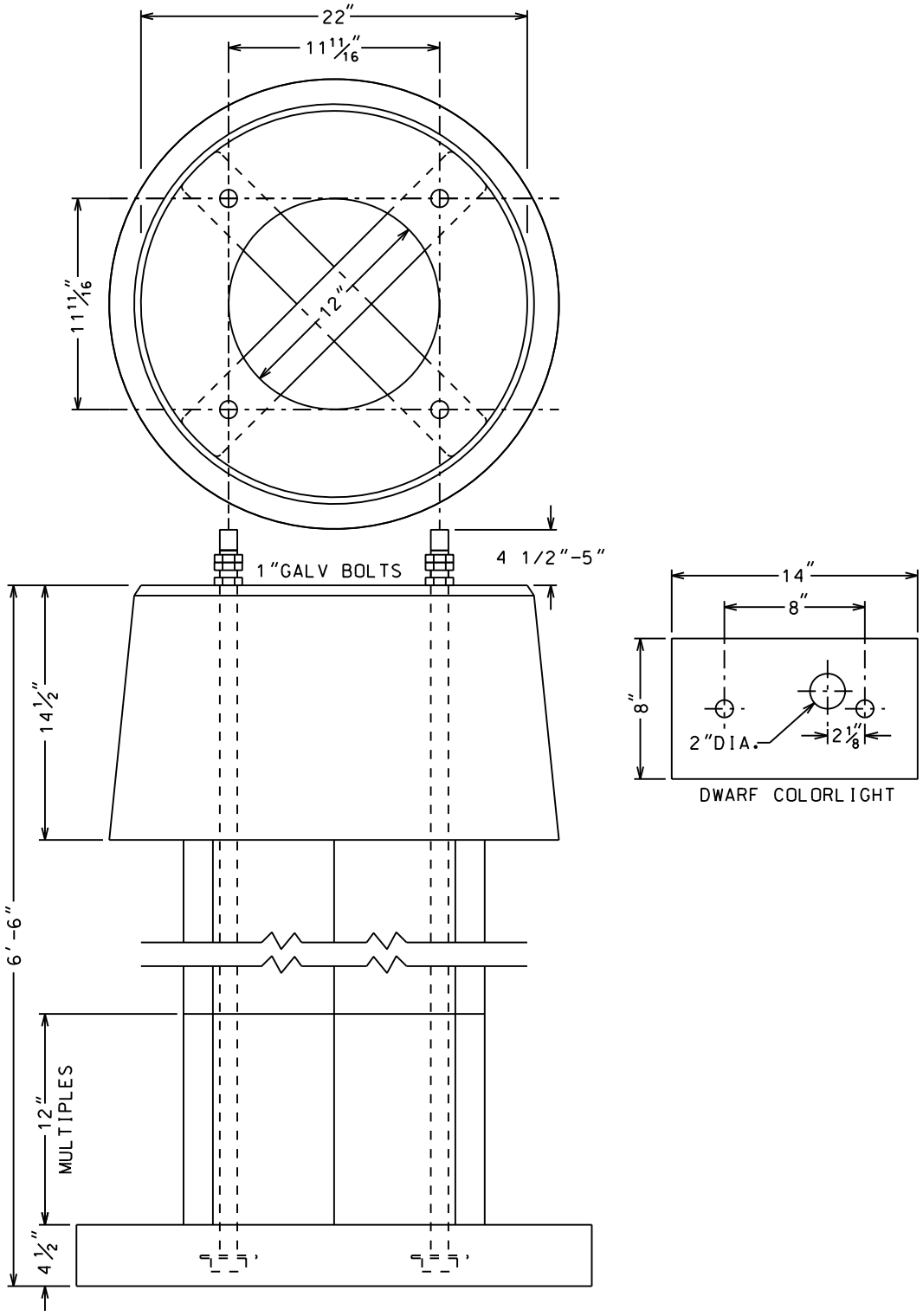
7.0 GUARANTEE

The Manufacturer shall replace (furnish, deliver to destination and install or correct) without charge, any part of material, which fails within a period of one year of date of installation from defects of material, design, manufacture and/or workmanship.

8.0 DEMONSTRATION

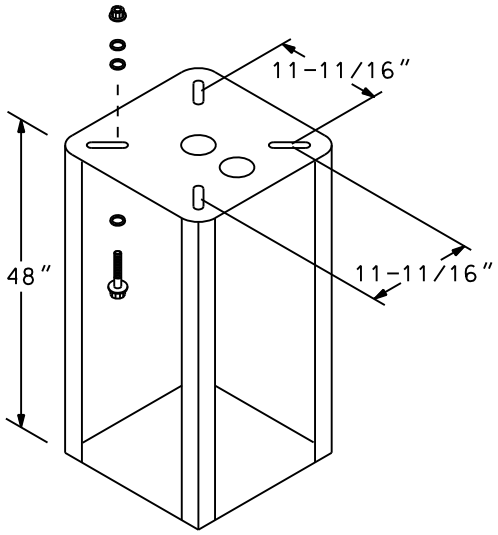
8.1 If requested prior to purchase, bidder shall arrange for inspection before one or more of Metra's representatives, of the basic unit to be furnished. Failure of a unit to be equal to or better than the quality herein specified by Metra shall be cause for rejection of Bid. Such inspection shall be performed at no cost to Metra within a distance of not more than 50 miles from Metra's headquarters at 547 West Jackson Boulevard, Chicago, unless otherwise agreed upon by Metra.

8.2 Metra or its Representative reserves the right to inspect all equipment at Manufacturer’s plant prior to shipment.

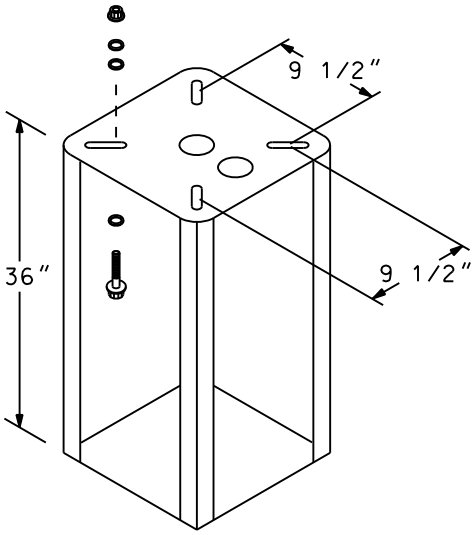


CROSSING GATE AND WAYSIDE SIGNAL

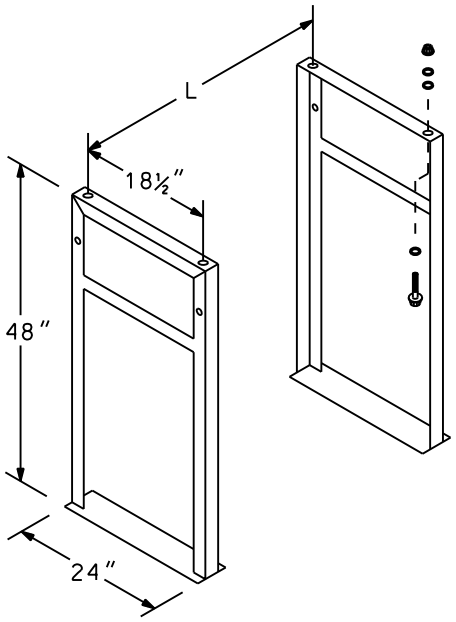
FIGURE 1



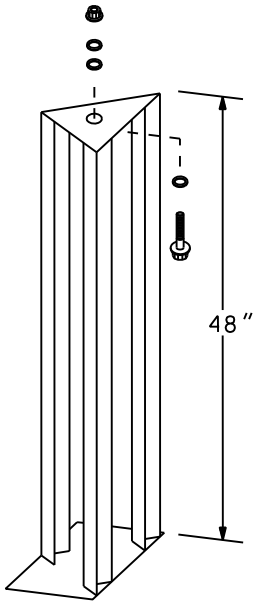
CROSSING FLASHER



PEDESTRIAN CROSSING FLASHER

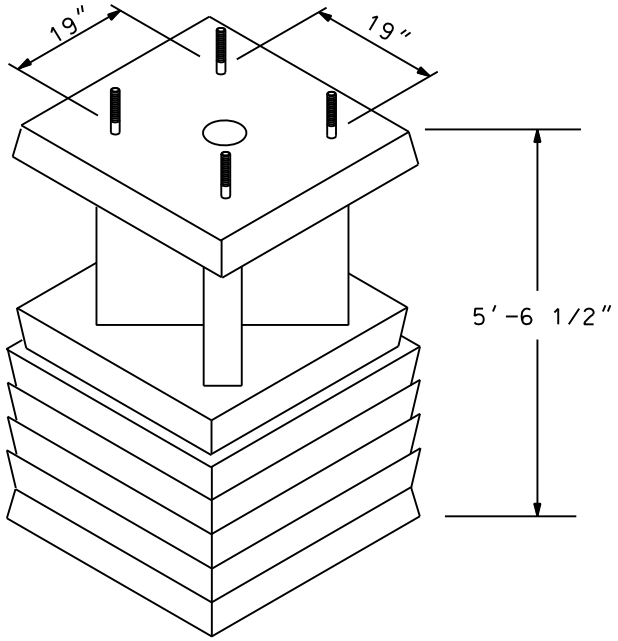


CASE PIERS

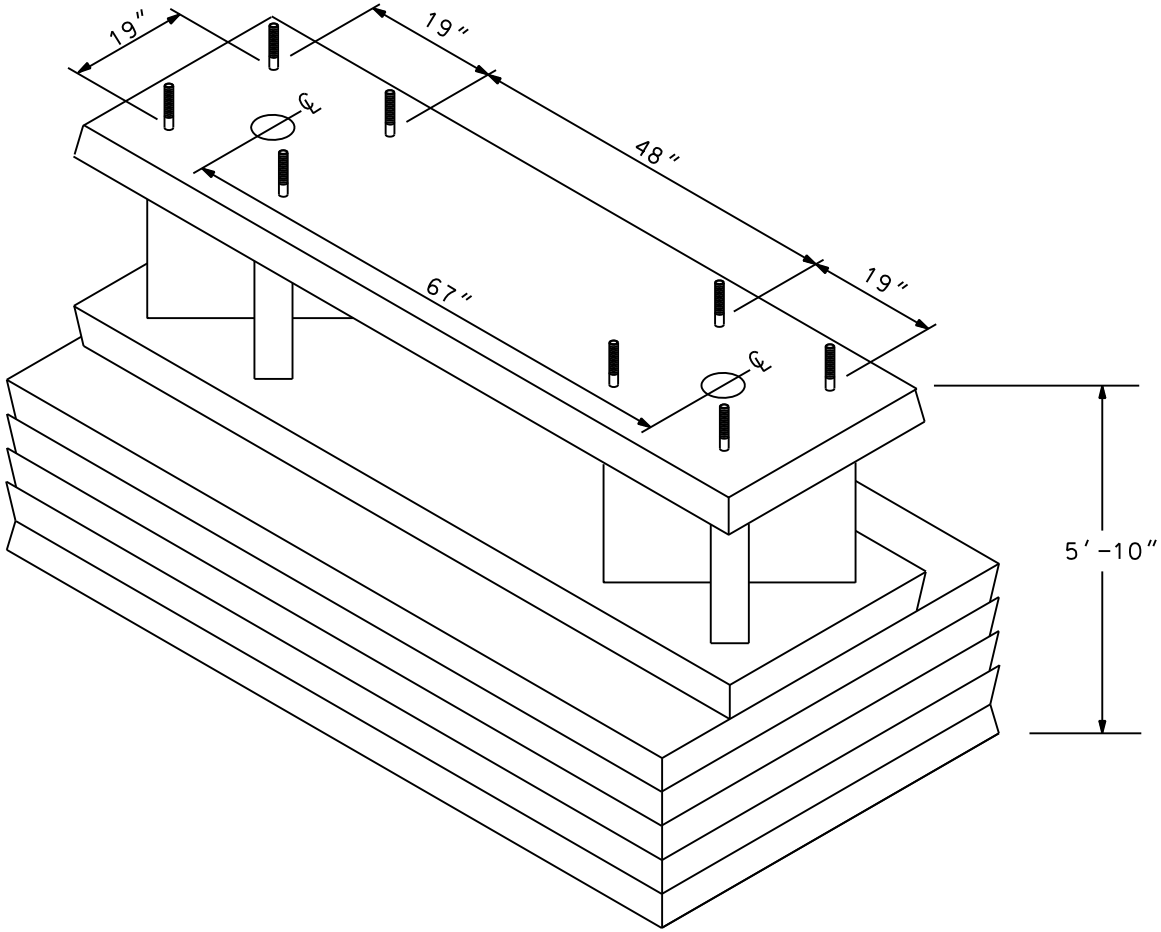


RELAY HOUSE CORNER

FIGURE 2



SINGLE MASTED WALKOUT CANTILEVER



DOUBLE MASTED WALKOUT CANTILEVER

FIGURE 3

METRA

SIGNAL SPECIFICATION

FOR

MICROPROCESSOR BASED SOLID-STATE
DC CODED TRACK CIRCUIT
AND
CAB TRANSMITTER

SPECIFICATION NO. 0030

April 12, 2011

1.0 SCOPE

1.1 This Specification is for furnishing a microprocessor based solid-state DC coded track circuit and cab transmitter for the control of block signals. The unit(s) furnished on this Specification shall be of the most current design. The material, equipment and workmanship shall be of the highest commercial quality.

1.2 Failure to conform to the highest standards of the industry shall be cause for rejection.

1.3 Metra's Chief Engineering Officer or his duly authorized representative shall be the final authority for deciding as to whether a competitive item conforms to these requirements and complies with the intention of this Specification.

1.4 This Specification is intended to be descriptive, but not restrictive and is solely for the purpose of indicating the type and quality of articles that will meet the approval of Metra.

1.5 Capacities and dimensions listed herein shall be interpreted as minimum; variation from the values listed will be judged as to their effect and ability to perform the work intended.

1.6 It shall be the responsibility of the Manufacturer to make certain that all parts and components fit and function together properly.

1.7 Where brand, manufacturer or product names are indicated in this Specification, they are included only for the purpose of establishing identification and general descriptions of the item. Wherever such names appear, the term “or Metra approved equivalent” is considered to follow.

1.8 The article(s)/unit(s) submitted under this Specification must be in production and must have had a previous, satisfactory in-service performance record of at least two years on three Class I railroads. Proof of performance statement(s) shall be provided, upon request, with confirming statement(s) from previous purchaser(s). Failure to provide proof may be cause for rejection.

2.0 GENERAL REQUIREMENTS

Solid state electronic microprocessor-based DC coded track circuit and solid state electronic cab signal transmitter shall meet all American Railway Engineering and Maintenance-of-Way Association (AREMA) Communications & Signals Manual of Recommended Practices specifications including but not limited to Manual Parts 1.1.1, 2.2.1, 8.1.1 and 8.1.2.

2.1 Electronic Cab

Solid-state electronic cab signal transmitters shall be capable of receiving a low voltage coded DC input directly from the microprocessor based DC coded track circuit unit or from contacts of a coding relay. The output shall be a 60 Hz waveform. Output current shall be adjustable from 0 to 3 amps into a 0.3-Ohm load. Cab units shall be compatible with DC track circuits, DC coded track, motion sensing devices, constant warning devices and other equipment operating on the track.

2.2 DC Coded Track

DC coded track circuit units shall be microprocessor based to provide a minimum of nine code rates with a minimum of six independent vital code rates in each direction for bi-directional signaling. The unit shall control one end each of two separate track circuits.

The units shall be Electro Code 4 or compatible with Electro Code 4. Compatibility shall be defined as the ability to be used as one end of a track circuit opposite Electro Code 4 and meeting all of the hardware, software, and operating requirements of this Specification. Units shall be modular in design and contain but not limited to the following modules:

A. Chassis

The chassis connectors and plug couplers shall be keyed to ensure the modules are placed in the proper slots. The chassis shall be equipped with quick-disconnect clips to secure the individual modules to the frame.

B. Power Supply Module

The power supply module shall provide the operating voltage for the system. The module shall have built-in surge protection, filtering and under voltage protections.

C. Vital Processor Module

This module shall contain dual microprocessors responsible for the vital application processing that will control and operate all functions of the vital system. A third communication processor shall provide diagnostic and serial communication interface. This unit shall provide a serial interface which will indicate all signal aspects to the PTC equipment. Other site specific information required by PTC shall also be provided. Field programmable features shall include establishing a site identification header, access to vital software switches, selection of baud rates for the communication ports, and adjustment algorithms for the digital lamp and track circuit adjustment processes. The executive

software shall provide system operation and shall reside on EPROMs.

D. Chassis Information Module

This module shall contain application and site-specific information. Application software shall be contained in EPROMs and be easily accessible through a removable front cover.

E. Communication Input/Output Modules.

The communication modules shall provide three types of interface to the system. The first module shall provide a non-vital serial interface with the system. It shall provide a serial port for local interface for diagnostic purposes and a serial port to be used as a telemetry link between an office and a remote site. The second module shall provide a vital point-to-point interface with the system. It shall also provide a serial port for data communication. The third module shall provide a vital RS-422 communication interface with the system. The communications interface shall be capable of providing links up to 3000 feet beyond the signal house.

F. Display Unit Module.

The Display Unit module shall provide the local interface to the system. The module shall be attached to the front panel of the chassis and be able for use as a hand-held device. The unit shall connect to the system by a serial cable and can be completely removed for use with other units. The keypad and display shall provide access to diagnostic functions, system and menu-driven set up processes including lamp and track circuit adjustments.

G. Vital Track Interface Module.

This module accomplishes coded DC-track circuit interface. The module provides two track circuit transceivers that communicate the DC coded track unit. The module shall provide 2 two-wire cab signal control outputs and 2 two-wire vital control inputs.

H. Track Inductor Module.

Track circuit signals from the vital track interface module shall be routed through a Track Inductor Module before connecting to the rails. This module shall provide independent secondary surge protection for each track circuit. Surge suppressors in each track circuit shall provide optimum performance in high lightning environments. Track chokes shall maintain compatibility with crossing warning equipment and other audio track circuit devices.

I. Vital Lamp Drive Module.

Vital Lamp Driver module shall contain two separate 40-watt DC-to-DC converters, each intended for one bulb in a bank of three signal lamps. One Vital Lamp Driver module shall be capable of controlling a single-

head, back-to-back signal location. Each lamp group shall have independent regulated voltage adjustment. Each vital lamp driver shall have provisions for four non-vital I/O connections.

2.2.1 Each unit shall provide a non-vital block occupancy indication code and a programmable option for light out protection and approach lighting of signals with AC power-off operation.

2.2.2 The unit shall send and receive codes through a track circuit by means of bi-directional coding synchronized to work in both directions alternately.

2.2.3 The unit shall be available in two basic styles, direct vital output without external relays and use with vital output designed for vital relays. Input and output parameters shall be as follows:

A. Outputs from the unit must have the ability to drive the signal lamps, neutral or polar relays, or searchlight mechanism directly.

B. Lamp rating (per bulb) shall be 25 watts maximum with a 3.5 watt minimum rating, with four lamps maximum, two bulbs per signal lit at the same time. Hot filament check shall downgrade signal aspect as specified with a burned out lamp.

C. Mechanism rating output will be 16.5-volt DC maximum with a 9.5 volt DC minimum output rating with a minimum impedance of 200 Ohms with four mechanisms or relays maximum, two per signal, energized at the same time.

D. Mechanism check voltage inputs will be 16.5-volt DC maximum with a 7.5-volt DC minimum, current input maximum rating of six milliamperes at 16.5-volts DC.

2.2.4 The unit(s) shall be compatible with and drive 60-Hz and 100 Hz cab signals of both relay and electronic types.

2.2.5 The unit(s) also must be compatible and directly inter-faceable with interlocking processors such as an Alstom VPI, Ansaldo MICROLOK or GE Transportation VHLC.

2.2.6 The unit(s) shall be designed for input supply voltages of 9.5 to 16.5-volts DC and, without relays, a dark signal supply current of not more than 1.5 Amp DC.

2.3 Electrified Territory Interface Unit

2.3.1 The Electrified Territory Interface Unit (ETIU) shall be compatible with and work in conjunction with the solid-state DC coded track circuits specified within. The

ETIU shall be capable of interfacing with all code rates used by the solid-state DC coded track circuit.

2.3.2 The ETIU shall provide signal control applications in electrified traction power territory with DC traction power and be capable of detecting a shunt of 0.06 ohms, rail-to-rail resistance or better in track circuits consisting of 1500 amp, 0.0006-ohm impedance bonds.

2.3.3 The protocol structure of the ETIU shall be based on coded DC pulse technology. The ETIU shall convert the DC pulses into a modulated AC carrier, which when applied to the tracks, provides a vital AC track circuit.

2.3.4 The ETIU shall be designed for input supply voltages of 12 to 16 volts DC and be capable of operating track circuits ranging from 1000 to 6000 feet with three ohms per 1000 feet of DC ballast resistance.

3.0 PROGRAMMING REQUIREMENTS

The following options shall be programmed into the microprocessor based track circuits.

3.1 Relay-less Systems

A. The unit(s) shall be programmed for color light signals.
B. The unit(s) shall be designed and programmed for the signal lamps normally lit, except approach lit in both directions on power-off.
C. Double track approach lighting shall be required.
D. The flash rate shall be 60 ppm.
E. Non-vital Code 5 shall be switch selectable. Additional modules required shall be provided.
F. Code 6 (tumbledown) shall operate in both directions.
G. Stick logic shall hold the opposing signal red.
H. Stick logic shall be based on a 10-second sample time.
I. East and west auxiliary inputs shall be required. Additional modules required shall be provided.
J. The NWP (auxiliary input) de-energized shall have Code 1 output in both directions, no Code 5, and the signals shall be red in approach to the switch.
K. The stick logic shall be maintained when the auxiliary input is open in advance of the signal. Code output shall degrade to Code 1.
L. The modules and program shall provide cab and auxiliary outputs in accordance with the following table:

CODE	USE	CAB RATE
1	Track	0
2	Yellow (vital)	75
3	Y/Y (vital)	120
4	"FY" (vital)	120
5	Block	N/A
6	Tumble Down	N/A
7	Green (vital)	180
8	Traffic (vital)	N/A
9	YG(vital)	120
M	Maintenance	N/A

M. Searchlight, light out, shall not be applicable.

N. There shall be a full directional signal cross check with opposing vital code shut-off of cab signals with traffic reversed.

O. HR repeater shall be designed for color light signals and be a direct repeater of Code 1. Additional modules/unit required shall be provided, if specified.

P. Intermediate signals shall be programmed for asynchronous operations.

Q. CAB is preconditioned by the reception of Code 1 or Code M prior to a shunt with HR Code in the opposing direction. Upon the loss of Code 1, Code M, or No Code, CAB will start in less than four seconds. Quick turn on is disabled with the reception of HR Code in both directions.

R. Code 8 input shall be repeated through in one direction only. Code 8 shall only repeat through the opposite HR (signal) codes.

3.2 Relay Systems

A. There shall be HR output with Codes 2, 3, 4, 7 or 9.

B. East and west auxiliary inputs shall be available. Additional modules required shall be provided.

C. If the NWP (auxiliary input) is absent, the unit shall downgrade code outputs and set signal to stop. Code 1 in both directions, no Code 5, and the signal red in advance of the switch.

D. The cab signal generator shall turn on one signal block ahead of the train. Code M and selected codes shall control cab signals in advance of the train.

4.0 MANUALS

One Installation and Maintenance Manual shall be furnished with each unit.

5.0 SUBMITTAL

Catalog cuts, drawings, descriptions, etc., of the Manufacturer's typical current production from which the submittal will be based shall be included with the quotation.

6.0 IDENTIFICATION AND SHIPPING

6.1 Unit(s) shall be plainly marked with Manufacturer’s references including serial and model numbers.

6.2 The product shall be assembled or packed as to permit convenient handling and to protect against loss or damage during shipment. Loose pieces shall be tightly taped or wired to the unit(s) or shipping pallet or, packed separately but firmly attached to the product.

6.3 A detailed list of packages and their contents shall be provided for all shipments. One copy will be included with shipment and one copy will be sent directly to Metra's Chief Engineering Officer. Metra Engineering's copy will be mailed not later than the shipping date of the equipment.

7.0 INSPECTION AT SHIPMENT

Metra will inspect the unit(s) after delivery and contact the Manufacturer listing any items not conforming to this Specification. The Manufacturer shall provide a timely schedule to furnish, deliver to destination and install or correct, without charge to Metra, such items. Failure to respond appropriately shall be cause for rejection with return of rejected units at the Manufacturer's total expense.

8.0 GUARANTEE

The Manufacturer shall replace (furnish, deliver to destination and install or correct) without charge, any part of material, which fails within a period of one year of date of installation from defects of material, design, manufacture and/or workmanship.

9.0 DEMONSTRATION

9.1 If requested prior to purchase, bidder shall arrange for inspection before one or more of Metra's representatives, of the basic unit to be furnished. Failure of a unit to be equal to or better than the quality herein specified by Metra shall be cause for rejection of Bid. Such inspection shall be performed at no cost to Metra within a distance of not more than 50 miles from Metra's headquarters at 547 West Jackson Boulevard, Chicago, unless otherwise agreed upon by Metra.

9.2 Metra or its Representative reserves the right to inspect all equipment at Manufacturer’s plant prior to shipment.

METRA

SIGNAL SPECIFICATION

FOR

MISCELLANEOUS SIGNAL MATERIAL

SPECIFICATION 0031

NOVEMBER 12, 2014

DRAFT COPY WIP

1.0 SCOPE

1.1 This Specification is for furnishing various signal items as listed in General Requirements (P-2.0). The unit(s) furnished on this Specification shall be of the most current design. The material, equipment and workmanship shall be of the highest commercial quality.

1.2 Failure to conform to the highest standards of the industry shall be cause for rejection.

1.3 Metra's Chief Engineering Officer or his duly authorized representative shall be the final authority for deciding as to whether a competitive item conforms to these requirements and complies with the intention of this Specification.

1.4 This Specification is intended to be descriptive, but not restrictive and is solely for the purpose of indicating the type and quality of articles that will meet the approval of Metra.

1.5 Capacities and dimensions listed herein shall be interpreted as minimum; variation from the values listed will be judged as to their effect and ability to perform the work intended.

1.6 It shall be the responsibility of the Manufacturer to make certain that all parts and components fit and function together properly.

1.7 Where brand, manufacturer or product names are indicated in this Specification, they are included only for the purpose of establishing identification and general descriptions of the item. Wherever such names appear, the term “or Metra approved equivalent” is considered to follow.

1.8 The article(s)/unit(s) submitted under this Specification must be in production and must have had a previous, satisfactory in-service performance record of at least two years on three Class I railroads. Proof of performance statement(s) shall be provided, upon request, with confirming statement(s) from previous purchaser(s). Failure to provide proof may be cause for rejection.

2.0 GENERAL REQUIREMENTS

2.1 Miscellaneous signal material shall meet all American Railway Engineering and Maintenance-of-Way Association (AREMA) Communications & Signals Manual of Recommended Practices specifications including but not limited to those parts listed below:

2.2 Transformers: 14.2.10, 14.2.25

2.3 Lightning Arresters: 11.3.1

2.4 Binding Posts: 14.1.10

2.5 Terminal Blocks: 14.1.5, 14.6.20

2.6 Resistors: 14.2.15

2.7 Wire/Cable Terminals 14.1.1

(a) All solderless terminals shall be in accordance with AREMA Signal Manual Part 14.1.1, or as specified herein.

(b) Where recommended by the relay manufacturer, solder terminals will be permitted for vital relay connections.

(c) Solder terminals shall be in accordance with AREMA Signal Manual Part 10.4.1 and the manufacturer's recommendations.

(d) Solderless terminals shall be of the crimp-on type.

(e) Samples of all solderless terminals shall be submitted for approval.

(f) All stranded copper wire shall be fitted with an approved type of terminal at all points where the wires are to be terminated on terminal binding posts.

(g) The terminating means shall be of six types: (l) a lug for terminating heavy wires or signal power wires; (2) a solderless insulated terminal as manufactured by AMP, Inc. under the trade name of "Ring Tongue Plasti-Bond", similar to Catalog No. 35628, or approved equal, for terminating No. 16 AWG. 14 AWG stranded wires; (3) a solderless insulated terminal similar to AMP Catalog No. 35627, or approved equal, for terminating insulated wires Nos. 12-10; (4) a solderless insulated terminal similar to AMP Catalog No. 324108 for terminating other stranded insulated wires No. 20-16 AWG having a maximum diameter of 0.200 inches; (5) a solderless insulated terminal, AMP Catalog No. 320554, or approved equal, shall be furnished for No. 8 studs and AMP Catalog No. 320571 or approved equal, shall be furnished for one-quarter inch studs for insulated stranded wires No. 20 - 16 AWG having a maximum diameter of 0.125 inches; (6) solder terminals for vital relays where recommended by the relay manufacturer.

(h) The terminals shall be designed for attaching to the ends of the conductor in such a manner that the flexibility of the conductor will not be destroyed and the possibility of breakage at the terminal will be reduced to a minimum.

(i) Terminals shall be designed for attaching to the wire with a tool made

by the manufacturer of the terminal. Should the Contractor require a specialized tool to connect the terminal to the wire, the Contractor shall provide a minimum of two tools for each housing containing the specialized connections.

(j) The tool shall be equipped with a ratchet device to insure proper indentation of the terminal, which will not release until proper indentation is complete. Three such tools shall be furnished by the Contractor.

2.8 Wire/Cable Tags

(a) Both ends of each cable and each cable wire and all single wires that terminate in the relay houses, relay rooms, towers, relay cases, junction boxes, signals, snowmelter cases, switch mechanisms, control panels, and any equipment of the signal system outside of such locations shall be permanently identified with a tag.

(b) Tags shall not obscure connecting links used between terminal binding posts.

(c) Tags shall be installed so that they may be read with a minimum of disturbance of the tags and wiring.

(d) Each conductor of the internal cable shall be rung out and identified before applying the tag.

(e) The lettering on all tags shall be typed and waterproofed: tag lettering shall also be permatized. The tags shall bear the following information in the sequence listed:
i) Wire nomenclature.
ii) Cable designation (if applicable).
iii) Termination point (rack no., row and contact no., if applicable).
iv) Termination point of other end of wire.

(f) Tags for wire and cable identification shall be waterproof, sleeve type tags Terminal board terminals shall be tagged with waterproof, flat type tags securely fastened to the front of the board.

(g) Tags for wire and cable identification shall be waterproof, sleeve type tags.

3.0 SUBMITTAL

3.1 Catalog cuts, drawings, descriptions, etc., of the Manufacturer's typical current production from which the submittal will be based shall be included with the quotation.

3.2 Detailed shop drawings of miscellaneous signal material(s) are to be furnished within 15 days of the award of the contract, and be approved by Metra's Chief Engineering Officer before manufacture begins.

4.0 IDENTIFICATION AND SHIPPING

4.1 All unit(s) shall be plainly marked with Manufacturer's references including serial and model numbers.

4.2 The product shall be assembled or packed as to permit convenient handling and to protect against loss or damage during shipment. Loose pieces shall be tightly taped or wired to the miscellaneous signal material(s) or shipping pallet or, packed separately but firmly attached to the product.

4.3 A detailed list of packages and their contents shall be provided for all shipments. One copy will be included with shipment and one copy will be sent directly to Metra's Chief Engineering Officer. Metra Engineering's copy will be mailed not later than the shipping date of the equipment.

5.0 INSPECTION AT SHIPMENT

Metra will inspect the unit(s) after delivery and contact the Manufacturer listing any items not conforming to this Specification. The Manufacturer shall provide a timely schedule to furnish, deliver to destination and install or correct, without charge to Metra, such items. Failure to respond appropriately shall be cause for rejection with return of rejected units at the Manufacturer's total expense.

6.0 GUARANTEE

The Manufacturer shall replace (furnish, deliver to destination and install or correct) without charge, any part of material, which fails within a period of one year of date of installation from defects of material, design, manufacture and/or workmanship.

7.0 DEMONSTRATION

7.1 If requested prior to purchase, bidder shall arrange for inspection before one or more of Metra's representatives, of the basic unit to be furnished. Failure of a unit to be equal to or better than the quality herein specified by Metra shall be cause for rejection of Bid. Such inspection shall be performed at no cost to Metra within a distance of not more than 50 miles from Metra's headquarters at 547 West Jackson Boulevard, Chicago unless otherwise agreed upon by Metra.

7.2 Metra or its Representative reserves the right to inspect all equipment at Manufacturer's plant prior to shipment.

METRA

SIGNAL SPECIFICATION

FOR

WAYSIDE SIGNAL BRIDGES AND CANTILEVERS

SPECIFICATION NO. 0039

August 23, 2012

1.0 SCOPE

This Specification is for furnishing wayside signal bridges and cantilevers. The unit(s) furnished under this Specification shall be of the most current design. The materials, equipment and workmanship shall be of the highest commercial quality.

1.2 Failure to conform to the highest standards of the industry shall be cause for rejection.

1.3 Metra's Chief Engineering Officer or his duly authorized representative shall be the final authority for deciding as to whether a competitive item conforms to these requirements and complies with the intention of this Specification.

1.4 This Specification is intended to be descriptive, but not restrictive and is solely for the purpose of indicating the type and quality of articles that will meet the approval of Metra.

1.5 Capacities and dimensions listed herein shall be interpreted as minimum; variation from the values listed will be judged as to their effect and ability to perform the work intended.

1.6 It shall be the responsibility of the Manufacturer to make certain that all parts and components fit and function together properly.

1.7 Where brand, manufacturer or product names are indicated in this Specification, they are included only for the purpose of establishing identification and general descriptions of the item. Wherever such names appear, the term “or Metra approved equivalent” is considered to follow.

1.8 The article(s)/unit(s) submitted under this Specification must be in production and must have had a previous, satisfactory in-service performance record of at least two years on three Class I railroads. Proof of performance statement(s) shall be provided, upon request, with confirming statement(s) from previous purchaser(s). Failure to provide proof may be cause for rejection.

2.0 GENERAL REQUIREMENTS (See Figures 1 and 2)

2.1 Wayside signal bridges and cantilevers shall be provided complete with all structural members, foundations, ladders, walkways, handrails, junction cases, pull boxes, conduit, masts, junction boxes, connectors and all necessary assembly and mounting hardware. Signals heads, if specified, shall meet or exceed the requirements of Metra Specification No. 0043, Color Light Signal units.

2.2 Signal bridge and cantilever foundations and structures described herein shall conform to the applicable portions of the American Railway Engineering and Maintenance-of-Way Association (AREMA) Communications & Signals Manual of Recommended Practice as follows:

Manual Parts:	14.4.1A	14.4.7A	14.47B	14.4.7C
	14.4.9A	14.4.9B	14.4.9C	14.4.9D
	14.4.9E	15.1.4	15.1.5	15.3.1

and AASHTO Specifications for a railroad signal bridge with walkway.

2.3 Each signal bridge or cantilever shall be sized to conform to minimum railroad clearance requirements of 12 feet 6 inches horizontal from the track centerline to the mast and a vertical clearance of 25 feet 0 inches from the top of rail to the lowest point on the bridge or cantilever assembly.

2.4 The signal bridge and cantilever shall be of tubular aluminum construction and shall be sectionalized such that on-site assembly by railroad forces is possible without modification.

2.5 Walkways shall be constructed of expanded aluminum grating to provide good footing, minimize wind load and prevent ice/snow build-up. Walkways shall be securely welded to the signal bridge and cover the length and width of the bridge with no gaps or openings. Minimal openings to allow signal masts or tube to pass through shall be provided. Two horizontal handrails shall be provided on all sides, approximately 21 and 42 inches above the walkway, and shall not interfere with view of the signals. If provided, tubular handrails shall not exceed two inches in diameter.

2.6 All threaded openings shall be plugged and protected from damage. All tubing and pipe ends shall be closed with caps. American Mechanical Engineering standards shall apply to threaded parts. No cable troughs or raceways will be permitted.

3.0 CONSTRUCTION DETAILS

Ladders

3.1 The signal bridges and cantilevers shall be equipped with an aluminum ladder to be securely and permanently fastened with the rungs parallel to the tracks, outside the main structure. The ladder shall have non-slip, 16-inch (minimum) rungs and be capable of supporting the weight of two people and shall be spaced six inches off the structure for ease of climbing. The signal bridge or cantilever shall be equipped for easy access without hindrance and may include handholds or other aids as necessary. The ladder shall extend from the base of the structure (top of foundation) to a point six feet above the lower platform.

A hinged ladder guard shall be fitted to the lower portion of the ladder. The ladder guard shall be fabricated from flat aluminum plate, of sufficient height to inhibit unauthorized access to the signal bridge. A hasp arrangement having a minimum 1/2-inch diameter opening shall be provided to secure the ladder guard with a Metra padlock. Grease fittings shall be provided in the hinges.

3.2 The signal bridges and cantilevers shall be supplied with an appropriate safety cage extending from the top of the ladder to 9 feet from the top of the rail. The lower platform walkway shall extend beyond the plane of the ladder approximately two feet. Suitable handholds shall be located within 30 inches of the top of the ladder to provide a firm grip when transferring from the ladder to the walkway.

3.3 For multiple head signal layout applications, the signal bridge(s) shall be equipped with an aluminum ladder between the lower and upper levels. This ladder shall extend from the surface of the lower platform to a minimum point five feet above the upper platform.

Junction Case

3.4 Junction case(s) suitable for terminating wires and underground cables shall be provided as a part of the signal bridge. The junction case(s) shall be weather-tight and fitted with a double-hinged door with provisions having a minimum 1/2-inch diameter opening for a Metra padlock and grease fittings in the hinges.

The junction case(s) shall be constructed of cast aluminum or sheet aluminum at least 0.100 inches thick, with all structural joints welded and sealed. Maximum outside width of junction cases shall be 24 inches.

The junction case(s) shall be located at the base of the signal bridge with the bottom of the case approximately three feet above the top of the foundation. The case(s) shall be mounted to the mast leg on the same side that the signal masts are mounted in order to provide the most direct wire routing to the signals (See Figure 3).

3.5 One 6 x 2 post terminal block complete with washers and nuts shall be provided for each signal head, plus 20 percent spare terminals. Insulated test links (Invensys No. 024620-1X or Metra approved equivalent) and appropriate hardware shall be provided for each pair of junction box terminals.

The junction case(s) shall be provided with a minimum of 21 square inches of 3/4-inch plywood backboard for each 6 x 2 post terminal block or part of a block. The backboard shall be mounted to fill the case height and width excluding the mast entrance opening. No overcrowding of terminals shall be

permitted. An alternate method of mounting the terminal block may be submitted as an equivalent.

3.6 Cable and wire entry to the junction case(s) shall be via a main mast of the signal bridge. External cable entrance conduits will not be permitted.

The method of routing wires from junction case(s) to each signal head shall be to route the wires within the tubular members of the signal bridge structure as shown in Figure 3. Wires shall be pulled entirely through the bridge members and signal masts. Appropriate pull box locations shall be provided as necessary. All edges shall be smooth and rounded to accommodate wire installation. Wire will not be furnished as part of this specification. Pull cords will be furnished and installed for each of the wire runs.

3.7 An opening approximately four inches by six inches shall be provided near the base of the signal bridge or cantilever, under the junction case(s), to allow access for cable sealing at the foundation. The opening shall be fitted with a bolt-on metal cover plate. The bases of vertical masts without cable entrances shall be provided with a plate to prevent the entrance of rodents and insects.

Signal Masts

3.8 Signal masts shall bolt to the structural members inside the signal bridge or cantilever horizontal truss assembly. Signal masts shall be five-inch aluminum with the bottom closed, but having a 1/16-inch weep-hole. Appropriate openings shall be provided for wire entrance from the structural members. All conduits, fittings and necessary mounting hardware that are required shall be furnished. One signal mast shall be provided for each signal head. All signal heads shall be top-of-mast mount.

For signals with three heads the upper two heads are to be installed on a single mast. An appropriate platform, handrails, ladder and mast brackets shall be provided for the upper two heads.

3.9 Signal number, when specified, shall be black letters on a white reflective background. Signal numbers shall be mounted on the signal bridge, but not below clearance. The overall size of the numbers shall be 5-1/2 inches by 8 inches and be complete with horizontal mounting brackets from Progress Rail No. 9482001173M or Metra approved equivalent.

4.0 FOUNDATIONS

4.1 Foundations supplied with signal bridges shall be of sectional concrete design, suitable for all soil conditions. Precast foundations shall conform to the applicable portions of the AREMA requirements for reinforcement,

aggregate, mix, air entrapment and compressive strength.

Precast foundations shall generally conform to the typical arrangements in Figure 4.

4.2 The construction of the foundations shall be such that entrance of all underground cables is into the mast(s) of the signal bridge.

Precast foundations shall have centerpieces in maximum two-foot increments. The base and top shall make the foundations size as specified plus/minus two inches.

4.3 The signal bridge or cantilever shall be mounted on bolts that project through the top of the foundation. Bolt projection shall be at least 9-1/2 inches with threaded portion only outside of foundation. Bolt diameter shall be 1-1/2-inch minimum. Bolt spacing and arrangement shall not weaken the foundation.

Bolts, nuts and washers, and all retaining fasteners shall be hot-dipped galvanized. One bolt, four nuts and three washers shall be furnished for each mounting hole at the base of the signal bridge or cantilever.

5.0 SUBMITTAL

5.1 Catalog cuts, drawings, descriptions, etc., of the Manufacturer's typical current production from which the submittal will be based shall be included with the quotation.

5.2 Detailed shop drawings and assembly drawings with instructions of the wayside signal bridges, cantilevers, foundations and color light units are to be furnished within 15 days of the award of the contract, and be approved by Metra's Chief Engineering Officer before manufacture begins.

6.0 IDENTIFICATION AND SHIPPING

6.1 Each signal bridge or cantilever shall be shipped complete with all associated hardware. Loose mounting hardware shall be individually tagged, identified and shall be plainly marked with Manufacturer’s references including serial and model numbers. The foundations can be shipped separately.

6.2 The product shall be assembled or packed as to permit convenient handling and to protect against loss or damage during shipment. Loose pieces shall be tightly taped or wired to the wayside signal bridge(s) or shipping pallet or, packed separately but firmly attached to the product.

6.3 A detailed list of packages and their contents shall be provided for all shipments. One copy will be included with shipment and one copy will be sent directly to

Metra's Chief Engineering Officer. Metra Engineering's copy will be mailed not later than the shipping date of the equipment.

6.4 Manufacturer shall notify Metra of shipping date 48 hours prior to shipment.

7.0 INSPECTION AT SHIPMENT

Metra will inspect the unit(s) after delivery and contact the Manufacturer listing any items not conforming to this Specification. The Manufacturer shall provide a timely schedule to furnish, deliver to destination and install or correct, without charge to Metra, such items. Failure to respond appropriately shall be cause for rejection with return of rejected units at the Manufacturer's total expense.

8.0 GUARANTEE

The Manufacturer shall replace (furnish, deliver to destination and install or correct) without charge, any part of material, which fails within a period of one year of date of installation from defects of material, design, manufacture and/or workmanship.

9.0 DEMONSTRATION

9.1 If requested prior to purchase, bidder shall arrange for inspection before one or more of Metra's representatives, of the basic unit to be furnished. Failure of a unit to be equal to or better than the quality herein specified by Metra shall be cause for rejection of Bid. Such inspection shall be performed at no cost to Metra within a distance of not more than 50 miles from Metra's headquarters at 547 West Jackson Boulevard, Chicago, unless otherwise agreed upon by Metra.

9.2 Metra or its Representative reserves the right to inspect all equipment at Manufacturer’s plant prior to shipment.

REQUISITION INSTRUCTIONS FOR WAYSIDE SIGNAL BRIDGES

The following information must be included with all requisitions:

1. Number and spacing of tracks. (P-2.3)

2. Number of signals, changes in the type of mounting, type of signals, etc. (P-2.1, P-3.8)

3. Changes in horizontal clearance. (P-2.3)

4. Changes in vertical clearance to top of rail. (P-2.3)

5. List number plates needed. (P-3.9)

6. Include the Specification No. 0043, Color Light Signal units (P-2.1) unless signal heads are excluded.

METRA

SIGNAL SPECIFICATION

FOR

COLOR LIGHT SIGNAL UNITS

SPECIFICATION NO. 0043

March 22, 2013

1.0 SCOPE

1.1 This Specification is for furnishing color light signal unit(s) of the doublet lens type. The unit(s) furnished on this Specification shall be of the most current design. The material, equipment and workmanship shall be of the highest commercial quality.

1.2 Failure to conform to the highest standards of the industry shall be cause for rejection.

1.3 Metra's Chief Engineering Officer or his duly authorized representative shall be the final authority for deciding as to whether a competitive item conforms to these requirements and complies with the intention of this Specification.

1.4 This Specification is intended to be descriptive, but not restrictive and is solely for the purpose of indicating the type and quality of articles that will meet the approval of Metra.

1.5 Capacities and dimensions listed herein shall be interpreted as minimum; variation from the values listed will be judged as to their effect and ability to perform the work intended.

1.6 It shall be the responsibility of the Manufacturer to make certain that all parts and components fit and function together properly.

1.7 Where brand, manufacturer or product names are indicated in this Specification, they are included only for the purpose of establishing identification and general descriptions of the item. Wherever such names appear, the term “or Metra approved equivalent” is considered to follow.

1.8 The article(s)/unit(s) submitted under this Specification must be in production and must have had a previous, satisfactory in-service performance record of at least two years on three Class I railroads. Proof of performance statement(s) shall be provided, upon request, with confirming statement(s) from previous purchaser(s). Failure to provide proof may be cause for rejection.

2.0 GENERAL REQUIREMENTS / STANDARDS

2.1 American Mechanical Engineering standards shall apply to threaded parts.

2.2 The color light signal unit(s) shall meet the requirements established by the American Railway Engineering and Maintenance-of-Way Association (AREMA) Communications & Signals Manual of Recommended Practices, Part 7.1.1, except as modified by any requirements of this Specification.

2.3 The color light signal ladder, mast, base and platforms, when specified, shall meet or exceed the requirements of AREMA Communications & Signals Manual of Recommended Practices, Parts 7.2.1, 7.2.41A and 7.2.41B.

3.0 DESIGN

3.1 General

The general design dimensions and structure of the signal unit(s) shall conform to figures 1 through 5 within this specification.

3.2 Signal Case and Light Units

3.2.1 The signal case shall be aluminum, weather-tight, and shall be equipped with suitable doors or covers locked with a hasp with a lug. The lug shall have a minimum opening of 1/2-inch for application of a screw type or key lock. The doors or covers when opened shall permit easy access to all parts.

3.2.2 The signal shall be of modular design and display one, two, three or four colors, with color lenses provided and arranged for a vertical configuration.

3.2.3 The wire entrance in a dwarf signal case shall allow for the use of a five conductor No. 6 AWG underground cable including the outer jacket.

3.2.4 The light unit lamp socket and all optical elements for an 8-3/8-inch outer lens configuration shall be removable as a unit from the rear of the signal case without removing or loosening more than four fasteners or disturbing the alignment of any of the components. Fasteners shall be integral to the case or captive to the removable unit.

3.3 Electric lamps shall be 25 watt, 10 volt, S11, SC, CC-6 bulbs. (AREMA Communications & Signals Manual of Recommended Practices, Part 14.2.1). Bulbs shall be rated for a minimum of 50,000 hours similar to Velcorp/GEM part #RS-1025GLD-SF or Metra approved equivalent.

3.4 Light Emitting Diode (LED) signal modules similar to GE Lumination or approved equivalent shall be furnished as the light unit for all new mast mounted signals. The LED modules shall be visible for a minimum distance of 5000 feet in daylight and be designed for direct retrofit into signal heads made for 8-3/8” outer lenses. The LED modules shall be of such design and construction so as to avoid undesirable reflection phantom indications of external light. The module shall be a self contained, sealed unit with a UV stabilized outer shell and pre-focused beam. The module shall meet or exceed the requirements of AREMA Part 11.5.1 for a class B environment, and dielectric requirements for AREMA Part 1.4.1. The module shall also meet the requirements of AREMA Part 11.3.3 for tertiary electrical surge

protection. Modules shall operate over a temperature range of -40^{O}C to +70^{O}C. Wattage, model number and light intensity ratings for each color aspect shall be as follows:

	WATTS (W)	MODEL NUMBER	CANDELA (Cd)
RED	16.0	RM4-RCFB-75(B)-92	800
YELLOW	16.0	RM4-YCFB-85(B)-92	2300
GREEN	15.0	RM4-GCFB-75(B)-92	800
WHITE	15.0	RM4-WCFB-75(B)-92	1100

The module shall operate on 8-20 Volts DC and be fully compatible with light out detection circuits as shown in the Typical Drawings. A light out condition shall be determined when 50% or greater of the LED's within the unit are not drawing any current.

3.5 Transformers, if specified, shall be provided in each lamp compartment with insulating caps over all terminals that the voltage is over 50 volts AC or DC.

3.6 Resistors, if specified, shall be provided in each lamp compartment.

3.7 Lenses

3.7.1 Outer lenses shall be 6-3/8 inches or 8-3/8 inches.

3.7.2 Lens shall be plastic.

3.7.3 A close-up signal aspect shall be displayed and the close-up refracting lens shall be molded as part of the outer lens.

3.8 Mast Mounted Signals without Junction Box Bases

3.8.1 The signal shall be wired with insulated case wire that is a minimum of No. 10 AWG and of a Metra approved type.

3.8.2 Signals shall be designed for mast mounting and shall be shipped complete and ready for assembly. Typical signal aspects and signal masts are shown in Figures 1 (back-to-back signal), 2 (double armed 3 and 2 aspect), 3 (double armed 3 and 4 aspect), 4 (double armed 3 aspect back-to-back) and 5 (dwarf).

3.8.3 All signal heads shall mount on tubular mast brackets (Invensys No. 042256-4X) in front of the masts. Double-armed signals shall have the red aspects shall be on six-foot centers. Outer lenses for all aspects shall be 8-3/8 inches.

3.8.4 A foundation, when specified, shall be provided and shall be of such design as to solidly hold the mounted signal so that it cannot be moved or affected by normal vibration. Physical dimensions and materials of the foundation shall be as specified. Foundations shall meet the requirements of Metra Specification No. 0027, Signal Foundations.

3.8.5 Masts shall be five-inch aluminum tubing minimum Schedule 80 or stronger and incorporate a welded aluminum base plate with four vertical support gussets. The base plate shall be designed for mounting on 11-11/16" x 11-11/16" foundations mounting bolts, leveling nuts and washers. An aluminum trim section shall mount around the outside of the base and extend down to the foundation to close the opening between the base and the foundation.

3.8.6 Ladders and platforms shall be aluminum. Front platforms shall be provided and shall allow access to the front of the signal head via an offset platform to one side of the signal. Ladders shall be vertical and mounted on the field side. Ladder rung width shall be at least 16 inches. Handrails shall be provided for each platform. All fasteners used to assemble the platforms, masts and ladders shall be stainless steel.

3.8.7 Signal numbers, when specified, shall be black letters on a white, reflective background. The numbers shall be mounted below the bottom signal head. The overall dimensions of the number plates shall be 5-1/2" x 8" and be furnished complete with vertical mounting frame (Invensys No. 036117-583) for wayside signals).

3.8.8 An external aluminum junction box case shall be mounted to the mast nominally 48 inches above the top of the foundation. The junction box shall be 12" x 18" and provide room for a minimum of five double AAR terminals for each signal head. Terminals shall be provided with insulating test links (Invensys No. 024620-1X). The double hinged door of the weather tight case shall be gasketed, tight closing and lockable with a minimum 1/2-inch diameter opening to accept a Metra padlock.

3.9 Mast Mounted Signals with Junction Box Bases

3.9.1 The signal shall be wired with insulated case wire that is a minimum of No. 10 AWG and of a Metra approved type.

3.9.2 Signals shall be designed for mast mounting and shall be shipped complete and ready for assembly. Typical signal aspects and signal masts are shown in Figures 1 (back-to-back signal), 2 (double armed 3 and 2 aspect), 3 (double armed 3 and 4 aspect), 4 (double armed 3 aspect back-to-back) and 5 (dwarf).

3.9.3 All signal heads shall mount on tubular mast brackets (Invensys No. 042256-4X) in front of the masts. Double-armed signals shall have the red aspects shall be on six-foot centers. Outer lenses for all aspects shall be 8-3/8 inches.

3.9.4 A foundation, when specified, shall be provided and shall be of such design as to solidly hold the mounted signal so that it cannot be moved or affected by normal vibration. Physical dimensions and materials of the foundation shall be as specified. Foundations shall meet the requirements of Metra Specification No. 0027, Signal Foundations.

3.9.5 Masts shall be five-inch aluminum tubing minimum Schedule 80 or stronger and incorporate an aluminum split base. The split base shall be designed for mounting on 11-11/16" x 11-11/16" foundations mounting bolts, leveling nuts and washers. An aluminum trim section shall mount around the outside of the base and extend down to the foundation to close the opening between the base and the foundation.

3.9.6 Ladders and platforms shall be aluminum. Front platforms shall be provided and shall allow access to the front of the signal head via an offset platform to one side of the signal. Ladders shall be vertical and mounted on the field side. Ladder rung width shall be at least sixteen inches. Handrails shall be provided for each platform. All fasteners used to assemble the platforms, masts and ladders shall be stainless steel.

3.9.7 Signal numbers, when specified shall be black letters on a white, reflective background. The numbers shall be mounted below the bottom signal head. The overall dimensions of the number plates shall be 5-1/2" x 8" and be furnished complete with vertical mounting frame (Invensys No. 036117-583) for wayside signals and horizontal mounting frame (Progress Rail No. 9482001173M) for bridge or cantilever mounted wayside signals.

3.10 Foundation Mounted Signals

3.10.1 The signal shall be wired with insulated case wire that is a minimum of No. 10 AWG and of a Metra approved type.

3.10.2 Ground signals shall have stackable signal heads and shall have the head designed for top of foundation mounting. Outer lenses for all aspects shall be 6-3/8 inches.

3.10.3 A foundation shall be provided and shall be of such design as to solidly hold the mounted signal so that it cannot be moved or affected by normal vibration. Physical dimensions and materials of the foundation shall be as specified. Foundations shall meet the requirements of Metra Specification No. 0027, Signal Foundations.

4.0 SUBMITTAL

4.1 Catalog cuts, drawings, descriptions, etc., of the Manufacturer's typical current production from which the submittal will be based shall be included with the quotation.

4.2 Detailed shop drawings of the color light signal unit(s) are to be furnished within 15 days of the award of the contract, and be approved by Metra's Chief Engineering Officer before manufacture begins.

5.0 IDENTIFICATION AND SHIPPING

5.1 The signal unit(s) shall be plainly marked with Manufacturer’s references including serial and model numbers.

5.2 The product shall be assembled or packed as to permit convenient handling and to protect against loss or damage during shipment. Loose pieces shall be tightly taped or wired to the color light signal unit(s) or shipping pallet or, packed separately but firmly attached to the product.

5.3 A detailed list of packages and their contents shall be provided for all shipments. One copy will be included with shipment and one copy will be sent directly to Metra's Chief Engineering Officer. Metra Engineering's copy will be mailed not later than the shipping date of the equipment.

5.4 Manufacturer shall notify Metra of shipping date 48 hours prior to shipment.

6.0 INSPECTION AT SHIPMENT

Metra will inspect the unit(s) after delivery and contact the Manufacturer listing any items not conforming to this Specification. The Manufacturer shall provide a timely schedule to furnish, deliver to destination and install or correct, without charge to Metra, such items. Failure to respond appropriately shall be cause for rejection with return of rejected units at the Manufacturer's total expense.

7.0 GUARANTEE

The Manufacturer shall replace (furnish, deliver to destination and install or correct) without charge, any part of material, which fails within a period of one year of date of installation from defects of material, design, manufacture and/or workmanship.

8.0 DEMONSTRATION

8.1 If requested prior to purchase, bidder shall arrange for inspection before one or more of Metra's representatives, the basic unit to be furnished. Failure of a unit to be equal to or better than the quality herein specified by Metra shall be cause for rejection of Bid. Such inspection shall be performed at no cost to Metra within a distance of not more than 50 miles from Metra's headquarters at 547 West Jackson Boulevard, Chicago, unless otherwise agreed upon by Metra.

8.2 Metra or its Representative reserves the right to inspect all equipment at Manufacturer’s plant prior to shipment.

REQUISITION INSTRUCTIONS FOR COLORLIGHT SIGNALS

The following information must be included with all requisitions:

1. Include any drawings of reference. (P-3.9)

2. Configuration of signal including number of signal lamp units (1, 2, 3 or 4) and color of each and position of each color/indication (P-3.2.2)

3. Arrangement of signal units can also be triangular or special. (P-3.2.2)

4. If electric lamp step down transformer is to be included, specify primary and secondary voltage current. (P-3.4)

5. Resistor should be specified if necessary. (P-3.5)

6. Type of signal: long range with 8-3/8 inch lens, short-range 6-3/8 inch lens. (P-3.7.4, P-3.8.4, and P-3.9.2)

7. Method of mounting: Bracket type bolted to mast, or bolted to a foundation. (P-3.7.1, P-3.8.1 and P-3.9.2)

8. Is foundation to be included? (P-3.7.5, P-3.8.5 and P-3.9.3) (If yes, specify size and type of foundation and include foundation specification.)

9. If signal to be foundation mounted and foundation not included, what is foundation bolt spacing, diameter and length? (P-3.7.6, P-3.8.6 and P-3.9.3) (4 bolt: 8”x8”, 6-3/4”x6-3/4”; 2 bolt: 7-1/2”, etc.) / 3/4-inch bolts (11-11/16”x11-11/16”) bases use one-inch mounting bolts. (P-3.7.6, P-3.8.6 and P-3.9.3)

10. Mast mounted signal descriptions should be checked for exceptions to the arrangement or aspects of Figure 1,2,3,4 and 5.

METRA

SIGNAL SPECIFICATION

FOR

INSULATED WIRE AND JACKETED RAILROAD SIGNAL CABLE

SPECIFICATION NO. 0069

April 12, 2011

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SECTION I: GENERAL (ALL CONSTRUCTIONS)

1.0 SCOPE

1.1 This Specification provides for single and multi-conductor insulated and jacketed cable for continuous operation in wet or dry locations, whether installed in the ground; in conduits or ducts; aerially; in ducts or any combination of these installations on circuits rated at 0 to 600 volts AC or DC.

1.1a This Specification also provides for single conductor insulated and jacketed wire for installation in wired housings on circuits rated as above.

1.2 The requirements of this section shall apply to wire and cable unless otherwise specified. Wire and cable shall meet or exceed the tests and requirements or insulation, jacketing and assemblies specified by Association of American Railway Engineering and Maintenance-of-Way Association (AREMA) Communications & Signals Manual of Recommended Practices, Part(s) 10.3.10, 10.3.14, 10.3.16, and 10.3.17 as they relate to specific types and as referred to by these Specifications and Appendices A through G. Reference to Specifications or publications of Insulated Cable Engineers Association (ICEA), American Society for Testing Materials (ASTM), American National Standards Institute (ANSI), and others imply current issues.

1.3 The materials provided and workmanship performed shall be consistently of the highest quality assuring durability for the life of the product. Failure to conform to the highest standards of the industry shall be cause for rejection.

1.4 Metra's Chief Engineering Officer or his authorized representative shall be the final authority for deciding as to whether a competitive item conforms to these requirements and complies with the intention of this Specification.

1.5 This Specification is intended to be descriptive, not restrictive, and is solely for the purpose of indicating the type and quality of wire or cable that will meet with the approval of Metra.

1.6 Capacities and properties listed herein are to be interpreted as minimums. Variations from these values and requirements will be judged as to their effect and ability to perform as intended.

1.7 It shall be the responsibility of the Manufacturer to make certain that all parts and components fit and function together properly.

1.8 Where brand, manufacturer or product names are indicated in this Specification, they are included only for the purpose of establishing identification and general description of the item. Wherever such names

appear, the term “or Metra approved equivalent” is considered to follow.

1.9 The Manufacturer offering a bid shall be qualified as to its facilities and its capabilities to produce a consistent quality product. As evidence of the Manufacturer’s ability, the materials proposed for the wire and cable construction shall meet or exceed the requirements of this Specification.

1.10 Metra reserves the right to judge the adequacy of the Manufacturer’s Quality Assurance Program and organization in relation to the degree of reliability required of the cable. A copy of the Manufacturer’s Quality Assurance Program, particularly as related to signal wire and cable, shall be furnished to Metra on request.

2.0 IDENTIFICATION

2.1 Multi-Conductor Cable: Each length of cable shall be permanently identified as to manufacturer and year of manufacture at intervals of not less than three feet on moisture resistant tape under the jacket. The cable shall also be marked, by printing on the surface of the jacket, as to the application and make-up of cable. For example, a cable to be installed directly in-ground and that has 7 #14 AWG conductors shall be marked “7 #14 DIRECT BURIAL” and, if to be installed aerially, it would be marked “7 #14 AERIAL” at intervals not less than three feet.

2.2 Track Wire: Manufacturer’s identification and AWG size is to be accomplished by printing on the surface of the jacket.

2.3 Single Conductor Case Wire: The reel or carton in which the case wire is to be shipped will be marked with manufacturer’s identification, AWG size, and amount shipped on side of reel or on carton shipped.

3.0 SPLICING

Current written instructions for splicing shall be promptly provided by the Manufacturer for each make-up of cable supplied, unless presently on file with Metra's Chief Engineering Officer.

4.0 MARKING

4.1 Reel and Cable Information: Each reel shall contain on the outside and inside flange, plainly legible and printed in a weather resistant manner, the Manufacturer’s name, Metra’s purchase order number; the length of each section of cable, the number and gauge of conductors; and the name and shipping address of Metra.

4.2 Reel Rolling Instruction: An arrow shall be painted on one head of each reel

pointing the opposite direction from the outer end of the cable with the words "ROLL THIS WAY" stenciled under the arrow.

5.0 SHIPPING

5.1 All cable except case wire shall be shipped on reels adequately protected from damage during shipment by heavy wrapping or wood lagging.

5.2 Shipping Lengths:

A. Unless specifically noted, all cable shall be furnished in exactly 1000-foot lengths.
B. #16 AWG case wire shall be furnished on a 1000-foot spool.
C. #10 AWG case wire shall be furnished on a 500-foot spool.

5.3 Reel Design: Each length of cable shall be wound on a separate reel. The reels shall be designated and constructed as non-returnable but be substantial enough to withstand reasonable handling. The reel shall be so constructed that the inner end of the cable will be accessible but protected from injury. The diameter of the drum shall be at least 14 times the diameter of the cable to prevent damage to the cable while reeling. The arbor hole shall admit a spindle 2-1/2 inches in diameter without binding.

5.4 Cable Winding on Reels: Cable shall be tightly wound in layers on a reel. Both ends of the cable shall be sealed to prevent moisture and securely fastened so they will not come loose during shipping.

6.0 CERTIFIED TEST REPORTS

6.1 As evidence of the Manufacturer's ability to provide insulation meeting the requirements of this Specification, he shall furnish certified test reports (Appendix G) of the requirements outlined in Appendix A, unless presently on file with Metra's Chief Engineering Officer.

6.2 When specified, other electrical and physical test reports, required by this Specification, shall be furnished to Metra for finished single and multi-conductor cable and wire no later than the time of shipment to Metra. Each test document shall, in addition to the test results, indicate the date the tests were performed and the signature of the engineer conducting the tests.

7.0 METRA'S INSPECTIONS AND TESTS

7.1 Inspection: Metra reserves the right to make such inspections and tests as necessary to determine if the cable meets the requirements of this Specification. Metra's inspector shall have the right to reject cable that is defective in any respect.

7.2 Determination of Tests: The Manufacturer shall give Metra at least ten days advance notice of the date the cable will be ready for testing so Metra, at its discretion, may be present during the tests.

7.3 Types of Tests: Tests shall be made on samples at random at the place of production. Each reel selected and the corresponding sample shall be identified. The tests required and the quantities of samples shall be those required in ICEA Standard Publication S-95-658, Part 6. The Manufacturer shall provide, at the point of production, the apparatus and labor for making any or all of the following tests under supervision of the Metra inspector.

Such tests may include:

A. Conductor size and physical characteristics
B. Insulation high voltage and resistance tests
C. Physical dimensions
D. Final high voltage, insulation resistance and conductor resistance on shipping reels
E. Special tests on materials in coverings

8.0 REJECTED CABLE

Wire or cable which does not meet the requirements of this Specification and the Purchase Order will be rejected. Wire or cable which shows defects or non-compliance after arrival at the destination may be rejected and the Manufacturer, upon request, shall advise disposition of defective material in question and pay for return transportation charges of the rejected material.

9.0 WARRANTY

The Manufacturer shall expressly warrant that the insulated wire and cable furnished under this Specification shall be free of defects in materials, design and workmanship for a minimum of 40 years when product is used in the application for which it was specified.

SECTION II: TECHNICAL (ALL CONSTRUCTIONS)

1.0 CONDUCTORS

1.1 Solid Conductors: Conductor shall be soft or annealed copper coated in accordance with ASTM B-33 for tin coated conductors or B-189 for alloy coated conductors or bare copper conductors per ASTM B-3. No factory splices or brazes shall be made on solid conductors after final drawing. The conductors shall be solid in sizes 16 through 6 AWG unless otherwise specified. Provided that no sulfur is used in the curing process, bare copper conductors are acceptable, otherwise conductors shall be tin coated.

1.2 Stranded Conductors: The wires shall be soft or annealed copper and stranded in accordance with ASTM B-8, latest revision and tinned or lead alloy coated to conform to ASTM designation B-33 or B-189, latest revision, where applicable.

1.3 Resistance of Conductor: The direct current resistance of conductors shall conform to ICEA Standard Publication S-95 658 Part 2.

2.0 CONDUCTOR INSULATION

2.1 The conductor insulation shall be an Ethylene-Propylene rubber compound, meeting the electrical and physical properties listed in Appendix B.

2.2 The conductor insulation shall be applied directly to the surface of the conductor by the continuous tube method and shall adhere tightly to that surface but be free of stripping and leave the conductor clean.

2.3 Multi-conductor cables for direct burial or in ducts shall have minimum conductor insulation thickness per Table I (underground). Multi-conductor cables for installation above grade shall have conductor insulation thickness per Table I (aerial).

TABLE I

TYPE	CONDUCTOR AWG	CONDUCTOR INSULATION THICKNESS	AC TEST VOLTAGE	DC TEST VOLTAGE
Underground	18 to 16	62 MILS	6,000	18,000
Underground	15 to 8	78 MILS	8,000	24,000
Underground	7 to 4	94 MILS	9,500	28,000
Aerial	18 to 16	47 MILS	5,000	15,000
Aerial	15 to 8	62 MILS	6,000	18,000
Aerial	7 to 4	78 MILS	8,000	24,000

2.4 Insulation minimum spot thickness shall not be less than 90 percent of specified value. The minimum average insulation thickness shall not be less than the specified value.

3.0 MANUFACTURER'S TESTING OF INDIVIDUAL INSULATED CONDUCTORS

3.1 Dry "Spark" Test: The single insulated conductors shall be passed through high voltage test electrodes with a minimum test level equal to 95 volts/MIL of insulation on all sizes using an AC spark test to ensure detection of any damage to the insulation prior to cabling.

3.2 AC Test (Wet Tank): Every individual conductor, before any further assembly steps, shall be randomly wound on spools and immersed in water, (the top of the reel is to be at least two feet below the surface of the water) for not less than 12 hours, then subjected to an AC voltage test for five minutes while still submerged. The insulation must withstand test voltages listed in Table I without any signs of puncture, overheating, or failure. The voltage is to be applied between conductor and "grounded" water.

3.3 Insulation Resistance Testing: Immediately after the AC test, and while the insulated conductor is still submerged, an insulation resistance test shall be made on each length of conductor. The insulation resistance constant "K" in the following formula, when corrected to 15.6°C (60°F), shall not be less than 25,000 megohms per 1000 feet.

$$R = K \operatorname{Log}\left(\frac{D}{d}\right)$$

R = Insulation resistance in megohms/1000 feet at 15.6°C (60°F)
K = Insulation resistance constant of material used in megohms per 1000 feet
D = Diameter over conductor insulation
d = Diameter under conductor insulation

3.3 DC Test: Immediately after the insulation resistance test and while still submerged, each coil of insulated conductor shall be subjected to and withstand the DC test voltages shown in Table I for five minutes. The sequence of these tests is not important so long as sufficient time is allowed between the DC test and insulation resistance test to prevent polarization from affecting the test results.

3.4 AC Test: All references to AC test voltage shall imply that the frequency is 60 Hz.

SECTION III: UNDERGROUND AND AERIAL MULTI-CONDUCTOR CABLE

1.0 GENERAL REQUIREMENTS

1.1 The required number of conductors shall be cabled helically with the adjacent layers wound in opposite directions in accordance with ICEA Standard Publication S-95-658.

1.2 Each conductor shall be numbered sequentially using surface printing at six-inch maximum intervals. The numbering shall be applied as to prevent loss or transfer of identification during manufacturing or installation handling.

1.3 To serve as a tracer, one conductor in each layer shall have the word "tracer" printed on it at six inch intervals maximum.

1.4 The assembled cable shall be capable of separation without damage to the individual conductors.

1.5 When required to provide a firm circular cross-section, flame and moisture resistant (non-wicking) fillers compatible with other cable components shall be used.

1.6 The minimum thickness of the outer jacket at any one point shall not be less than 80 percent of the minimum average thickness of the jacket specified in Table III.

2.0 ASSEMBLY AND OUTER JACKET

2.1 Underground direct burial or duct cables (UGC) shall be made by assembling individual conductors of thickness as specified in Section II, Table I.

2.1.1a Individual conductors shall be cabled with fillers as specified in Section III, paragraph 1.5, when necessary and covered with a shock absorbing layer of moisture resistant core tape or an extruded elastomeric material.

2.1.1b When a core tape is used, the assembled core is to be covered with a minimum 8 MIL helically applied, compound-filled tape with a minimum overlap of 15 percent.

2.1.1c The compound-filled tape shall be compatible with the conductor insulation.

2.1.1d When extruded material is used, the assembled core is to be covered with the thickness of extruded material specified in Table II.

TABLE II

CALCULATED CORE DIAMETER – INCHES	AVERAGE CUSHION LAYER THICKNESS
0 to 1.5	47 MILS
1.5 and LARGER	62 MILS

2.1.2 For mechanical protection, underground cable shall have a flat, 7 MIL Copper 194 tape or a flat, 10 MIL bronze tape helically applied so that a minimum 20 percent overlap is obtained.

2.1.3 The outer jacket shall be made of extruded, black, low density, high molecular weight polyethylene as specified by ASTM D-1248 for Type 1, Class C, Grade E5 material and with the physical properties as specified in Appendix C with thickness in accordance with Table III.

TABLE III

CALCULATED CORE DIAMETER – INCHES	POLYETHYLENE JACKET - THICKNESS
0 to 0.425	47 MILS
0.426 to 0.700	62 MILS
0.701 to 1.050	78 MILS
1.051 to1.500	94 MILS
1.501 to 2.000	109 MILS
2.001 AND LARGER	140 MILS

2.1.4 A ripcord shall be provided parallel and beneath the outer jacket and each layer to facilitate stripping. The cord is to be strong enough to separate material without breaking.

2.2 Aerial cables shall be made by assembling individual conductors specified in Section II, Table I.

2.2.1a Individual conductors shall be cabled with fillers as specified in Section III, paragraph 1.5 when necessary and covered with a shock-absorbing layer of moisture resistant core tape or an extruded elastomeric material.

2.2.1b When a core tape is used, the assembled core is to be covered with a minimum 10 MIL helically applied, compound filled tape with a minimum overlap of 12.5 percent.

2.2.1c The compound filled tape shall be compatible with the conductor insulation.

2.2.1d When extruded material is used, the assembled core is to be covered with the thickness of extruded material specified in Table II.

2.2.2 The outer jacket shall be made of neoprene, meeting the physical properties specified in Appendix D, and with thickness as specified in Table IV.

TABLE IV

CALCULATED CORE DIAMETER – INCHES	NEOPRENE JACKET THICKNESS
0 to 0.425	62 MILS
0.426 to 0.700	78 MILS
0.701 to 1.050	94 MILS
1.051 to 1.500	109 MILS
1.501 to 2.000	125 MILS

2.2.3 A ripcord shall be provided parallel and beneath the outer jacket and each layer to facilitate stripping. The cord is to be strong enough to separate material without breaking.

3.0 TESTING

3.1 Dry “Spark” Test shall be made as specified in Section II, paragraph 3.1.

3.2 Final tests to be made while on shipping reel.

3.2.a An AC voltage not less than twice the water test voltage shall be applied for one minute between individual conductors in the cable. The metallic shield if used shall be grounded.

3.2.b The DC resistance of each conductor of each length of finished cable shall be measured and recorded.

3.2.c The shield continuity of each length of finished cable shall be tested and verified.

3.3 Test results must meet or exceed the criteria established in this Specification and its Appendices.

SECTION IV: UNDERGROUND AND AERIAL 3-CONDUCTOR 600V POWER CABLE

1.0 GENERAL REQUIREMENTS

1.1 Each conductor shall be numbered sequentially using surface printing at six-inch maximum intervals.

1.2 The assembled cable shall be capable of separation without damage to the individual conductors.

1.3 A firm circular cross-section shall be provided using flame and moisture resistant (non-wicking) fillers compatible with other cable components.

1.4 The minimum thickness of the individual conductor insulation shall not be less than that specified in Table V. The average thickness of the outer jacket shall be 80 mils. The minimum thickness of the outer jacket shall not be less than 64 mils.

TABLE V

CONDUCTOR SIZE	INSULATION THICKNESS
#2 AWG	45 MILS
#1/0 AWG	55 MILS
#2/0 AWG	55 MILS
#4/0 AWG	55 MILS
500 MCM	65 MILS

2.0 ASSEMBLY AND OUTER JACKET

2.1 The conductors shall be cabled in accordance with UL 1277 using fillers, as necessary, with a cable tape overall.

2.2 The outer jacket compound shall meet or exceed the requirements of UL 1581. The outer jacket shall comply with UL 1277. The jacket shall be UL listed as Type TC cable that is sunlight resistant and also suitable for direct burial.

2.3 A smaller, 4th conductor shall also be included in the makeup of the cable. This smaller conductor shall be used for a ground wire and shall be sized as specified in Table VI.

TABLE VI

CONDUCTOR SIZE	GROUND WIRE SIZE
#2 AWG	#6 AWG
#1/0 AWG	#6 AWG
#2/0 AWG	#6 AWG
#4/0 AWG	#4 AWG
500 MCM	#2 AWG

3.0 TESTING

3.1 Dry "spark" test shall be made as specified in Section II, paragraph 3.1.

3.2 Final tests to be made while on shipping reel.

3.3 An AC voltage not less than twice the water test voltage shall be applied for one minute between individual conductors in the cable.

3.4 The test results must meet or exceed the criteria established in this Specification and its Appendices.

SECTION V: TRACK CABLE – TWISTED PAIR

1.0 SINGLE CONDUCTOR UNDERGROUND TRACK WIRE

1.1 The solid conductor shall meet the requirements of Section II, paragraph 1.1 and 1.3.

1.2 The conductor insulation shall meet the requirements of Section II, paragraph 2.1, 2.2 and 2.4 with thickness per Table VII.

1.3 The outer jacket shall meet the requirements of Section III, paragraph 2.1.3 and thickness per Table VII.

2.0 DUPLEX TRACK CABLE

2.1 A twisted pair shall be formed from two individually insulated and jacketed conductors as in this Section, paragraphs 1.1 through 1.3, above. The pair shall be constructed with two twists per foot.

2.2 One of the insulated and jacketed conductors used in this construction shall be prominently marked for easy identification.

3.0 TESTING

Each single insulated and jacketed track wire of the duplex track cable shall pass the requirements of Section II, paragraphs 3.1 through 3.5, except voltages specified in 3.2 and 3.4 shall be from Table VII.

TABLE VII

CONDUCTOR SIZE - AWG	THICKNESS OF INSULATION	THICKNESS OF POLYETHYLENE JACKET	AC – FIVE MINUTE TEST VOLTAGE	DC – FIVE MINUTE TEST VOLTAGE
6	94 MILS	62 MILS	11,000	33,000
9	78 MILS	62 MILS	6,000	18,000

SECTION VI: CASE WIRE

1.0 SINGLE AND TWISTED CONDUCTOR CASE WIRE

1.1 The conductors shall meet the requirements of Section II, paragraph 1.2 and 1.3.

1.2 The conductor insulation shall meet the requirements of Section II, paragraphs 2.1, 2.2 and 2.4 with minimum thickness as specified in Table VIII or IX.

1.3 The insulation jacket of AWG sizes 10 and 16 shall be of nylon braid. Nylon braid jacketing (Table VIII – Case with Nylon Jacket) shall be a five MIL tight nylon braid suitably finished with lacquer overall. The overall construction shall be as required in Table VIII.

TABLE VIII – CASE WIRE WITH NYLON JACKET

SIZE - AWG	NUMBER OF STRANDS	INSULATION THICKNESS	JACKET THICKNESS	AC TEST VOLTAGE	DC TEST VOLTAGE
10	37	47 MILS	5 MILS	4,500	9,000
16	19	31 MILS	5 MILS	3,000	6,000

1.4 The insulation jacket of AWG size 6 shall be of chorosulfonated-polyethylene. The insulation jacket and overall construction shall meet the requirements of Table IX (Case Wire with Alternate Jacket).

1.5 Alternate jackets, if specified for any other wire, may be neoprene (Appendix D), cross-linked polyethylene (Appendix E), or low smoke chlorosulfonated-polyethylene (Appendix F) with thickness as specified in Table IX. Alternate jacket color shall be black unless a different color is specified.

TABLE IX – CASE WIRE WITH ALTERNATE JACKET

SIZE - AWG	NUMBER OF STRANDS	INSULATION THICKNESS	JACKET THICKNESS	AC TEST VOLTAGE	DC TEST VOLTAGE
6	7	47 MILS	30 MILS	5,000	15,000
10	37	47 MILS	16 MILS	5,000	15,000
12	19	47 MILS	16 MILS	5,000	15,000
14	19	31 MILS	16 MILS	3,000	10,000
16	19	31 MILS	16 MILS	3,000	10,000

1.6 Twisted #10 AWG wire shall be provided with two twists per foot.

2.0 TESTING

Single conductor and two conductor twisted insulated case wire shall pass the requirements of Section II, paragraphs 3.1 through 3.5, except voltages specified in 3.2 and 3.4 shall be from Table VIII for nylon jacketed wire or Table IX for alternate jackets.

SECTION VII: CODE CABLE

1.0 CONDUCTORS

The conductor shall be solid copper in accordance with ASTM B-3-95. No factory splices or brazes shall be made in the solid conductor after final drawing.

2.0 INSULATION

Low density, natural, high molecular weight polyethylene compound shall comply with ASTM D-1248, Type I, Class A, Grade E5 (with maximum dielectric constant of 2.3) and shall meet the physical properties of Appendix C. The minimum average thickness of insulation of the #10 AWG wire shall be 78 MILS.

3.0 ASSEMBLY

3.1 The two insulated conductors shall be twisted together to form a balanced pair. The cable pair shall conform to Table X.

TABLE X

(Electrical Characteristics at 20 kHz, Zo = 101 Ohms)

CONDUCTOR SIZE – AWG	ATTENUATION	MUTUAL CAPACITANCE	CAPACITY UNBALANCE
10	0.69 db/mile	0.808 uf/mile	3 percent

3.2 A belt of natural high molecular weight polyethylene shall be extruded over the twisted pair and into the interstices and shall meet all the requirements described in this Section, paragraph 2.0 above. The nominal diameter of this belt shall be 0.64 inches.

3.3 For mechanical protection a five MIL flat copper tape shall be applied helically with a minimum 12.5 percent overlap over the extruded 0.64-inch belt.

3.4 The outer jacket shall be made of extruded, black, low density, high molecular weight polyethylene as specified in ASTM D-1248-74, Type 1, Class C, Grade J3 material and with the physical properties as specified in Appendix C, with thickness of 78 MILS.

4.0 TESTING

Cable shall be tested in accordance with Section III, paragraphs 3.1, 3.2 and 3.3.

APPENDIX A: INSULATION QUALIFICATION REQUIREMENTS

When tested with the methods described below, the insulation successfully passing constitutes evidence of its acceptability for use in single and multi-conductor cable and wire as described by these Specifications.

1.0 VOLTAGE AGING

1.1 The dielectric strength stability of the insulating material shall be demonstrated by voltage aging a minimum of ten feet of a single conductor #14 AWG or larger size with 80 MIL or thicker insulation. The cable shall be tested in free air with the ends securely terminated.

1.2 Apply one of the following stresses to voltage age the sample:

60 Hz AC VOLTAGE PER MIL OF INSULATION	TIME - YEARS
225	2
180	3
135	5

1.3 Use the voltage-aged sample from this Appendix, Section 1.2 and apply an AC voltage in 5 kV steps for five minutes of each step until breakdown. Start the test at the voltage level used in this Appendix Section 1.2.

1.4 No cable breakdown shall occur during the voltage-aging test up to and including a voltage stress of 350 volts/MIL.

2.0 THERMAL AGING

2.1 The insulation shall be tested in a circulating air oven on 80 MIL thick slabs of material as follows and shall meet or exceed both of the results stipulated.

2.2 After 168 hours in an oven at 121°C:

Tensile strength, percent of unaged value	85
Elongation at rupture, percent of unaged value	85

2.3 After additional 168 hours at 150°C:

Tensile strength, percent of unaged value	85
Elongation at rupture, percent of unaged value	60

APPENDIX A: INSULATION QUALIFICATION REQUIREMENTS (continued)

3.0 LONG TERM MOISTURE RESISTANCE

3.1 A single conductor #14 AWG or larger in size with 80 MILS or thicker insulation shall have at least ten feet submerged in water at 20°C. The insulated conductor without any jacket over the insulation shall be continuously energized under one of the conditions shown below:

DC VOLTAGE PER MIL OF INSULATION	TIME - YEARS
325	2
280	3
240	4
200	6

4.0 TEST RESULTS

4.1 No insulation failure shall occur at any point during a test period.

4.2 The results of insulation qualification tests must be recorded and certified on the Insulation Qualification Test report included in this Specification as Appendix G.

APPENDIX B: ETHYLENE-PROPYLENE RUBBER INSULATION

When tested in accordance with ICEA S-58-516, the insulation shall meet the following guaranteed values:

Physical Properties

1. Original Requirements:

A.	Tensile strength, minimum PSI.	1,000
B.	Tensile stress at 200 percent elongation, minimum PSI.	600
C.	Elongation at rupture, minimum percent.	300

2. Aging Requirements:

After air oven heat test at 121°C for 168 hours

A.	Tensile strength, minimum percent of unaged value.	85
B.	Elongation at rupture, minimum percent of unaged value.	85

Hot creep test at 150°C

A.	Hot creep elongation, maximum percent.	50
B.	Hot creep set, maximum percent of unaged value.	5

3. Accelerated water absorption:

168 hours at 70°C, Mg/square inch maximum	8

4. Cold bend requirement:

One hour at –40°C	No Cracks

5. Ozone resistance

168 hours at 250 ppm Ozone	No Cracks

APPENDIX B: ETHYLENE-PROPYLENE RUBBER INSULATION (continued)

Electrical Properties

1. AC Voltage Test:

   Apply 100 volts per MIL of insulation for five minutes after a period of 12 hours immersion in water. Voltage shall be applied between the conductor and grounded water. — No Punctures

2. Insulation Resistance:

   Resistance Constant K = megohm/1000 feet at 15.6°C — 25,000

3. Accelerated Water Absorption:

   80-volt/MIL insulation at 75°C

A.	Dielectric Constant:	One day maximum	4.0
B.	Increase in Capacitance:	1-14 days, maximum percent	3.5
C.	Increase in Capacitance:	7-14 days, maximum percent	1.5
D.	Stability Factor:	After 14 days	1.0

4. Capacity and Power Factor:

Specific inductive capacity, maximum percent	4.0
Power factor, maximum percent	2.0

5. Long Term Water Stability:

   Test specimen of #14 AWG conductor with 47 MILS of insulation according to ICEA Standards Publication T-22-294 with the following modifications:

   A. 90°C water temperature – in lieu of 50°C.
   B. 52 week test duration – in lieu of 16 weeks.
   C. 3,300 volts AC withstood – in lieu of 5,000 volts AC withstood.

   Insulation shall <u>not</u> fail under the continuous DC stress or the applied AC test voltage and meet the requirements below:

A.	Dielectric constant after 52 weeks, maximum percent.	4.5
B.	Stability factor after 52 weeks, maximum percent.	1.5
C.	Power factor after 52 weeks, maximum percent.	2.5

APPENDIX C: POLYETHYLENE JACKETING

Physical Properties

1.	Original Properties:	
	Tensile strength, minimum PSI	1,400
	Elongated at rupture, minimum percent	350
2.	After air oven aging for 48 hours at 100°C:	
	Tensile strength, minimum percent of unaged value	85
	Elongation at rupture, minimum percent of unaged value	75
3.	Oil Immersion, four hours at 70°C.:	
	Tensile strength, minimum percent of unaged value	75
	Elongation at rupture, minimum percent of unaged value	75
4.	Accelerated Water Absorption:	
	168 hours at 70°C, Mg/square inch, maximum	5
5.	Shrink Back, 24 hours at 100°C:	
	Percent minimum	5
6.	Cold Bend:	
	One hour at –55°C then bent 180° uniformly around mandrel not greater than three times diameter of cable	No Cracks
7.	Heat Distortion, one hour at 90°C:	
	Maximum percent distortion	25
8.	Absorption Coefficient:	
	Reciprocal function of light transmission, minimum	320
9.	Environmental Stress Cracking:	
	Immerse in reagent Igepal CO-630 – 48 hours at 50°C	No Cracks
10.	Impact after four hours at -45°C:	
	Strike with one-inch diameter flat surface with three foot/pound force – VISUAL	No Cracks

APPENDIX D: NEOPRENE JACKETING

Physical Properties

1. Original Properties:

Tensile strength, minimum PSI	1,800
Tensile strength at 200 percent elongation, minimum PSI	500
Elongated at rupture, minimum percent	300
Set in two-inch gauge length, maximum percent	20

2. After air oven aging for 168 hours at 100°C:

Tensile strength, per cent original, minimum of unaged value	50
Elongation at rupture, percent original, minimum of unaged value	20

3. Oil Immersion, aging 18 hours in ASTM #20.L at 121°C:

Tensile strength, percent original, minimum	60
Elongation at rupture, percent original, minimum	60

4. Accelerated Water Absorption:

168 hours at 70°C, Mg/square inch, maximum	35

5. Cold Bend, 24 hours at –35°C:

Bend 180° around mandrel

0. to .80 O.D.:	8 x O.D. of cable	
.80 O.D. and over:	10 x O.D. of cable	No Cracks

6. Vertical Flame Test:

ICEA #S-19-81, paragraph 6.19.6	Pass

7. Ozone Distortion:

24 hours in 150 ppm Ozone	No Cracks

8. Heat Distortion:

One hour in air oven at 121°C	
Maximum percent distortion	15

APPENDIX E: CROSS-LINKED POLYETHYLENE JACKETING

Physical Properties

1.	Original Properties:	
	Tensile strength, minimum PSI	1,800
	Elongated at rupture, minimum percent	250
2.	After Air Oven Aging for 168 Hours at 158°C:	
	Tensile strength, percent minimum of unaged value	85
	Elongation at rupture, minimum percent of unaged value	85
3.	Accelerated Water Absorption:	
	168 hours at 70°C, Mg/square inch, maximum	8
4.	Heat Distortion:	
	One hour at 121°C, percent of unaged value	30
5.	Flame Test:	
	Vertical Flame Test	Pass
6.	Cold Bend Test:	
	One hour at –55°C and then bent 180° uniformly around mandrel not greater than three times diameter of cable.	No Cracks
7.	Ozone Resistance:	
	24 hours in 150 ppm Ozone	No Cracks

APPENDIX F: CHLOROSULFONATED-POLYETHYLENE JACKETING

Physical Properties

1. Original Properties:

Tensile strength, minimum PSI	1,500
Elongated at rupture, minimum percent	125

2. After Air Oven Aging for 168 Hours at 100°C:

Tensile strength, percent minimum of unaged	60
Elongation at rupture, percent minimum of unaged	60

3. Accelerated Water Absorption:

168 hours at 70°C, Mg/square inch, maximum	35

4. Smoke Properties per ASTM E666:

Flaming mode –	
D_S – four minute maximum	20
D_M – (corrected) maximum	150
Non-flaming mode –	
D_S – four minute maximum	50
D_M – (corrected) maximum	350

5. Heat distortion:

One hour at 121°C, percent of unaged	40

6. Vertical Flame Test:

Per ICEA #S-19-81, paragraph 6.19.6	Pass

7. Cold Bend Test:

One hour at –55°C and then bent 180° uniformly around mandrel not greater than three times diameter of cable.	No Cracks

8. Ozone Resistance:

24 hours in 150 ppm Ozone	No Cracks

APPENDIX G: INSULATION QUALIFICATION TEST REPORT

CABLE MANUFACTURER

Metra Specifications call for rather specific qualification tests on the insulation. These tests involve voltage aging, thermal aging and long-term moisture resistance. Ethylene-Propylene Rubber insulation used in railroad signal cable was tested according to Metra Specification 0069. Standard factory production cables were used as samples.

SUMMARY AND CONCLUSIONS

Ethylene-Propylene Rubber insulation, tested in accordance with the procedures below, meets or exceeds the requirements of Metra Specification 0069.

_____ _____

Certified by: Date:

RESULTS

Voltage Aging

The dielectric strength stability shall have been demonstrated by voltage aging, a tested sample of a single conductor #14 AWG or larger size wire with 80 MIL or thicker insulation. The conductor shall be tested in free air with a minimum of ten feet between terminals. One of the following voltage stresses shall have been applied to voltage age the sample.

TEST VOLTAGE 60 Hz AC VOLTS PER MIL	AGING TIME DURATION
225	2 years
180	3 years
135	5 years

No insulation failure shall occur within the test period.

Ethylene-Propylene Rubber insulation _____ MILS thick on a # _____ AWG copper conductor of _____ length was placed in free air at 20°C for _____ years at a stress of _____ volts/MIL. No failure occurred during the test period.

Voltage at breakdown as specified in Appendix A, paragraph 1.3 was _____ volts.

_____
Date Test(s) Performed

Thermal Aging

The insulation shall be tested in a circulating air oven on 80 MIL thick slabs of material and shall meet or exceed both of the results stipulated in Metra Specification 0069, Appendix A, paragraphs 2.2 and 2.3

The insulation tested as above gave the following results:

TEST	RESULTS
Tensile Strength – Initial	PSI
Tensile Strength – After 168 hours at 121°C	PSI
Tensile Strength – After additional 168 hours at 150°C	PSI
Elongation at Rupture – Initial	%
Elongation at Rupture – After 168 hours at 121°C	%
Elongation at Rupture – After additional 168 hours at 150°C	%

_____
Date Test(s) Performed

Long Term Moisture Resistance

A single conductor #14 AWG or larger size with 80 MILS or thicker insulation, shall have at least 10 feet submerged in water at 20°C. The insulated conductor without any jacket over the insulation shall be continuously energized under one of the conditions shown below:

DC VOLTAGE VOLTS PER MIL	TIME
325	2 months
280	3 months
240	4 months
200	6 months

No insulation failure shall occur within the test period.

Unjacketed insulation ____ MILS thick on a # _____ AWG copper conductor of _____ length was placed in tap water at 20°C for _____ months at a stress of _____ volts/MIL. No failure occurred during the test period.

_____
Date Test(s) Performed

METRA

SIGNAL SPECIFICATION

FOR

VITAL SOLID-STATE MICROPROCESSOR INTERLOCKING

SPECIFICATION NO. 0617

August 23, 2012

1.0 SCOPE

1.1 This Specification is for furnishing vital solid-state microprocessor interlockers (VSSMI). These devices must meet all FRA RS&I safety requirements and interface to wayside and cab signal equipment currently in use by Metra. These requirements shall apply to the vital control of interlockers, control points and block signal systems unless otherwise noted. The unit(s) furnished on this Specification shall be of the most current design. The material, equipment and workmanship shall be of the highest commercial quality.

1.2 Failure to conform to the highest standards of the industry shall be cause for rejection.

1.3 Metra's Chief Engineering Officer shall be the final authority for deciding as to whether a competitive item conforms to these requirements and complies with the intention of this Specification.

1.4 This Specification is intended to be descriptive, but not restrictive and is solely for the purpose of indicating the type and quality of articles that will meet the approval of Metra.

1.5 Capacities and dimensions listed herein shall be interpreted as minimums; variation from the values listed will be judged as to their effect and ability to perform the work intended.

1.6 It shall be the responsibility of the Manufacturer to make certain that all parts and components fit and function together properly as a system.

1.7 Where brand, manufacturer or product names are indicated in this Specification, they are included only for the purpose of establishing identification and general descriptions of the item. Wherever such names appear, the term "or Metra approved equivalent" is considered to follow.

1.8 The article(s)/unit(s) submitted under this Specification must be in production and must have had a previous, satisfactory in-service performance record of at least five units for two years on three Class I railroads. Proof of performance statement(s) shall be provided, upon request, with confirming statement(s) from previous purchaser(s). Failure to provide proof may be cause for rejection.

2.0 GENERAL REQUIREMENTS

2.1 The Manufacturer shall furnish a current microprocessor based signal system that operates in accordance with all applicable requirements of the American Railway Engineering and Maintenance-of-Way Association (AREMA) Communications & Signals Manual of Recommended Practices, Part 2.2.12. The VSSMI shall provide the control and indication of safety functions

traditionally implemented with vital relays. Each VSSMI system or sub-system complete with all related serial and parallel Input/Output (I/O) interface shall operate on the basis of a single microprocessor philosophy using closed loop principles to achieve safety. Each VSSMI system or sub-system shall contain Ethernet devices that can be configured in independent or redundant networks. Each Ethernet device shall support multiple node connections and protocols. The use of open loop multiple processor arrangements based on voting and/or redundancy to achieve safety is not an acceptable alternative to the single microprocessor specified.

2.2 The circuits and designs resulting from this Specification shall operate in accordance with the General Code of Operating Rules. In addition, the equipment and designs must meet all FRA RS&I requirements at the time of delivery. Metra will accept designs and equipment that meets or exceeds the standards and requirements of AREMA, IEEE, Metra standard drawings, or other recognized standards. Design shall follow accepted good signal practice. In all cases of question or dispute, Metra's Chief Engineering Officer or his duly authorized representative will have final authority.

3.0 DESIGN REQUIREMENTS

3.1 General

3.1.1 All terminations, cable materials and methods shall be of commercially available types and be adequate in all respects for the purpose intended. Terminals shall be provided at the top of the rack for connections to the relay house terminal board or other racks. No terminals shall be provided for the direct connection of underground single or multiple cables. Terminals shall meet the requirements of the AREMA Communications & Signals Manual of Recommended Practices, Part 14.1.2, or shall be a Metra approved equivalent.

3.1.2 All connections to external circuits shall be designed to interface to standard signal equipment operating at normal voltages for the type of equipment. Any modification or additions required to the system to operate devices such as high voltage switch machines shall be resolved by the Manufacturer.

3.1.3 The power source shall be a traditional 12-volt battery-rectifier set. A solid-state interlocker needing an uninterruptible power supply system for power will not be acceptable.

3.1.4 All signals shall display their most restrictive aspect in the event of either a vital processor error or safety failure or when the vital system is not operating.

3.1.5 Protection against surges, spikes, or over or under voltage shall be provided. The Manufacturer shall protect all input and output lines and any auxiliary equipment as necessary.

3.1.6 All vital timers and other vital circuits which are selectable or changeable by means of switches, jumpers, or other means must have covers or other means provided to insure the integrity of the settings and prevent accidental contact. Covers provided with non-reusable seals will be considered adequate.

3.1.7 All software for programming and listings for ladder logic or other Metra approved methods shall be furnished in printed form. Source software as well as other needed files shall be provided on disk. Programming shall be arranged in a manner that emulates Metra's typical book of plans for an interlocked control point. Relay equivalent circuits of the ladder logic programming shall be provided with the program equations.

3.1.8 The Manufacturer shall state and guarantee that parts shall be available for the system for a minimum of ten (10) years after acceptance of the system.

3.2 Interfaces

3.2.1 There shall be provisions for the system to accept inputs from non-vital functions such as a Local Control panel, C.T.C. code communication systems, or other signal system apparatus as specified. Non-vital functions shall be input to the non-vital portion of the VSSMI and sent serially to the vital portions if needed.

3.2.2 There shall be a minimum of 10% spare input and 10% spare output ports provided on both the non-vital and vital systems. The spare ports shall be furnished complete with all hardware and wired out to terminals. The spare ports shall be isolated from other ports.

3.2.3 A complete data logging system with all hardware shall be installed either internally or externally and shall not compromise the safety of the vital system. No changes to the vital software shall be allowed by any auxiliary system such as a data logger. The data logger shall be able to download to a laptop computer and permanently record its data on paper or disk. Events to be monitored shall include but not be limited to the following:

A. Local and remote control indication
B. Normal or generator power on indication
C. Instrusion alarm indication
D. Trouble indications
E. Snow melter on and failure indication
F. Normal and standby processor status
G. Signal fleet control and indication for each signal
H. Switch control and indication for each independent switch
I. Switch locked indication for each independent switch or crossovers

J. Signal control and indication for each signal
K. Light out indication for each signal
L. Call on control and indication for each signal
M. Normal and reverse traffic indication for all tracks
N. Track block control and indication for all tracks
O. Track occupancy indication for each track circuit
P. Approach track circuit indications

The data logging system shall be capable of recording and storing data for a minimum of 72 hours.

The operation of any diagnostics or the monitoring of the operation of the microprocessor shall not, under any circumstances, have the ability to change any vital software routines.

3.2.4 A complete standby system of all components shall be furnished, including power supplies. Standby units shall start without special commands or programs. All standby units shall provide protection for such operator controlled functions such as track blocks. These functions must be started in a fail-safe mode to prevent the clearing of signals into a protected section of track. A standby processor complete with all power supplies with automatic and manual changeover and office indication is acceptable for each subsystem to maximize system availability. This standby unit with housing(s) shall be provided wired into the racks, programmed and ready to run.

3.2.5 The system shall be capable of providing the required information to the Positive Train Control (PTC) system via a serial link. Information shall include all signal aspects and switch positions that are controlled by the microprocessor(s). Other site specific information required by the PTC system shall also be provided through this serial link. See Technical Appendix Specification No. 1544, Positive Train Control System, for additional information.

3.3 Environment

3.3.1 The solid state interlocking must be capable of operating in temperatures of minus 40^{o} to plus 160^{o} Fahrenheit.

3.3.2 The conditions of humidity, vibration and other similar uncontrollable factors shall not influence operation of the installation. The use of fans, air filters or purifiers, humidifiers, de-humidifiers, or other environmental control devices to keep the solid state interlocker operating properly will not be acceptable.

3.3.3 No microprocessor equipment or racks may have terminals wired directly to commercial AC power.

3.4 Software Revisions

3.4.1 The Manufacturer's method of making changes to the software must be adequate in preventing accidental or unintentional changes to the programs. Erasable portions of memory must have the appropriate physical or electrical protection to prevent unauthorized or accidental changes. All portions of memory containing vital software routines must be in a sealed or otherwise verifiable and protected package. All vital software must have complete identification on and within the individual ROMS or other storage devices stating the software number, location, and any other information required to identify the application of software by location.

3.4.2 Separation and isolation between the non-vital and vital portions of the system shall be such that any changes made in the non-vital software will not affect the operation of the vital software.

3.4.3 The system shall have intrinsic electrical protection to prevent the operation of application software (e.g. PROMS) in a location other than the location where intended.

3.5 Factory Wiring and Testing of Metra Signal Equipment

3.5.1 The signal houses and racks that house the VSSMI equipment shall be "partially pre-wired." The items that may be mounted at the factory by the manufacturer include: carrier equipment, non-vital solid-state control equipment, solid-state vital units, local control panels, intrusion alarm equipment and solid-state recorder and recorder input boards.

3.5.2 Items which may be factory wired and connected include: cables between solid-state vital units, make up cables to the local control panel, cables between vital and non-vital units, connections to the equipment side of rack mounted surge equipment, the ribbon cable from the solid state recorder to its input board, fire detection equipment and pre-made plug connectors to the solid state vital units (plug connector end of cable only).

3.5.3 The mounting and wiring by Metra signal forces shall include: all vital relays (including the vital failure relays of solid state units), inputs to the solid state vital unit factory made I/O cables, AAR terminals, rectifiers, batteries, power busses, grounds, arresters, equalizers, and the field side connection to surge panels.

3.5.4 Manufacturer shall perform a complete factory and field operational test of all programming and I/O by the following methods:

A. At the manufacturer's facility and using manufacturer's personnel to perform the operational tests, the VSSMI card file or chassis shall be

partially hard wired to a simulator that provides inputs and outputs that simulate the actual field conditions that the system will be used in. All programming and I/O would then be fully tested. If programming or I/O errors are encountered during test, the program will be corrected and re-tested. Metra shall be notified of the factory test date two weeks in advance and reserve the right to be present during testing.

B. When the signal house is completely wired and on site, the manufacturer's personnel will be given access to the house and, using Metra wiring personnel, wire temporary circuits that provide inputs and outputs that simulate the actual field conditions that the system will be used in. All programming and I/O would then again be fully tested. If programming or I/O errors are encountered during testing, the program will be corrected and re-tested.

3.6 Maintainer's Test Panel

3.6.1 When specified, a Maintainer Test Panel for maintainer use shall be provided. General appearance of the Maintainer Test Panel shall be as shown on Figure 2 - "Typical Maintainer Test Panel" of Metra Specification No. 0874, Solid-State Type CTC Field Code Units.

3.6.2 The track plan and all information printed upon the faceplate of the panel shall be applied by a photo-etching process to be approved by Metra. The faceplate shall be 1/8-inch thick; #4 finish aluminum that shall be bonded to a 1/4-inch thick phenolic backer plate. Details are to be drawn in black on a light background.

3.6.3 The track plan shall be arranged to orient railroad east toward the right side of the panel and shall coincide to the physical track layout.

3.6.4 The switches and indicators in the Test Panel shall be of the unit type. The term "Unit Type" being understood as meaning that each of units may be completely and easily removed from the test panel without interfering with the operation of any other unit.

A. Switches shall be DPDT; Eaton Econo-switch sealed Leverlock toggle switch, catalog no. 8537K94D.

B. Lamp holder shall be Data Display Products, part number MFS1-B.

C. Lamp shall be Data Display Products T 1-3/4 miniature LED lamp MF200.

D. Test links shall be Invensys 024620-1X with special nut and clamp nut.

3.6.5 All indications on the Test Panel shall be by means of colored indicators and similar colored filters. LED's shall be replaceable from the front of the panel. If an extractor tool is required, the manufacturer shall furnish three extractor tools with each panel.

3.6.6 The following indications and controls are to be provided as part of the maintainer test panel:

3.6.6.1 INDICATIONS

Maintainer Test Panel Indication (lights, if any test switch is not in normal position).

3.6.6.2 CONTROLS

A. Switch and test link for each track circuit.
B. Switch and test link for each lock repeater circuit.

3.6.7 A full-size drawing of the panel shall be provided for Metra approval before manufacture. Indication LED, test switches and test straps shall be located as shown on the Metra approved plans.

3.6.8 The Maintainer Test Panel will be wired by the railroad with #16 AWG stranded single conductor insulated copper wire. The wiring harness shall allow clear access to all test switches, test straps and LED terminals.

4.0 TRAINING

4.1 Training, as specified, for signal maintenance personnel shall be provided by the Manufacturer. Training shall cover trouble-shooting and maintenance to the board level.

4.2 The Manufacturer shall provide a complete set of technical manuals, plans and other documents required for training each trainee.

4.3 A copy of the Course Outline and other training material shall be provided two months prior to the actual training for Metra approval and comments.

The Training Course Outline shall include:

A. Course objectives and the method for evaluating when the objectives have been met.
B. A breakdown, in the order to be taught, of the subjects to be covered.
C. The anticipated hands-on experience which will be required and the plan for training on the actual equipment.
D. The approximate time to be spent on each subject.

5.0 REQUIRED TECHNICAL SUPPORT MATERIAL

5.1 The Manufacturer shall provide basic instant support equipment for maintenance and testing. Basic instant support includes parts that will be permanently provided for Metra's use in trouble shooting and replacement of system components.

A. A minimum of one duplicate proms/eproms of each type per each location shall be furnished as support material.

B. For purposes of determining support material, physically identical programmable boards containing different proms shall be considered as being the same type of board.

C. Any extraction or crimping tools that are unique to the VSSMI equipment.

6.0 DEVELOPMENT SYSTEM

. A complete development system package including hardware, software and training shall be provided for programming the microprocessor-based equipment. The applications package shall be provided on a Pentium based PC of the latest technology with Windows NT, version 4.0 capabilities. The application package for modifying the interlocking logic circuitry shall not require specialized knowledge of computers. The engineering user shall only require knowledge of interlocking design and the ladder logic equivalents of circuits to configure or reconfigure an interlocking.

7.0 SUBMITTAL

7.1 Catalog cuts, drawings, descriptions, etc. of the Manufacture's typical current production from which the submittal will be based shall be included with the quotation.

7.2 Within thirty (30) days of award of the contract, the Manufacturer shall state the clearance required for maintenance of the equipment and what sides of the equipment must be accessible for installation and/or maintenance. If the Manufacturer is providing a complete enclosure or housing, the layout must note the clearances or the scale diagram must be complete.

7.3 Within thirty (30) days of award of the contract, the Manufacturer shall provide preliminary calculations showing DC power consumption, nominal and maximum, for power used by the VSSMI, and power controlled (e.g., signal lighting) by the VSSMI. Final values (-0% +20%) shall be submitted within ninety (90) days of the award.

7.4 An estimate of the mean time between failures for the system shall be furnished within sixty (60) days of the award of the contract. The estimate shall be in

hours and be based on the design criteria and field experience. The estimates shall be for both hardware and software, independently and as a system. Basis of the calculation shall be provided.

7.5 The Bidder shall submit within sixty (60) days after the award of the contract, for all equipment supplied, a recommended technical support parts list that includes prices. The prices shall be valid through the term of the Contract.

7.6 The Bidder must identify a source of parts for all components of equipment supplied that are not identified as standard commercially available parts. A current price list including all such components available from the Bidder or from a supplier shall be furnished within 60 days of the award of the contract.

7.7 Detailed shop drawings of the solid-state microprocessor interlockings are to be furnished within ninety (90) days after the award of the contract, and be approved by Metra's Chief Engineering Officer before manufacture begins.

7.8 Final plans shall be produced after incorporating all field changes that were made during installation and testing. Final plans shall not be submitted until all issues regarding design or equipment performance have been resolved. The contractor will first submit an electronic file and hard copy plot of all final plans. Once approved, Metra will electronically sign the electronic files and return them to the contractor. CAD drawing and electronic files of the final plans and five (5) black and white copies shall be delivered. The CAD drawings shall be MicroStation format on CD-Rom per Metra Specification 1040, Signal Engineering CAD Drawings.

Final plans will also include CAD drawings of all relay/circuit equivalent plans of all program logic used in the software of the VSSMI and shall be arranged in a manner that emulates Metra's typical book of plans for an interlocked control point.

8.0 IDENTIFICATION AND SHIPPING

8.1 Unit(s) shall be plainly marked with Manufacturer's references including serial and model numbers.

8.2 The product shall be assembled or packed as to permit convenient handling and to protect against loss or damage during shipment. Loose pieces shall be tightly taped or wired to the unit(s) or shipping pallet or, packed separately, but be firmly attached to the product.

8.3 A detailed list of packages and their contents shall be provided for all shipments. One copy will be included with shipment and one copy will be sent directly to Metra's Chief Engineering Officer. Metra Engineering's copy will be mailed not later than the shipping date of the equipment.

8.4 Manufacturer shall notify Metra of the shipping date 48 hours prior to shipment.

9.0 INSPECTION AT SHIPMENT

Metra will inspect the unit(s) after delivery and contact the Manufacturer listing any missing items. The Manufacturer shall provide a timely schedule to furnish, deliver to destination and install or correct, without charge to Metra, such items. Failure to respond appropriately shall be cause for rejection with return of rejected units at the Manufacture's total expense.

10.0 GUARANTEE

10.1 The Manufacturer shall replace (furnish, deliver to destination and install or correct) without charge, any part of material that fails within a period of one year of date of cutover of the system from defects of material, design, manufacture and/or workmanship.

10.2 The guarantee shall include all changes to the software to allow the complete system to operate as intended.

11.0 DEMONSTRATION

11.1 If requested prior to purchase, bidder shall arrange for inspection before one or more of Metra's representatives, of the basic unit to be furnished. Failure of a unit to be equal to or better than the quality herein specified by Metra shall be cause for rejection of Bid. Such inspection shall be performed at no cost to Metra within a distance of not more than 50 miles from Metra's headquarters at 547 West Jackson Boulevard, Chicago, unless otherwise agreed upon by Metra.

11.2 Metra or its Representative reserves the right to inspect all equipment at Manufacturer’s plant prior to shipment.

REQUISITION INSTRUCTIONS FOR VITAL SOLID-STATE MICROPROCESSOR INTERLOCKING

1. Include book of typical plans for use by programmer.

2. Specify if a maintainer test panel is required. (P-3.6.1)

3. Include Metra Specification No. 0874, Solid-State Type C.T.C. Field Code Units. (P-3.6.1)

4. Specify number of classes and number of trainees per class. (P-4.1 and 4.2)

METRA

SIGNAL SPECIFICATION

FOR

SIGNAL RELAY HOUSES

SPECIFICATION NO. 0674

March 22, 2013

1.0 SCOPE

1.1 This Specification is for furnishing a signal relay house. The unit(s) furnished on this Specification shall be of the most current design. The material, equipment and workmanship shall be of the highest commercial quality.

1.2 Failure to conform to the highest standards of the industry shall be cause for rejection.

1.3 Metra's Chief Engineering Officer or his duly authorized representative shall be the final authority for deciding as to whether a competitive item conforms to these requirements and complies with the intention of this Specification.

1.4 This Specification is intended to be descriptive, but not restrictive and is solely for the purpose of indicating the type and quality of articles that will meet the approval of Metra.

1.5 Capacities and dimensions listed herein shall be interpreted as minimums; variation from the values listed will be judged as to their effect and ability to perform the work intended.

1.6 It shall be the responsibility of the Manufacturer to make certain that all parts and components fit and function together properly.

1.7 Where brand, manufacturer or product names are indicated in this Specification, they are included only for the purpose of establishing identification and general descriptions of the item. Wherever such names appear, the term "or Metra approved equivalent" is considered to follow.

1.8 The article(s)/unit(s) submitted under this Specification must be in production and must have had a previous, satisfactory in-service performance record of at least two years on three Class I railroads. Proof of performance statement(s) shall be provided, upon request, with confirming statement(s) from previous purchaser(s). Failure to provide proof may be cause for rejection.

2.0 GENERAL REQUIREMENTS

2.1 Shape:

The relay house size shall be as specified in Table 1. The house shall have a gable roof. The relay house shall be equipped with lifting lugs of adequate size located at each of the four reinforced corners. Inside headroom clearance shall be at least seven feet to the lowest portion of the ceiling (which includes wire troughs and lights). One plated inlet shall be located at the top of the four corner side panels (for Power On Indicator Light, aerial cable, antenna…….).

2.2 Arrangement:

2.2.1 The house shall have a terminal board centered in front of the back door(s). The terminal board shall be 3/4-inch two-sided MDO plywood with A-C fire retardant paint applied to both sides, such as Flame Control. The terminal board shall be mounted in a metal frame bolted to the house structure for grounding purposes. The minimum terminal board size shall be as shown in Table 1. The center of each side of the terminal board shall be braced to the wall for additional strength. There shall be one metal trough over the center of the terminal board toward the front of the house with cross troughs arranged to carry wire to the sides of the house. The troughs shall be teed and welded to the center trough to form a level, continuous trough. All troughs shall have “L” bracket shaped side members fastened together by circular runs welded into the “L” brackets. The runs shall be spaced every six inches. The metal trough shall resemble a “ladder” assembly. The metal trough shall have a minimum depth of two inches and a total width of no more than eight and one half inches. If the metal troughs are not aluminum, the finish of the metal trough assembly shall be primed and painted with ANSI-61 non-textured gray enamel. Size F house shall also have one metal trough from the terminal board toward the front of the house with two cross metal troughs spaced at a minimum 36 inches apart and extend to each sidewall of the house. The metal troughs shall be positioned over the racks as illustrated on Figure 4. The metal troughs shall be free of sharp edges, burrs and weld splatter. Size D-F houses shall have double doors behind the terminal board and the terminal board shall be additionally braced between the doors.

2.2.2 A copper prime ground plate mounted at the extreme bottom right of the back of the terminal board shall be provided. The number of AAR terminals shall be as shown in Table 1. The size of the prime ground plate shall be 4”x4” for size A, B, C and D houses and 4”x8” for size E and F houses. Terminals shall be mounted to the plate in four equal horizontal rows with one-inch spacing both horizontally and vertically between terminals and a ½ inch space between the terminals and the edge of the plate. Each terminal shall be provided with a jamb nut, 3 washers and 2 binding nuts. One terminal shall be used to connect the ground plate to both the AC service grounded neutral in the load center and to a terminal mounted on the metal frame of the house with number six AWG copper wire that has green insulation and suitable ring connectors.

2.3 Materials and Finish:

2.3.1 A relay house specified "aluminum" should be constructed of 0.100-inch minimum sheet aluminum, Alloy 3003-H14. The exterior walls shall be constructed in vertical panels approximately two feet wide. The edges of adjacent panels shall be rolled or folded into a sealed, interlocked wall. The gable roof shall be constructed in two panels, which shall be overlapped, welded and sealed. The floor shall be constructed of 0.125-inch minimum aluminum box or channel sections. All structural joints and seams shall be

welded. All joints and seams shall be sealed and weatherproofed.

2.3.2 A relay house specified "steel" shall be constructed of 12-gauge steel, constructed in vertical panels approximately two feet wide. The edges of adjacent panels shall be rolled or folded into a sealed, interlocked wall. The gable roof shall be constructed in two panels, which shall be overlapped welded and sealed. The floor shall be steel box or channel sections. All structural joints and seams shall be welded. All joints and seams shall be sealed and weatherproofed. All exterior surfaces shall be primed and painted as described in the American Railway Engineering and Maintenance-of-Way Association (AREMA) Communications & Signals Manual of Recommended Practices, Part 2.4.3. The paint shall be applied using "powder coat" methods. The exterior surface shall be treated with a clear coating of an anti-graffiti material, such as "Graffiti Guard".

2.3.3 The interior shall be finished white except for the following items which shall be gray: wooden wire troughs, shelves, racks (reference 2.7.2 on rack finish), shelf brackets, backboards, and floor.

2.3.4 The house walls shall be insulated with two inch thick Thermax above the floor. The ceiling shall be insulated with four inch thick Thermax. A combination of 1/2-inch Thermax and 3/4-inch plywood with A-C fire retardant gray paint applied to topside, covered by a rubber mat over the complete surface, shall be used over the metal floor.

2.4 Access:

2.4.1 House size A shall have a door (front) on the wall. Houses in sizes B-C shall have two doors, one in front and one in back, centered on the wall. House sizes D-F shall have three doors, one in front offset and two in back, with the back doors centered on the walls opening outward. The front door will be offset to accommodate the placement of the climate control system. A No-Drip channel shall be over all outside doors.

2.4.2 Each door shall be provided with a heavy-duty three point latching system and facilities with a 1/2-inch minimum diameter hole for locking with a Metra padlock. The front door's latching system shall have a feature to prevent locking from inside and to allow quick opening of the door from inside, even if locked on the outside. This shall be done by not removing any of the latching system's hardware. The latching system must operate smoothly through the complete opening and closing cycle. A lock security cover for all doors shall be provided over the handle to protect the padlock from being sawn off. The door's hinges shall be removable and consist of a vandal resistant bolt on 3/4 inch x 1-1/2-inch solid 6063-T6 aluminum bar hinges with brass hinge pins and grease fittings. The door(s) shall be made weatherproof by use of a neoprene gasket secured in a suitable channel. The door(s) shall have a rod type latch to hold the door open 90 and 180 degrees. The front door shall open to the left, while a rear door shall open to the right, unless there are two

rear doors, which both will open from the center out as in Figures 2-4. The front door's sill and the floor shall be level and not cause a tripping hazard.

2.5 Mounting Facilities:

2.5.1 Houses in sizes A-D shall be constructed with a minimum of four inner wall type foundations that drop-down when unbolted, from each corner. The foundations shall be constructed of hot dipped galvanized steel with a zinc coating, sized 60" long with a 12" square footing plate. The foundations shall be adjustable in 1" increments extending to lengths between 36" to 52" long. The foundations shall be of adequate size and construction to support the structure in 100MPH wind gusts. Size E and F houses shall be constructed with a minimum of six inner wall type foundations as described above.

2.5.2 Additional inner wall type foundations recommended by the manufacturer shall be furnished as a part of the bid.

2.6 Cable Openings:

The house shall have a cable opening(s) in the floor centered behind the terminal board in accordance with Table 1. The cable opening(s) in the floor shall be large enough to accept a 5" x 23" cable chute. One cable opening and chute shall be provided for house sizes A-C and two cable openings shall be provided for sizes D-F. Cable chutes 5" x 23" x 24" with all fastenings shall be furnished with each cable opening. A removable metal cover plate(s) shall be fastened to the floor to secure the cable opening(s). The cable opening shall require a fastening system with a seal to attach the cable chute securely to the floor. The cable chute and the fastening system shall be constructed of hot dipped galvanized steel with a zinc coating.

2.7 Appurtenances:

2.7.1 Reference Figures 1 and 5 "Typical Relay House for Shelf Relay Mounting" sizes A-C shall have provided four sponge rubber matted shelves on each side, running from the front wall of the house to the plane of the backboard. Shelves shall be mounted on steel bar "L" brackets that fit into keyways of vertical internal members. The shelves shall be vertically adjustable in approximately two-inch increments for spacing from floor to ceiling. The shelves shall be constructed of 3/4-inch one-sided MDO plywood with an A-C fire retardant paint applied to both sides, have a depth of 12 inches and extend from the front wall to the terminal board. The front edge of the shelf shall have a securely fastened, smooth, wood trim strip (7/16 by 1-1/4 inch "Modern Stop" or equivalent) that extends 1/4-inch above the rubber mat. The left wall's top fourth shelf shall only extend from the edge of the climate control system to the terminal board. Behind each shelf, a wooden wire trough shall be mounted which has the front side at least 10 inches high to form a backboard for the shelf. Each wooden trough shall have a minimum of three openings in the bottom, three inches long, and the width of the trough.

These openings shall be arranged vertically below the wire openings of the metal cross troughs... Below each of the sidewall's bottom shelves, a 10-inch high tag board shall be mounted. The tag board shall be offset from the wall and spaced from the shelf the same distances as the above mentioned shelves/backboard spacing.

2.7.2 Reference Figures 2-3, "Typical Relay House for Plug-in Relay Mounting". Houses shall come complete with installed stationary floor bolt mounted plug-in relay racks. The racks floor plate's "footprint" dimensions shall be 20-1/2 inches by 15 inches. The bolt slot spacing on the plate shall be 16-1/2 inches by 11 inches. The rack assembly shall be 19" wide by 83" high complete with relay bars, wire tie bars and all necessary hardware for the mounting of a minimum of eight rows of plug-in relays (seven relays per row). The rack assembly shall be constructed of 10 GA. low alloy Mild or P&O steel. The rack assembly shall accommodate all manufacturers' style plug-in relays with vertical spacing of 7 5/16" to 8 13/16". The top of the rack shall be securely fastened to the metal troughs with mounting bars that will run directly above the rack. The number of racks per house shall be as shown in Table 1. The racks shall be free of sharp edges, burrs and weld spatter.

2.7.3 Reference Figures 2-3, "Typical Relay House for Plug-in Relay Mounting". In addition to the relay racks there shall be two shelves on each sidewall (as entered to right and left) that extends from the front wall to the terminal board. The two shelves shall be constructed and mounted as referenced above in section 2.7.1 "Typical Relay House for Shelf Relay Mounting"

2.7.4 Reference Figure 4, "Typical Relay House for Plug-in Relay Mounting". There shall not be any relay racks supplied with this specification. The metal troughs shall be supplied and mounted to the relay house as referenced above in section 2.2.1. There shall be two shelves as specified in section 2.7.1, on the left sidewall and an equipment-mounting wall on the right sidewall. The top shelf on the left sidewall shall only extend from the terminal board to within 6 inches of the climate control system. The equipment-mounting wall shall be mounted 24 inches off the floor. The equipment-mounting wall shall be 48 inches high and extend from the front wall to the terminal board. The equipment-mounting wall shall be 3/4-inch MDO plywood with A-C fire retardant paint applied to both sides and mounted to the vertical internal members with a 2-inch offset from the Thermax sidewall.

2.7.5 The sponge rubber shelf matting shall be Neoprene-EPDM-SBR blend, medium firm, 1/4-inch thick and black in color, similar to Durkee-Atwood NES42. Floor type matting is not acceptable.

2.8 Accessories:

2.8.1 The house shall be equipped and wired with two-lamp, four-foot fluorescent fixtures (Genlyte Thomas Model SCF232 BL2M or equivalent) having low temperature ballasts and generally mounted as shown in Figures 1-4. The lamps provided with the fixtures (Philips, Model F32T8/TL841/ALTO 800 series) shall be fluorescent, 32 watt, low temperature, high output lamp with a recessed double-contact base. The fixtures shall be controlled from a switch located next to the front door. The number of fixtures to be furnished is shown in Table 1. A duplex GFCI outlet shall be provided and wired next to the front door and on the terminal board adjacent to the load center.

2.8.2 A load center described in Table 1 shall be provided in the top left corner of the terminal board and be equipped with the number of circuit breakers as shown in Figures 6 and 7. A 120/240 VAC primary surge protector (Erico Part Number EPD120/240TDFL) shall be provided and mounted to the load center.

2.8.3 Intake and exhaust vents located at the gable ends of the roof shall be provided. Each vent will be equipped with a moisture resistant polyester fiber, snap in filter. Each vent will also be equipped with a 115 volt, 60 Hz, 273CFM centrifugal ventilation fans (Grainger # 1TDR3 or equivalent). A Dayton 30^{o} to 110^{o} F thermostat shall be provided to control the fans.

2.9 Climate Control System

2.9.1 A self-contained energy efficient climate control system (McLean T-Series Climate Control Unit or Metra approved equivalent) with heater package shall be provided for all houses unless otherwise stated. The climate control system components shall be nominally 240 volt, 60Hz single-phase. The electrical efficiency and capacity ratings for the air conditioner shall be rated at 19,000 BTU or greater with an EER of at least 4.5. The heater shall have a minimum rating of 3,000 watts. The climate control system shall be a closed system with passive ventilation above the ceiling. The climate control unit shall be sized for the application and capable of maintaining a temperature range of between 40 and 80 degrees Fahrenheit for a Midwestern climate. The climate control system's electrical components shall be easily accessible through a service panel opening for routine inspection and maintenance. Provision for easily accessing the filter shall be provided.

2.9.2 The following features shall be installed in the climate control system, but not limited to:

A. Low ambient control.
B. Auto-reset high and low pressure switches.
C. Compressor control module.
D. High efficiency compressor.
E. Unit alarm.

2.9.3 The unit shall have a factory preset temperature operating range of 40 to 80 degrees Fahrenheit. No thermostat controls will be visible within the house. A thermostat capable of maintaining a heating temperature of 40 to 50 degrees Fahrenheit and a cooling temperature of 70 to 80 degrees Fahrenheit shall be furnished within the climate control unit enclosure.

2.9.4 The self-contained climate control system shall be mounted on the exterior of the house in the approximate location shown in the Figures 1-4. All exterior sheet metal shall be constructed of stainless steel or galvanized zinc coated steel. The cabinet shall have built-in full length mounting flanges for a secure and easy installation. The fins and tubing of the system shall be protected by louvers built into the exterior cabinet. A double hinged wire mesh cage and facilities with a 1/2-inch minimum diameter hole for locking with a Metra padlock shall be provided. These items shall prevent objects, 3/8-inch or larger in diameter to enter and damage the systems components. The exterior cabinet fastening shall be sealed and caulked to prevent moisture from entering the house. The cabinet shall have a sloped top with flashing for rain run-off. The unit shall be sized for the application and capable of maintaining a temperature range of 40 to 80 degrees Fahrenheit in the house. The house shall be wired with the required outlets, and circuit breakers needed to operate the climate control system efficiently as specified.

2.9.5 All electrical accessories listed above shall have thin wall conduit installed and wired to connect them to the load center. All accessories, conduit and wiring shall meet the requirements of the National Electrical Code for size, gauge, and number of conductors and be UL approved. The manufacturer shall wire all branch circuits and furnish circuit breakers according to Figures 6 and 7.

2.10 Two wooden battery trays, the full usable length of the house and capable of being mounted under the shelves on either side of the house, shall be provided. The depth of the trays shall be 4 inches to accommodate valve regulated lead acid batteries. The trays shall be painted with acid resisting, black paint.

2.11 For house size F only, a plan table 20 x 24 inches shall be furnished. The table shall have a hinged lid and 4-inch deep storage for signal prints. The table shall be mounted on the front wall of the house.

3.0 SUBMITTAL

3.1 Catalog cuts, drawings, descriptions, etc. of the Manufacturer’s typical current production from which the submittal will be based shall be included with the quotation.

3.2 Detailed shop drawings of the house(s) are to be furnished within 15 days of the award of the contract, and be approved by Metra's Chief Engineering Officer before manufacture begins.

4.0 IDENTIFICATION AND SHIPPING

4.1 Each house shall be plainly marked with Manufacturer's references including serial and model numbers.

4.2 The product shall be assembled or packed as to permit convenient handling and to protect against loss or damage during shipment. Loose pieces shall be tightly taped or wired to the house(s) or shipping pallet or, packed separately but be firmly attached to the product.

4.3 A detailed list of packages and their contents shall be provided for all shipments. One copy will be included with shipment and one copy will be sent directly to Metra's Chief Engineering Officer. Metra Engineering's copy will be mailed not later than the shipping date of the equipment.

4.4 Manufacturer shall notify Metra of the shipping date 48 hours prior to shipment.

5.0 INSPECTION AT SHIPMENT

Metra will inspect the unit(s) after delivery and contact the Manufacturer listing any items not conforming to this Specification. The Manufacturer shall provide a timely schedule to furnish, deliver to destination and install or correct, without charge to Metra, such items. Failure to respond appropriately shall be cause for rejection with return of rejected units at the Manufacturer's total expense.

6.0 GUARANTEE

The Manufacturer shall replace (furnish, deliver to destination and install or correct) without charge, any part of material that fails within a period of one year of date of installation from defects of material, design, manufacture and/or workmanship.

7.0 DEMONSTRATION

7.1 If requested prior to purchase, bidder shall arrange for inspection before one or more of Metra's representatives, of the basic unit to be furnished. Failure of a unit to be equal to or better than the quality herein specified by Metra shall be cause for rejection of Bid. Such inspection shall be performed at no cost to Metra within a distance of not more than 50 miles from Metra's headquarters at 547 West Jackson Boulevard, Chicago, unless otherwise agreed upon by Metra.

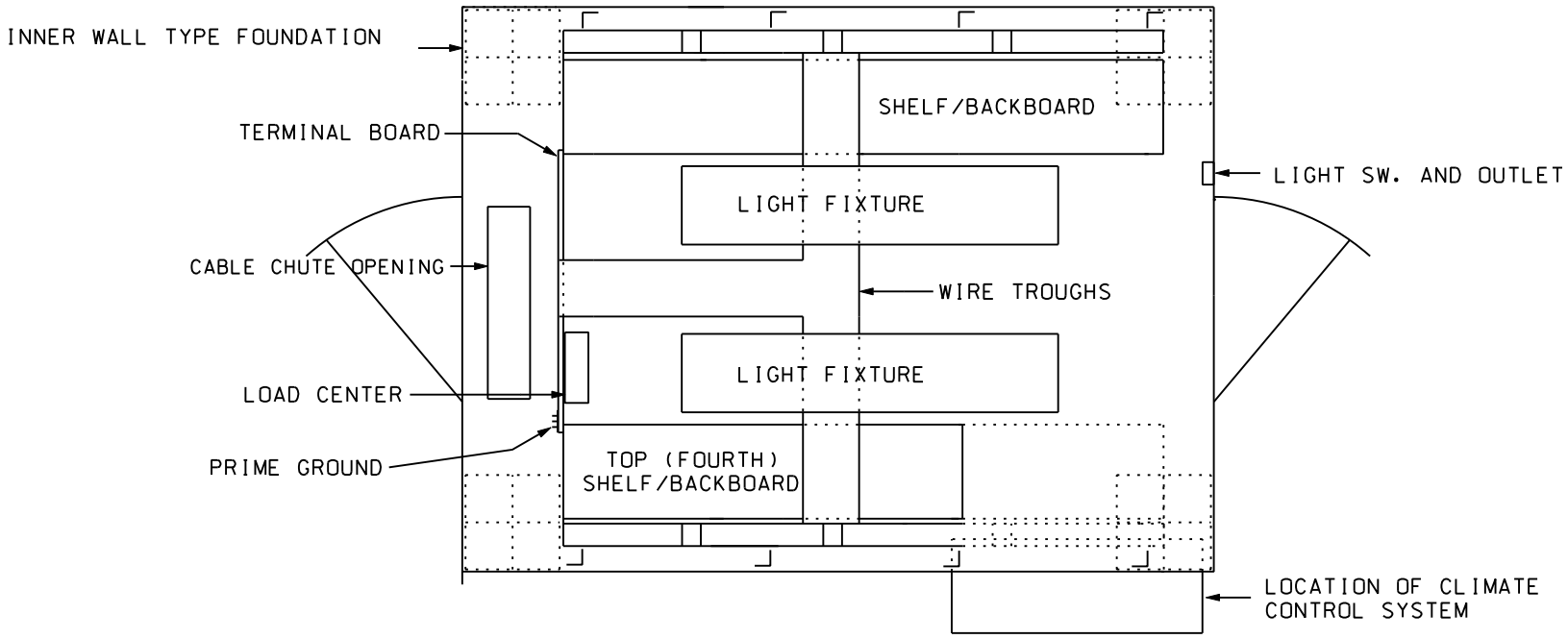
7.2 Metra or its Representative reserves the right to inspect all equipment at Manufacturer’s plant prior to shipment.

TABLE 1

Size	Nominal Width and Depth (Feet)	Minimum Terminal Board Size (inches)	Ground Terminals	Number of Doors
A	4 x 6	36 x 82	16	2
B	6 x 6	36 x 82	16	2
C	6 x 8	36 x 82	16	2
D	10 x 8	84 x 82	16	3
E	10 x 10	84 x 82	32	3
F	10 x 12	84 x 82	32	3

Size	Racks	Minimum Number of 5” x 23” Opening(s)	Load Center	Number of Fluorescent Fixtures
A	0	1	Q08	1
B	0	1	Q08	2
C	0	1	Q12	2
D	1	2	Q12	3
E	2	2	Q12	4
F	TBD	2	Q12	5

Note: 10'x14' Signal Relay House is similar to 10'x12' with the addition of one (1) additional Rack and two (2) additional Fluorescent Fixtures.

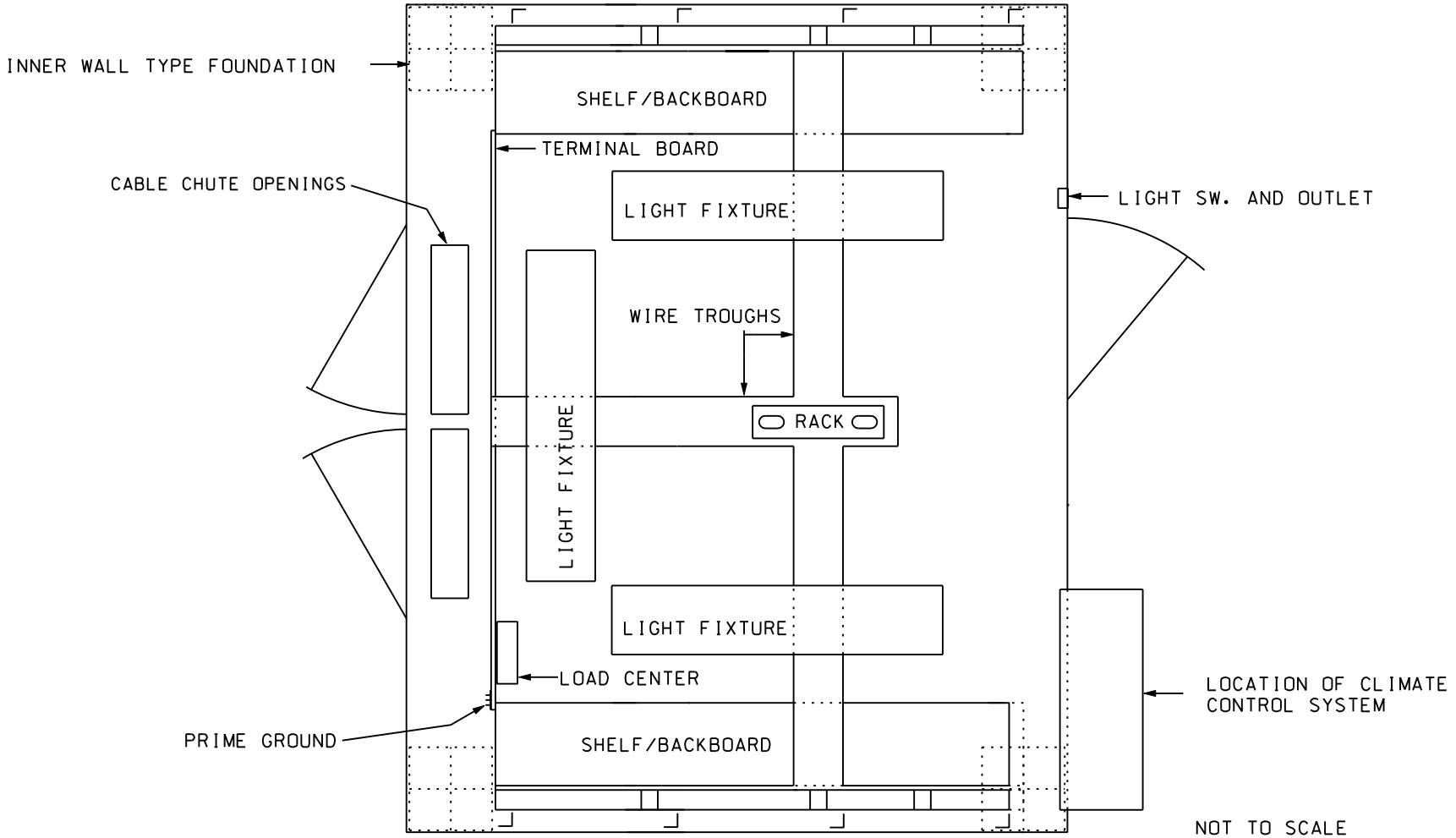


NOT TO SCALE

NOTE:
SEE TABLE 1 FOR HOUSE SIZE, QUANTITY AND DIMENSIONS OF ITEMS PROVIDED.

TYPICAL 6′ X 6′ AND 6′ x 8′ RELAY HOUSE FOR SHELF RELAY MOUNTING

FIGURE 1

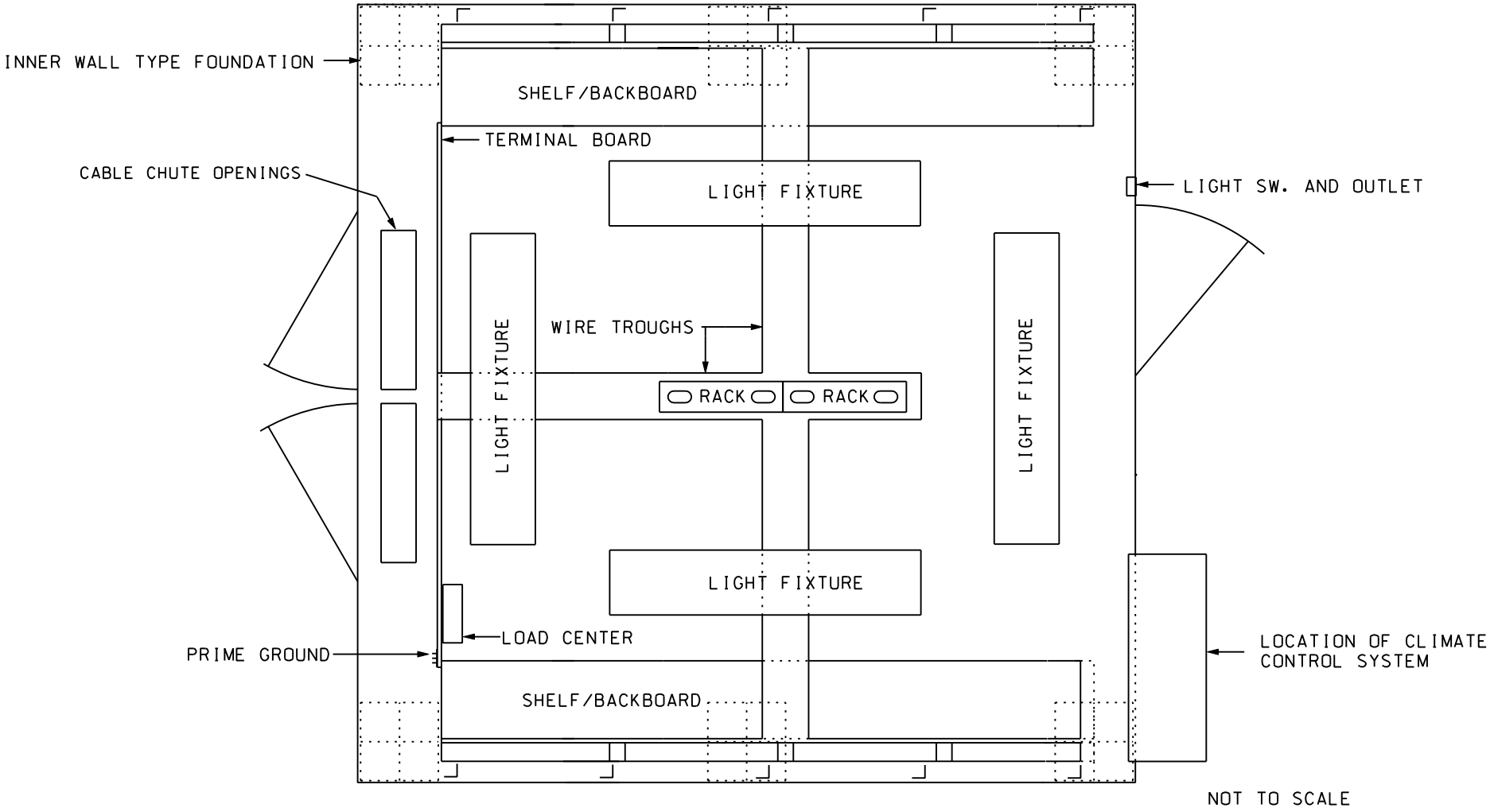


NOT TO SCALE

NOTE:
SEE TABLE 1 FOR HOUSE SIZE, QUANTITY AND DIMENSIONS OF ITEMS PROVIDED.

TYPICAL 10' x 8' RELAY HOUSE FOR PLUG-IN RELAY MOUNTING

FIGURE 2

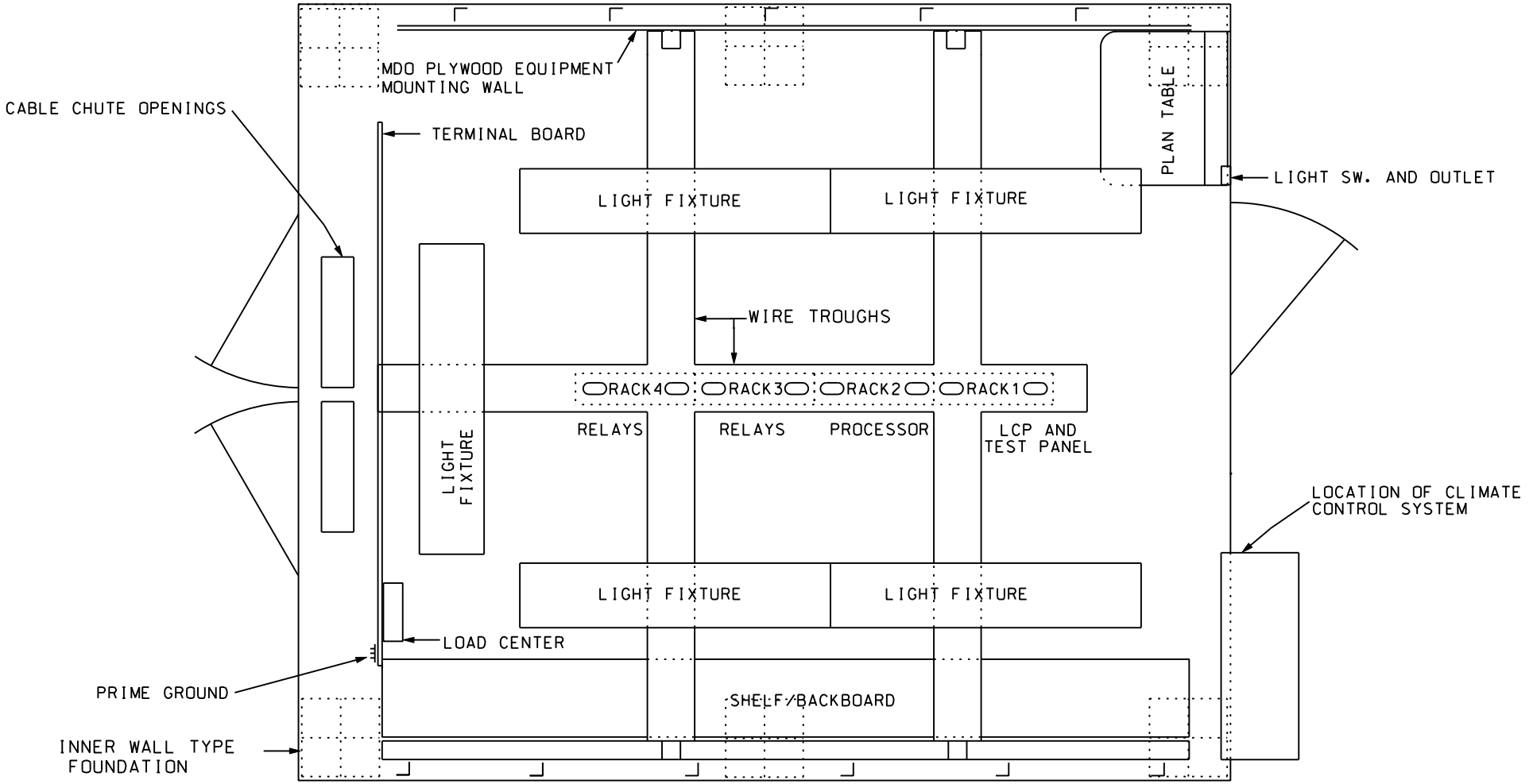


NOT TO SCALE

NOTE:
SEE TABLE 1 FOR HOUSE SIZE, QUANTITY AND DIMENSIONS OF ITEMS PROVIDED.

TYPICAL 10' x 10' RELAY HOUSE FOR PLUG-IN RELAY MOUNTING

FIGURE 3

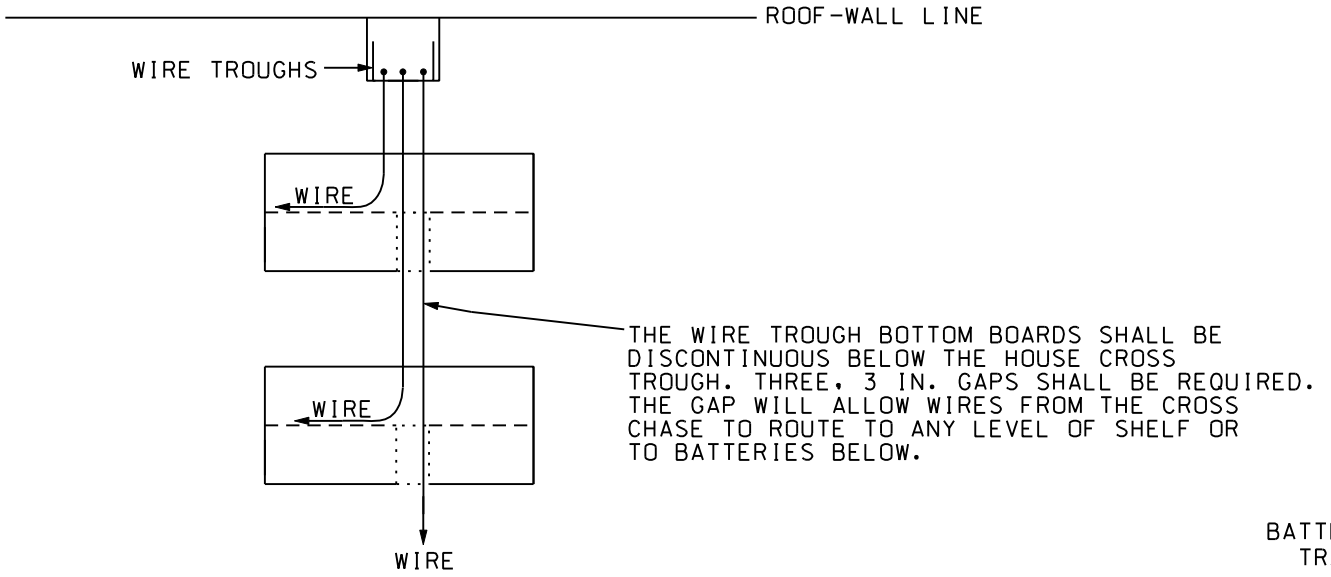


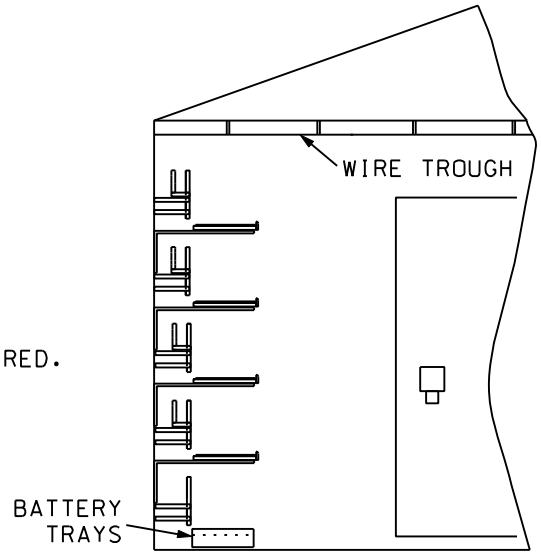
TYPICAL 10' X 12' RELAY HOUSE FOR PLUG-IN RELAY MOUNTING

FIGURE 4

NOT TO SCALE

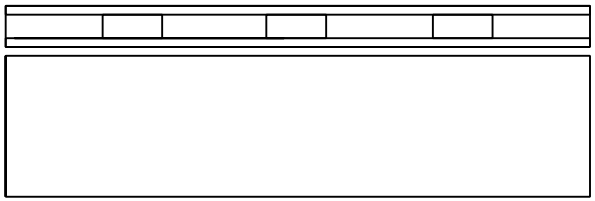
NOTE:
SEE TABLE 1 FOR QUANTITY AND DIMENSIONS OF ITEMS PROVIDED.
FOR 10'X14' HOUSE ADD RACK 5 & 2 ADDITIONAL LIGHT FIXTURES





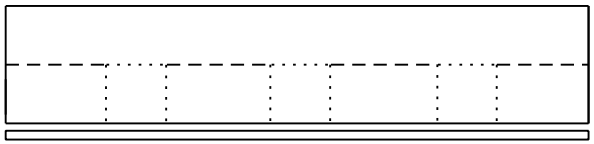
TYPICAL RELAY HOUSE CROSS SECTION SHOWING SHELVES, BACKBOARDS, AND WIRE CHASES.

TOP

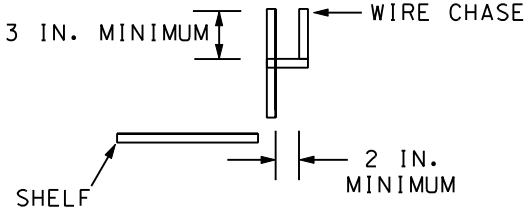


NOT TO SCALE

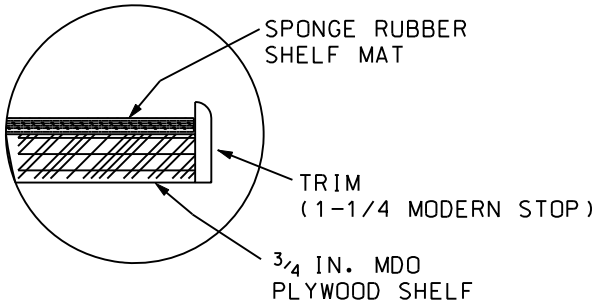
FRONT



SIDE

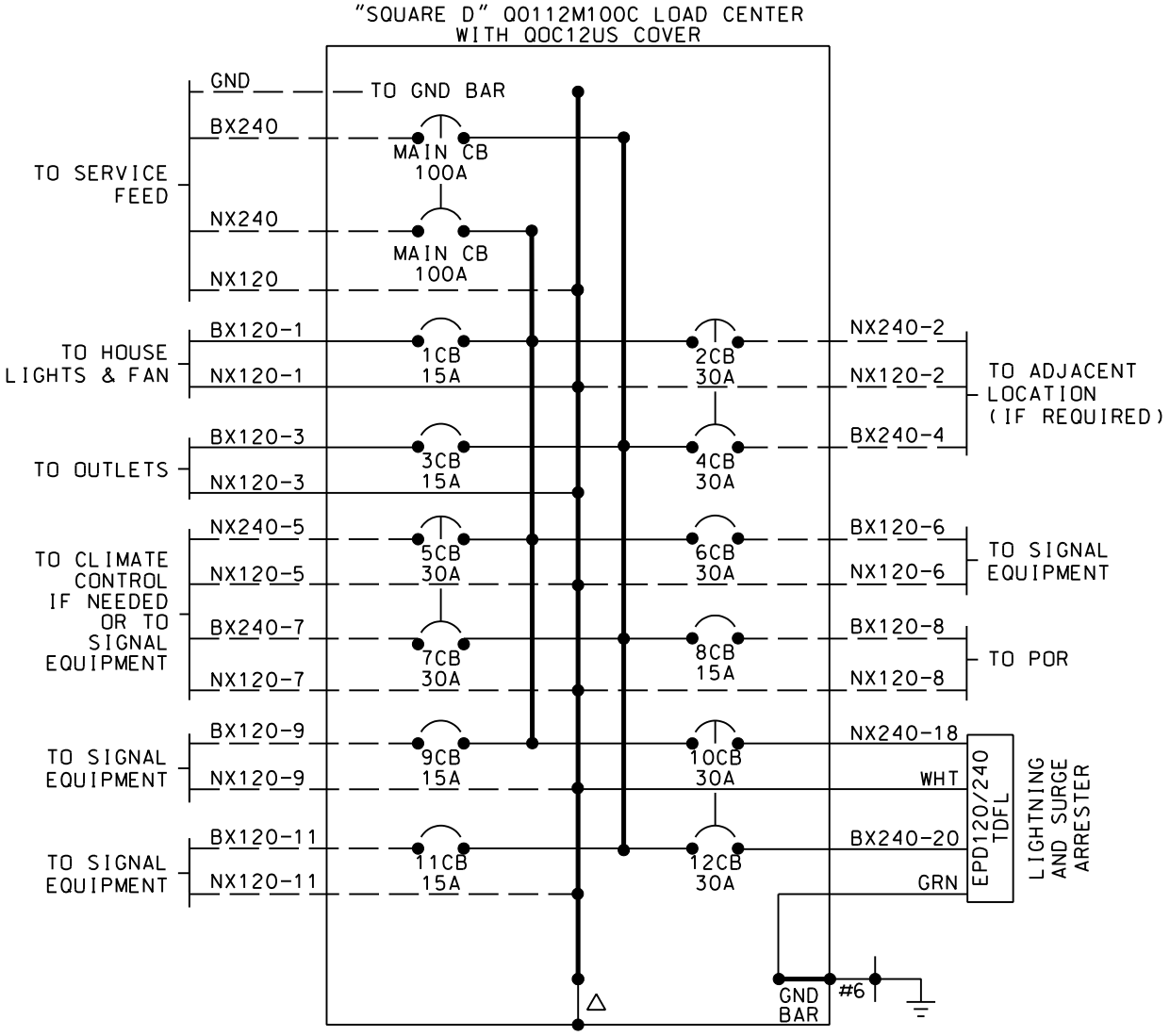


HOUSE DETAILS



SHELF DETAILS

FIGURE 5



NOTES:

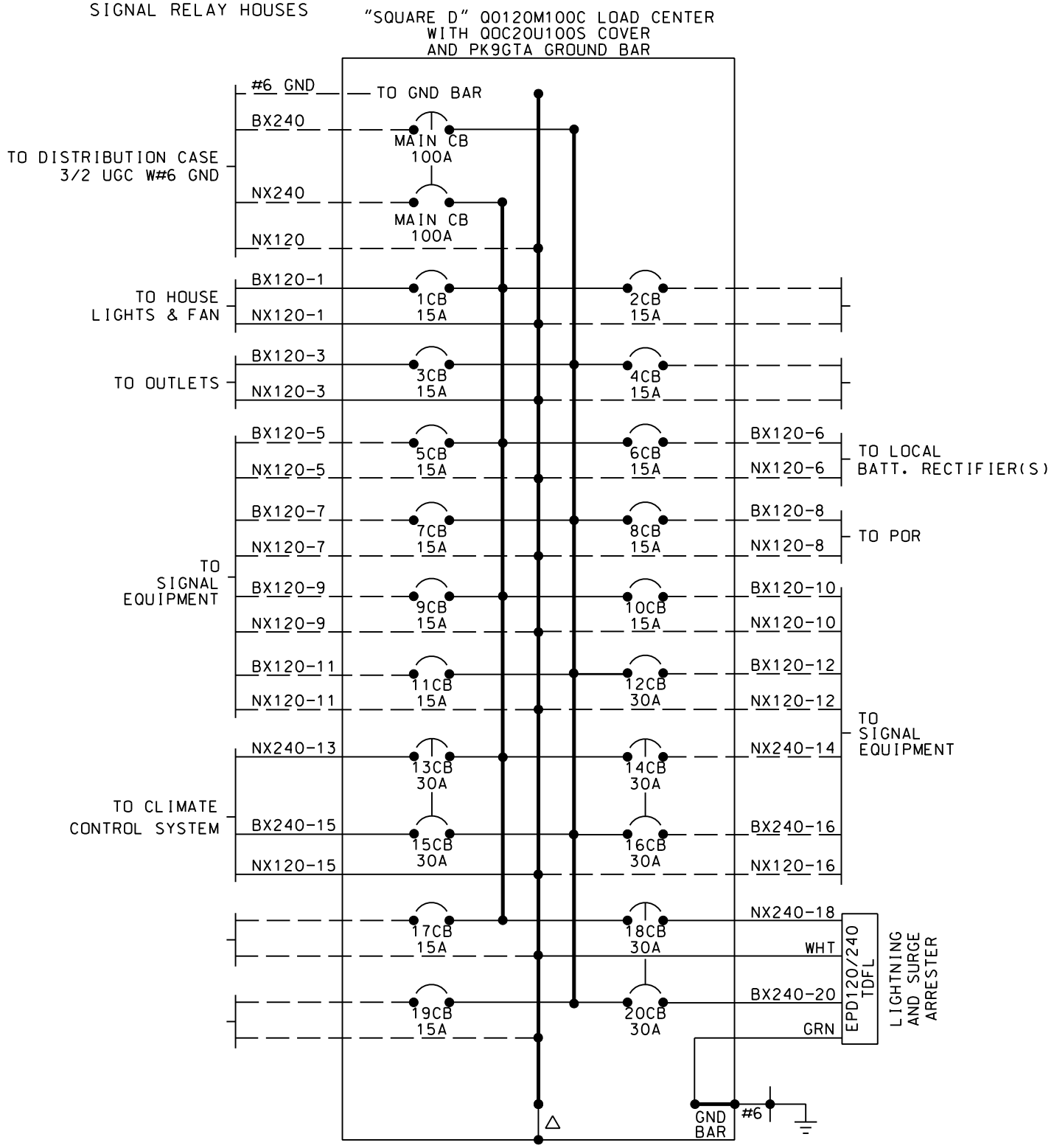
ALL CIRCUIT BREAKERS SHOWN TO BE FURNISHED.

— — · WIRING BY METRA FROM CIRCUIT BREAKERS.

△ BONDING SCREW

FACTORY WIRING FOR A 12 CIRCUIT LOAD CENTER

FIGURE 6



NOTES:

ALL CIRCUIT BREAKERS SHOWN TO BE FURNISHED.

— — · WIRING BY METRA FROM CIRCUIT BREAKERS.

△ BONDING SCREW

FACTORY WIRING FOR A 20 CIRCUIT LOAD CENTER

FIGURE 7

METRA

SIGNAL SPECIFICATION

FOR

ELECTRONICALLY CONTROLLED CONSTANT VOLTAGE RECTIFIER

SPECIFICATION NO. 0790

April 12, 2011

1.0 SCOPE

1.1 This Specification is for furnishing electronically controlled constant voltage rectifier. The unit(s) furnished on this Specification shall be of the most current design. The material, equipment and workmanship shall be of the highest commercial quality.

1.2 Failure to conform to the highest standards of the industry shall be cause for rejection.

1.3 Metra's Chief Engineering Officer or his duly authorized representative shall be the final authority for deciding as to whether a competitive item conforms to these requirements and complies with the intention of this Specification.

1.4 This Specification is intended to be descriptive, but not restrictive and is solely for the purpose of indicating the type and quality of articles that will meet the approval of Metra.

1.5 Capacities and dimensions listed herein shall be interpreted as minimums; variation from the values listed will be judged as to their effect and ability to perform the work intended.

1.6 It shall be the responsibility of the Manufacturer to make certain that all parts and components fit and function together properly.

1.7 Where brand, manufacturer or product names are indicated in this Specification, they are included only for the purpose of establishing identification and general descriptions of the item. Wherever such names appear, the term "or Metra approved equivalent" is considered to follow.

1.8 The article(s)/unit(s) submitted under this Specification must be in production and must have had a previous, satisfactory in-service performance record of at least two years on three Class I railroads. Proof of performance statement(s) shall be provided, upon request, with confirming statement(s) from previous purchaser(s). Failure to provide proof may be cause for rejection.

2.0 GENERAL REQUIREMENTS

2.1 Electronically controlled constant voltage rectifiers shall meet all applicable requirements of the American Railway Engineering and Right-of-Way Association (AREMA) Communications & Signals Manual of Recommended Practices including, but not limited to, Part 9.2.1.

2.2 The unit(s) shall be capable of operating from an AC supply of nominally 120/240 volts, 60 Hz AC. AC terminals shall be provided with insulating caps and shields (Invensys 023408-5X or equivalent). Any external surge protection required shall be provided with each unit.

2.3 The output shall be programmable for various amounts of cells of lead acid battery nominally 2.25 volts DC per cell. (See Table 1 for number of cells.) The coarse output setting shall be plainly shown on the control board indication by cell type and number. A fine output adjustment shall be provided. The adjustments shall be suitable for valve regulated lead-acid batteries.

2.4 The current output rating as shown in Table 1 shall be continuous plus 10 percent intermittent. A meter capable of indicating the maximum continuous current output of the unit shall be a part of the unit.

TABLE 1

RECTIFIER USE	NOMINAL VOLTAGE	MAXIMUM CURRENT	CELLS OF LEAD-ACID
Track Circuit	8V	5A	1
Operating Battery	14V	60A	7
Operating Battery	12V	20A	6
Operating Battery	12V	40A	6
Crossing Gates	14V	40A	7
Low Voltage Switch Machines	24V	30A	12
High Voltage Switch Machines	130V	10A	55

2.5 The unit shall be designed for wall or shelf mounting without need for cooling airflow at the mounting surface.

2.6 A manual resetting AC input circuit breaker shall be accessible without disassembly of the unit.

2.7 The unit shall be temperature compensated to operate from minus 40° Fahrenheit to plus 160° Fahrenheit. The temperature probe shall be 25 feet long.

2.8 DC output ripple shall be limited to less than 1.0V peak to peak, without battery, at maximum rated output.

2.9 DC output voltage shall be maintained at plus/minus 1 percent of the setting throughout the operating range.

3.0 MANUALS

One Installation and Maintenance Manual shall be furnished with each unit.

4.0 SUBMITTAL

Catalog cuts, drawings, descriptions, etc., of the Manufacture's typical current production from which the submittal will be based shall be included with the quotation.

5.0 IDENTIFICATION AND SHIPPING

5.1 Electronically controlled constant voltage rectifier unit(s) shall be plainly marked with manufacturer's references including serial and model numbers.

5.2 Loose pieces shall be packed separately, but be firmly attached to the product.

5.3 A detailed list of packages and their contents shall be provided for all shipments. One copy will be included with shipment and one copy will be sent directly to Metra's Chief Engineering Officer. Metra Engineering's copy will be mailed not later than the shipping date of the equipment.

5.4 Manufacturer shall notify Metra of shipping date 48 hours prior to shipment.

6.0 INSPECTION AT SHIPMENT

Metra will inspect the unit(s) after delivery and contact the Manufacturer listing any items not conforming to this Specification. The Manufacturer shall provide a timely schedule to furnish, deliver to destination and install or correct, without charge to Metra, such items. Failure to respond appropriately shall be cause for rejection with return of rejected units at the Manufacturer's total expense.

7.0 GUARANTEE

The Manufacturer shall replace (furnish, deliver to destination and install or correct) without charge, any part of material that fails within a period of one year of date of installation from defects of material, design, manufacture and/or workmanship.

8.0 DEMONSTRATION

8.1 If requested prior to purchase, bidder shall arrange for inspection before one or more of Metra's representatives, of the basic unit to be furnished. Failure of a unit to be equal to or better than the quality herein specified by Metra shall be cause for rejection of Bid. Such inspection shall be performed at no cost to Metra within a distance of not more than 50 miles from Metra's headquarters at 547 West Jackson Boulevard, Chicago, unless otherwise agreed upon by

Metra.

8.2 Metra or its Representative reserves the right to inspect all equipment at Manufacturer's plant prior to shipment.

REQUISITION INSTRUCTIONS FOR ELECTRONICALLY CONTROLLED CONSTANT VOLTAGE RECTIFIERS

The following information must be included with all requisitions:

1. State the proper voltage output. (P-2.3)

2. State the proper current output. (P-2.4)

RECTIFIER USE	NOMINAL VOLTAGE	MAXIMUM CURRENT	INVENTORY NO.
Track Circuit	8V	5A	06-56013-0
Operating Battery	14V	60A	Special Order
Operating Battery	12V	20A	06-56020-5
Operating Battery	12V	40A	06-56040-3
Crossing Gates	14V	40A	06-56040-3
Low Voltage Switch Machines	24V	30A	06-56030-4
High Voltage Switch Machines	130V	10A	06-56220-1

METRA

SIGNAL SPECIFICATION

FOR

VALVE REGULATED LEAD ACID
SIGNAL STORAGE BATTERY

SPECIFICATION NO. 0806

April 12, 2011

1.0 SCOPE

1.1 This Specification is for furnishing valve regulated lead acid signal storage battery. The units furnished on this Specification shall be of the most current design. The material, equipment and workmanship shall be of the highest commercial quality.

1.2 Failure to conform to the highest standards of the industry shall be cause for rejection.

1.3 Metra's Chief Engineering Officer or his duly authorized representative shall be the final authority for deciding as to whether a competitive item conforms to these requirements and complies with the intention of this Specification.

1.4 This Specification is intended to be descriptive, but not restrictive, and is solely for the purpose of indicating the type, and quality of articles that will meet the approval of Metra.

1.5 Capacities and dimensions listed herein shall be interpreted as minimums; variation from the values listed will be judged as to their effect and ability to perform the work intended.

1.6 It shall be the responsibility of the Manufacturer to make certain that all parts and components fit and function together properly.

1.7 Where brand, manufacturer or product names are indicated in this Specification, they are included only for the purpose of establishing identification and general descriptions of the item. Wherever such names appear, the term "or Metra approved equivalent" is considered to follow.

1.8 The article(s)/unit(s) submitted under this Specification must be in production and must have had a previous, satisfactory in-service performance record of at least two years on three Class I railroads. Proof of performance statement(s) shall be provided, upon request, with confirming statement(s) from previous purchaser(s). Failure to provide proof may be cause for rejection.

2.0 GENERAL REQUIREMENTS

2.1 Battery shall be utilized for railroad use as a standby power source for highway crossing warning devices, wayside signals, signal control systems, and other similar uses. Battery must meet or exceed all applicable requirements of the American Railway Engineering and Maintenance-of-Way Association (AREMA) Communications & Signals Manual of Recommended Practices, Part, 9.1.

2.2 Battery must operate from minus 40 degrees Fahrenheit to plus 160 degrees Fahrenheit (-40°F to +160°F) in a harsh environment enclosed only in a relay

house or raised concrete battery box.

2.3 The battery shall be leak proof and spill proof. No electrolyte shall be lost, when the battery is stored or mounted in any position, or if a cell container should become ruptured.

2.4 Metra's standard amp-hour rating of 80, 160 or 240 at an eight-hour rate will be specified. These values are the minimum capacity that shall be acceptable for each range. If a non-standard rating is specified, that value will then be considered the minimum capacity acceptable.

2.5 The battery shall not be capable of explosion under any condition including a short circuit discharge.

2.6 The nominal size for each standard range of battery cell shall be:

	LENGTH	WIDTH	HEIGHT
80 AH	5"	10"	16-1/8"
160 AH	6-3/4"	10"	16-1/8"
240 AH	9-1/4"	10-1/8"	16-13/16"

3.0 PHYSICAL CONSTRUCTION

3.1 Lead Acid - 2.25 volts per cell nominal

3.2 Immobilized electrolyte

3.3 Polypropylene container and cover

3.4 Gas recombination design

3.5 Sealed housing (venting above 10 lb. psi allowed)

3.6 Projected design life of 20 years at 80 percent rated capacity

3.7 Individual cells (multiple cell groups or modules not allowed)

3.8 The battery shall not require:

A. Addition of water
B. Equalizing charge
C. Overcharge

4.0 ELECTRICAL CHARGE

4.1 The battery shall be suitable for float charge at 2.25 volts per cell, or deep cycle charge, using electronically controlled constant voltage rectifier.

4.2 The battery shall be capable of a minimum of 1000 charge - discharge cycles to 80 percent discharge without loss of capacity.

5.0 ELECTRICAL DISCHARGE

5.1 "Ampere Hour Capacity" or "AH" means the available current in amperes, multiplied by discharge time in hours, when the battery is discharged at a constant rate for eight hours to a minimum final voltage of 1.75 volts per cell.

5.2 Internal discharge shall not exceed four percent per month.

5.3 The battery shall be capable of deep cycle discharge with minimal loss of performance.

6.0 CAPACITY RETENTION

The battery shall be capable of 20 to 40 percent retention of rated capacity at minus 40 degrees Fahrenheit (-40°F).

7.0 OTHER MATERIALS

Battery shall be shipped with appropriate straps, lugs and terminals for assembly into multiple cell groupings.

8.0 SUBMITTAL

Catalog cuts, drawings, descriptions, etc., of the Manufacturer's typical current production from which the submittal will be based shall be included with the quotation.

9.0 IDENTIFICATION AND SHIPPING

9.1 Battery unit(s) shall be plainly marked with Manufacturer's references including serial and model numbers.

9.2 The product shall be assembled or packed as to permit convenient handling and to protect against loss or damage during shipment. Loose pieces shall be tightly taped or wired to the battery or shipping pallet or, packed separately but firmly attached to the product.

9.3 A detailed list of packages and their contents shall be provided for all shipments. One copy will be included with shipment and one copy will be sent directly to Metra's Chief Engineering Officer. Metra Engineering's copy will be mailed not later than the shipping date of the equipment.

9.4 Manufacturer shall notify Metra of shipping date 48 hours prior to shipment.

10.0 INSPECTION AT SHIPMENT

Metra will inspect the units after delivery and contact the Manufacturer listing any items not conforming to this Specification. The Manufacturer shall provide a timely schedule to furnish, deliver to destination and install or correct, without charge to Metra, such items. Failure to respond appropriately shall be cause for rejection with return of rejected units at the Manufacturer's total expense.

11.0 GUARANTEE

11.1 The Manufacturer shall replace (furnish, deliver to destination and install or correct) without charge, any part of material that fails within a period of one year of date of installation from defects of material, design, manufacture and/or workmanship.

11.2 The manufacturer shall warranty the battery for 19 additional years on a pro-rated basis.

12.0 DEMONSTRATION

12.1 If requested prior to purchase, bidder shall arrange for inspection before one or more of Metra's representatives, of the basic unit to be furnished. Failure of a unit to be equal to or better than the quality herein specified by Metra shall be cause for rejection of Bid. Such demonstration shall be performed at no cost to Metra within a distance of not more than 50 miles from Metra's headquarters at 547 West Jackson Boulevard, Chicago, unless otherwise agreed upon by Metra.

12.2 Metra or its Representative reserves the right to inspect all equipment at Manufacturer plant prior to shipment.

METRA

SIGNAL SPECIFICATION

FOR

SOLID-STATE TYPE
C.T.C. FIELD CODE UNITS

SPECIFICATION NO. 0874

August 23, 2012

1.0 SCOPE

1.1 This Specification is for furnishing Solid State type C.T.C field code equipment with optional Radio Based facilities for code communication. The equipment furnished on this Specification shall be of the most current design.

1.2 The material, equipment and workmanship shall be of the highest commercial quality. Failure to conform to the highest standards of the industry shall be cause for rejection.

1.3 Metra's Chief Engineering Officer or his duly authorized representative shall be the final authority for deciding as to whether a competitive item conforms to these requirements and complies with the intention of this Specification.

1.4 This Specification is intended to be descriptive, but not restrictive and is solely for the purpose of indicating the type and quality of the article that will meet with the approval of Metra.

1.5 Capacities and dimensions listed herein shall be interpreted as minimums; variation from the values listed will be judged as to their effect and ability to perform the work intended.

1.6 It shall be the responsibility of the Manufacturer to make certain that all parts and components fit and function together properly as a system.

1.7 Where brand, manufacturer or product names are indicated in this Specification, they are included only for the purpose of establishing identification and general descriptions of the item. Wherever such names appear, the term "or Metra approved equivalent" is considered to follow.

1.8 The article(s)/unit(s) submitted under this Specification must be in production and must have had a previous satisfactory in service performance record of at least two years on three Class I railroads. Proof of performance statement(s) shall be provided, upon request, with confirming statement(s) from previous purchaser(s). Failure to provide proof may be cause for rejection.

2.0 GENERAL REQUIREMENTS-STANDARDS

2.1 Solid State Field Code Unit

2.1.1 The solid-state field code unit shall be used for the installation of a CTC code system. All modems and code line interface equipment (carriers and repeaters) shall be included. Each field code unit shall be designed to directly interface with the code line using the same coding format as the existing system, and have the ability to upgrade to a higher speed system.

2.1.2 The field code unit shall be designed to have a minimum useful service life of 15 years.

2.1.3 The field code unit shall be designed for a minimum Mean Time Between Failure (MTBF) of no more than 1 failure in every 18,000 hours of operation.

2.1.4 The field code unit shall be designed to have a Mean Time To Repair (MTTR) of 30 minutes maximum. This does not include traveling time or in-service testing, only the time to return the equipment to proper operation. The unit shall also be designed for shop MTTR of 60 minutes for replacing defective PC board components.

2.1.5 The field code unit shall be designed to interface to commercial telephone company type data circuits or data multiplexers, or a data radio system. Interface shall consist of EIA Standard RS-232C port. Configuration will be dependent on modem equipment type.

2.1.6 When specified as above for 2 or 4 wire carrier type code line the coding system shall incorporate a high speed polling arrangement and shall connect directly to carrier modems which are to be connected to the code line. When specified as above for radio based code system the coding system will incorporate a "contention type" arrangement.

2.1.7 When field code unit is provided as a part of a complete code system replacement (i.e. with office end equipment), the protocol between the office and field shall provide full compatibility with Ansaldo's Genisys protocol.

2.1.8 The field code unit shall be capable of directly connecting to modems that would be connected to the code line or a radio network, when the communications are on a high-speed data system.

2.2 Environment

2.2.1 FIELD CODE EQUIPMENT IMMUNITY TO INTERFERENCE

2.2.1.1 The field code unit shall be protected from lightning. Manufacturer shall provide all necessary lightning and surge suppression equipment.

2.2.1.2 The field code unit shall not incorporate or require gas tube lightning arresters, capacitors, nor surge suppressors between battery lines and ground.

2.2.1.3 The field code unit shall have a minimum isolation or dielectric breakdown characteristic of 2,000 volts AC RMS at 60 hertz for one minute, where the leakage current shall not exceed 3 milliampere, as specified in the American

Railway Engineering And Maintenance-of-Way Association (AREMA) Communications & Signals Manual of Recommended Practices, Part 11.5.1, between:

A. Internal electronic circuits and ground or chassis
B. Input and output circuits and ground or chassis
C. DC battery input connections and ground or chassis

2.2.1.4 The field code unit shall not be affected by the operation of nearby Metra Railroad radios having frequencies near 161, 220, 450, and 900 megahertz (MHz) and up to 100 watts output power.

2.2.1.5 The field code unit shall not be affected by commercial broadcast frequencies such as used for television, radio, CB, etc. which may have transmitters operating in close proximity to Metra's right-of-way.

2.2.1.6 The field code unit shall not be affected by induced voltage spikes and surges on interface wiring found in typical CTC field locations.

2.2.1.7 The field code unit shall operate properly with up to 5 volts AC RMS line to line or 50 volts AC RMS code line to ground of induced interference from 60 hertz and harmonics from nearby power lines, whether the code line configuration is a 2-wire or 4-wire carrier line.

2.2.2 FIELD CODE UNIT – ENVIRONMENT

2.2.2.1 The field code unit and any electronic components or subsystems supplied with the field code unit shall be convection cooled, and operate over the temperature range of -40°C to +70°C. The field code unit and associated equipment shall not be damaged at temperatures down to -55°C under any combination of power supply on or off, with full or no load applied. When the field code unit stops operating due to the temperature falling below the lower operating temperature range, the unit shall resume proper operation on reaching the lower limit of -40°C.

2.2.2.2 The unit shall adhere to AREMA Communications & Signals Manual of Recommended Practices, Part 8.1.2, for all other environmental design requirements. The unit shall operate over the specified environmental limits without requiring any adjustment.

2.3 Power

2.3.1 The field code unit shall operate from a nominal input voltage of 12 volts DC shall operate over a range of 9.0 to 16.5 volts DC.

2.3.2 The field code unit shall operate with a ripple of up to 1 volt peak to peak on the 12-volt supply.

2.3.3 The field code unit shall be capable of operating with DC battery floating ungrounded.

2.3.4 The field code unit shall not be damaged if the DC input supply voltage is accidentally connected with the wrong polarity.

2.3.5 The field code unit shall be capable of automatically restarting after a power failure and after any failure caused by noise or interference or any other temporary cause. Output power shall not be re-applied until the unit has successfully passed all initialization diagnostics, as described in section 3.3.1.1.

2.3.6 The field code unit shall be designed to minimize power consumption and shall not require more than 50 watts for internal use including output drive interface losses. This does not include the external relays.

2.4 Documentation

2.4.1 FIELD CODE UNITS

2.4.1.1 Manufacturer shall provide detailed technical information on message formats and protocol for communication between the diagnostic computer and the field code unit.

2.4.1.2 Manufacturer shall provide detailed information on the code line format, including timing information. This information shall indicate, in detail, how the codeline format is related to the communication between the CTC office computer and the field code unit.

2.4.1.3 Manufacturer shall provide one copy of operation manuals, with detail plans and testing procedures in sufficient detail to allow Metra to maintain the units and to make field repairs for each code unit supplied. Manuals shall include fault isolation procedures.

2.4.1.4 Manufacturer shall provide one copy per field code unit supplied of service manuals showing calibration and adjustment of all electronic equipment. Manuals shall include a complete description of the theory of operation of the circuit boards. Manufacturer shall provide maximum 11 inch by 17-inch schematic diagrams for ALL electronic subsystems used in the field code unit.

2.4.1.5 Manufacturer shall provide a list of all available training aids and materials for the field code unit.

2.4.1.6 Manufacturer shall provide wiring drawings showing:

A. Typical interface wiring to the physical code lines
B. Typical connections to data and power supply terminals
C. Typical connections to relay circuits
D. Site specific connections. Drawings shall show all wiring on rack out to terminals leaving the rack.

2.4.1.7 Manuals shall be bound 8-1/2 by 11 inch size and shall be standard 3-hole punched for placing in 3-ring binders.

2.4.2 HARDWARE DOCUMENTATION (General)

Documentation for the hardware supplied with the system shall include, but not be limited to, the following:

2.4.2.1 Documentation showing detailed interconnections between various modules, racks, panel and other assemblies. Information shall include descriptions of individual control and data lines that are part of these interconnections and identify their particular location in connectors.

2.4.2.2 Documentation showing, describing and identifying control and data lines of all internal buses connecting individual circuit board modules together.

2.4.2.3 Documentation showing and identifying the placement of individual circuit board modules in each assembly of the system.

2.4.2.4 Documentation complete enough to allow troubleshooting of the system down to the circuit board module level. Documentation shall include a description of how each circuit board module operates and how to determine whether or not it is functioning properly.

2.4.3 SOFTWARE DOCUMENTATION

Documentation for the software supplied with the system shall include, but not be limited to, the following:

2.4.3.1 All software for programming and listings for ladder logic or other Metra approved methods shall be furnished in printed form. Source software as well as other needed files shall be provided on disk. Programming shall be arranged in a manner that emulates Metra's typical book of plans for an interlocked control point.

2.4.3.2 Any other documentation deemed necessary to understand system software including block diagrams, logic flow charts, instructions, etc.

2.4.4 TRAINING

Training, as specified, for signal maintenance personnel shall be provided by the Manufacturer. Training shall cover troubleshooting and maintenance to the board level.

2.4.4.1 The Manufacturer shall provide a complete set of technical manuals, plans and other documents required for training each trainee.

2.4.4.2 A copy of the Course Outline and other training material shall be provided two months prior to the actual training for Metra approval and comments.

The Training Course Outline shall include:

A. Course objectives and the method for evaluating when objectives have been met
B. A breakdown, in the order to be taught, of the subjects covered
C. The anticipated hands-on experience which will be required and the plan for training on the actual equipment
D. The approximate time to be spent on each subject

2.5 Special Application Software

2.5.1 The field code unit shall be capable of being programmed in the field with application logic to handle such things as, but not limited to:

A. Local and remote control indication
B. Normal or generator power on indication
C. Intrusion alarm indication
D. Trouble indications
E. Snow melter on and failure indication
F. Normal and standby processor status
G. Signal fleet control and indication for each signal
H. Switch control and indication for each independent switch
I. Switch locked indication for each independent switch or crossovers
J. Signal control and indication for each signal
K. Light out indication for each signal
L. Call on control and indication for each signal
M. Normal and reverse traffic indication for all tracks

N. Track block control and indication for all tracks
O. Track occupancy indication for each track circuit
P. Approach track circuit indications

2.5.2 Application software shall be provided and follow the format and order of Metra's typical book of plans. The software shall be site dependent and shall be approved by Metra.

2.5.3 A complete development system consisting of all the software, hardware, training and instruction manuals necessary to implement changes to the final installation shall be provided. All of the necessary compilers, linkers, interpreters, etc., shall be provided, together with any other software or other programming devices. The development system shall include an EPROM eraser/burner or other equipment as required to reprogram the application memory units.

3.0 DESIGN

3.1 Field Code Equipment

3.1.1 The Field Code Equipment shall be provided completely wired and tested on a 19-inch rack.

3.1.2 The field code unit mechanical design shall meet the following requirements:

A. Self-tapping screws shall not be used.
B. Screws, bolts and similar fasteners shall be equipped with lock washer or other locking devices to prevent loosening from shock and vibration.
C. Metallic parts shall be plated or otherwise fully protected against corrosion.
D. Sharp edges shall be removed from all parts of the unit to reduce personnel safety hazard.

3.1.3 Wire for the field code unit shall be in accordance with the following requirements:

A. Wiring internal to the field code unit shall be #22 AWG stranded, PVC or polyethylene, insulated copper wire, or larger. The insulation shall be rated for 300-volt circuits.
B. Interface wiring to external devices (e.g. vital relays) shall be #16 AWG stranded single conductor insulated copper wire or larger and in accordance with Metra Specification No. 0069, Insulated Wire and Jacketed Railroad Signal Cable.
C. Power input wiring shall be #10 AWG stranded single conductor insulated

copper wire or larger and in accordance with Metra Specification No. 0069-1, Insulated Wire and Jacketed Railroad Signal Cable.

3.1.4 The field code unit shall be designed such that circuit boards cannot be inserted upside-down, and so that no damage or unsafe operation will occur if a circuit board is plugged into the wrong slot. This may be accomplished using keyed slots.

3.1.5 The field code unit shall be designed such that circuit boards shall be accessible and removable:

A. From the front of the unit
B. Without requiring interface wiring to be removed or disconnected

3.1.6 Component required adjustments shall be accessible from the front of the unit. All indicator LEDS shall be visible from the front of the unit.

The field code unit shall be permanently identified with a manufacturer's label showing:

A. Manufacturer's name
B. Catalog number
C. DC supply voltage range
D. Serial number
E. Date of manufacture

3.2 Interfaces

3.2.1 RELAY INTERFACE

3.2.1.1 In addition to serial interfaces, the field code unit shall be designed to operate properly from signal relay contact closures, having contact resistance between 0.01 and 2.0 ohms, in accordance with AREMA Communications & Signals Manual of Recommended Practices, Part 6.5.1. In addition, the field code unit shall tolerate contact bounce of up to 200 ms.

3.2.1.2 The field code unit shall be capable of driving standard signal relay coils having coil resistance of 100 to 1000 ohms with a voltage range of from 5 to 24 volts. Output current rating shall not be less than 500 milliamps.

3.2.1.3 The field code unit shall be capable of driving Normal Acting or Magnetic Stick type final stick relays.

3.2.1.4 The Field Code Units shall provide a minimum of 20 percent spare control

outputs and a minimum of 20 percent spare indication inputs. The spare input/outputs shall be based on the number of functions shown on the code charts when they are supplied with this Specification. Spare inputs and outputs shall include all circuit boards necessary to provide the 20% operable spares. When Code Charts are not supplied the spares shall be based on the specific number of inputs/outputs as specified by Metra's typical circuit drawings. Spare inputs and outputs shall be wired out to terminals on the rack. Terminals shall be in accordance with AREMA Communications & Signals Manual of Recommended Practices, Part 14.1.2, or approved equivalent. In software, spare input bits will be passed directly to spare code line output bits and spare code line input bits will be passed directly to spare output bits.

3.2.2 CODELINE INTERFACE

3.2.2.1 Where modems are specified and the baud rate is less than or equal to 300, the modems shall be RFL Series 9850 and shall be UDS V.3600 or equal (temperature rated for -30^{o} C to +70^{o} C) when the baud rate exceeds 300.

3.2.2.2 All equipment, keypad, portable terminal, or software necessary for programming the modems shall be provided.

3.2.2.3 Each field code unit shall have a unique site identification code. This code and any other site-specific information shall be resident on the CPU board, the motherboard (back panel), or a separate device connected to the field code unit. This site code shall be transmitted to the control office system for every transmission as part of the indication message address. This identification code shall be programmable by Metra.

3.2.2.4 Communication link backup shall be provided in accordance with the requirements for telephone 2-wire systems. Failure detection shall be automatic and there shall be provisions to allow transfer to be initiated from either the Control Office or the field location. A means of security shall be provided to prevent switchover due to an accidental dial-in to the system.

3.2.3 MODEM INTERFACE

Interface to modems shall be EIA Standard RS-232C; configuration will be dependent on modem equipment type.

3.2.3.1 The modems shall be compatible to and work in conjunction with any modems provided with a Base Radio Controller site or control point sites on 4 wire normal or telephone two wire backup lines. All equipment and wiring required to interface the modems to the field code equipment shall be provided.

3.3 Diagnostics and Logging Functions

3.3.1 DIAGNOSTICS

3.3.1.1 The field code unit shall incorporate a diagnostic self test of its hardware (including inputs and outputs) upon initialization.

3.3.1.2 The field code unit shall incorporate maintenance diagnostic items such as LEDS, displays, etc. as well as a communications port to interface to an external diagnostics computer.

3.3.2 LOGGING FUNCTIONS

3.3.2.1 The field code unit shall provide an RS-232C serial port for continuous logging of event changes and status to an external diagnostic computer terminal without interruption of normal operation (i.e. poll response, control delivery) of the unit. The diagnostic computer terminal shall be provided by the Manufacturer when specified. The diagnostic computer terminal shall be a laptop type computer with the following provisions as a minimum:

A. Intel (R) Core (TM) i5-540M Dual Core Processor
B. 2.3 GHz clock
C. Min 15.6" diag .color display utilizing Intel (R) HD Graphics
D. 4 GB DDR3 System Memory
E. 3 USB ports
F. Optical CD/DVD R/W disk drive
G. Internal hard drive, 250 GB
H. Internal modem, 56Kbs
I. RS-232C serial communications interface
J. Printer interface
K. Installed licensed copy of Microsoft Office Professional, latest version
L. Windows 7 Professional latest version
M. Installed Terminal program, ProComm Plus or Metra approved equivalent
N. Portable printer utilizing bubble-jet technology

3.3.2.2 The field code unit shall convert controls and indications from code line address and data words used by the code system to standard characters (such as ASCII) for use by a diagnostic computer. The communication with the diagnostic computer shall have the following characteristics:

A. Compatible with EIA Standard RS-232C
B. Asynchronous

C. Baud rate switch, strap or remote computer selectable from 1200 to 9600 bits per second
D. Full duplex
E. 1 start bit, 8 data bits, 1 stop bit and no parity
F. Support XON/XOFF protocol for handshaking

3.3.2.3 The following information shall be transmitted through the interface as the events occur:

A. All events relating to controls sent to the field code unit along with the associated time and date
B. All events relating to indications sent from the field code unit along with the associated time and date
C. All events relating to diagnostics carried out by the field code unit along with the associated time and date

3.3.2.4 The field code unit shall incorporate a Real Time Clock (RTC) for use with the unit logging functions. The RTC shall be used for time and date, and shall utilize an internal battery within the unit for continual operation of at least 72 hours, when DC power fails. The RTC shall be capable of being updated locally or remotely via modem.

3.3.2.5 A field code unit memory shall be provided and the memory shall have the following characteristics:

A. Storage of all events relating to controls sent to the field code unit along with the associated time and date
B. Storage of all events relating to indications sent from the field code unit along with the associated time and date
C. Storage of all events relating to diagnostics carried out by the field code unit along with the associated time and date
D. Employ non-volatile memory that will not be lost during DC power supply failure
E. Have circular queue memory where data is stored until the memory is completely filled and then the newest data will overwrite the oldest data
F. Be capable of storing events with associated times for a minimum of 72 hours and be expandable by simple addition of memory chips or cards
G. Be capable of being downloaded through the RS-232C port to an external diagnostic computer without interruption of normal operation (i.e. polling response, control delivery, etc.) of the field code unit

H. Be capable of storing a mnemonic reference name for each function (control and indication). This mnemonic shall be programmable by Metra through the diagnostic port.

3.3.2.6 The field code unit memory shall output on demand (either initiated locally or remotely) to a diagnostic laptop computer. Provision shall be made to permit the memory to be output as follows:

A. The entire memory
B. The entire memory starting at a specified date/time, which is input
C. A portion of the memory between two date/time locations, which are input

3.3.2.7 The field code unit memory dump shall not destroy or alter any stored data (i.e. the same data may be requested more than once).

3.3.2.8 The field code unit memory dump shall be able to be suspended by an input command before the dump is completed.

3.3.2.9 The format of the memory printout shall be approved by Metra, and shall be selected to provide quick and easy understanding of the data by using mnemonic labels.

3.3.2.10 When specified, an external event logging system shall also be furnished. The external data logging system shall be complete with all hardware and shall be installed pre-wired on the racks furnished. The portable terminal/printer with carrying case furnished shall be capable of interrogating the data logger and permanently record its data on paper. All information to decode the inputs to relay name/function mnemonics shall be preprogrammed.

3.4 Local Control Panel

3.4.1 When specified, a Local Control Panel for maintainer use shall be provided. General appearance of the Local Control Panel shall be as shown on Figure 1 - "Typical Local Control Panel."

3.4.2 The track plan and all information printed upon the face of the panel shall be applied by a photo-etching process to be approved by Metra. Details are to be drawn in black on a light background.

3.4.3 Track indication units and track block indication units shall be mounted in the etched track plan on the element for which they will indicate. The indication units for the signal, switch and miscellaneous functions shall be mounted in or near their controlling push buttons.

3.4.4 The track plan shall be arranged to orient railroad east toward the right side of

the panel and shall coincide to the physical track layout.

3.4.5 The miniature levers, pushbuttons and light indication units in the control panel shall be of the unit type. The term "Unit Type" being understood as meaning that each of the above units may be completely and easily removed from the control panel without interfering with the operation of any other unit.

A. Push buttons shall be Dialight Corp. Part Number 922-1524-525 and 908 series caps (9081631-1635).
B. Indication units shall be Dialight Corp. Part Number MFS1-B with MF61 Lens, andNFX12H lamp.

3.4.6 The design of the electrical contacts, lamps, etc., in the above units shall be such that any circuit or lamp may be disconnected or removed without disturbing or interfering with other such equipment on an adjacent unit.

3.4.7 All indications on the control panel shall be by means of colored LED's. LED's shall be replaceable from the front of the panel. If an extractor tool is required, the manufacturer shall furnish three extractor tools with each panel.

3.4.8 The following indications and controls are to be provided as part of the Local Control Panel:

A. Trouble Indication
B. Snow Melter Control and Indications (run and fail)
C. Signal Fleet Control and Indication for each fleeted signal
D. Switch Control and Indication
E. Switch Locked Indication
F. Signal Control and Indication for each signal
G. Call On Control and Indication
H. Traffic Direction Indication for opposing traffic on each approach track
I. Panel Light On-Off Switch
J. Track Block Control and Indication for all track circuits
K. Track Occupancy Indication (per track circuit)
L. Approach Indication same as indications to control office
M. Local - Remote Switch
N. Power off and generator on Indications
O. Intrusion Alarm indication

3.4.9 A full size drawing of the panel shall be provided for Metra approval before manufacture. Indication lights, pushbuttons and control levers shall be located as shown on the Metra approved plans.

3.4.10 A toggle switch shall be provided on the face of the panel to enable the transfer of control from the Remote Control and Indication System to the Local Control Panel. The selection lever shall be equipped with a red cover that can be secured in the closed position with a wire seal. When this switch is in local control, the Local Control Panel indications shall be illuminated directly and indications shall continue to be sent to the control office. The switch shall cause the transfer of control outputs from the code system to the Local Control Panel pushbuttons.

3.4.11 Control inputs from the Local Control Panel shall only be enabled when the location is in local control.

3.4.12 A toggle switch shall be mounted on the Local Control Panel for control of the panel lighting energy. When this switch is in the UP position, the control panel indications shall be illuminated. When this switch is in the DOWN position, the control panel indications shall not be illuminated. The operation of this toggle switch shall be effective whether or not the location is controlled from the Local Control Panel. The IA lamp shall be energized independent of this switch.

3.4.13 The back of the panel shall be enclosed in a sheet metal box to protect the electrical contacts and wiring harness. The face panel shall be hinged on the side to provide access to the components and terminations for maintenance without disconnecting or disabling any control or indication function.

3.4.14 The Local Control Panel shall be wired with single conductor, not smaller than No. 22 AWG, 7 strand, insulated 300-volt service wire. The wiring harness shall allow clear access to all levers, pushbuttons and lights.

3.5 Intrusion Alarm

3.5.1 An Intrusion alarm Arm/Bypass switch, door open switches and Sonalert shall be provided. The switch shall be mounted on the rear top center of the Local Control Panel rack. The Sonalert shall be mounted on the rear of the rack below the Local Control Panel.

3.5.2 INTRUSION ALARM LOGIC

3.5.2.1 Inputs Required: All Relay House Doors (usually 2)
A/B Switch (Arm/Bypass)

Outputs Required: Sonalert Audible Beeper
IA Lamp (on the Local Control Panel)
Event Recorder

3.5.2.2 Opening of any door starts the 60-second "pre-alarm" timer and causes the IA

illuminated pushbutton to flash. If the A/B switch is not set to "Bypass" within the 60-second time period, a full alarm is activated (the IA illuminated pushbutton lights steady, the Sonalert sounds, the IAK is sent to the office via the code system, and the event recorder output is de-energized).

3.5.2.3 When the A/B switch is in "Bypass" position the door may be opened and closed at will and the IA illuminated pushbutton is turned off. Switching to "Bypass" initiates the start of a "Reset Timer" that is set for 50 minutes. After the system is bypassed for 50 minutes the IA illuminated pushbutton will flash for a 1-minute "pre-alarm" to indicate a need to push the IA illuminated pushbutton. This reset procedure will restart the "Reset Timer" to begin a new 50-minute cycle and turn off the IA illuminated pushbutton. After the 1-minute "pre-alarm period", if the reset is not done, a full alarm is activated (the Sonalert will sound, the IA illuminated pushbutton will light steady, an IAK will be sent to the office via the code system and the event recorder output is de-energized).

3.5.2.4 When leaving, the A/B switch is set to the "Armed" position. This allows 60 seconds to exit by opening and closing the door or, if the door is open, by just closing the door. When "Armed", and after 60 seconds the door is not closed, a full alarm is activated (the Sonalert will sound, the IA illuminated pushbutton will light steady, an IAK will be sent to the office via the code system and the even recorder output is de-energized).

3.5.2.5 After a full alarm is activated the system must be reset by cycling the A/B switch (A to B to A) or (B to A to B). The Sonalert shall turn off, the IA illuminated pushbutton shall be turned off, the IAK will be reset at the office via the code system and the event recorder output shall be energized. The system will be re-initialized to the state determined by the A/B switch.

4.0 SUBMITTALS

4.1 Catalog cuts, drawings, descriptions, etc. of the Manufacturer's typical current production from which the submittal will be based shall be included with the quotation.

4.2 Within thirty (30) days of award the Manufacturer shall state the clearance required for maintenance of the equipment and what sides of the equipment must be accessible for installation and/or maintenance. If the manufacturer is providing a complete enclosure or housing, the layout must note the clearances or the scale diagram must be complete.

4.3 Within thirty (30) days of award of the contract, the Manufacturer shall provide preliminary calculations showing DC power consumption, nominal and maximum, for power used by the field code units. Final values (-0% +20%) shall be submitted within ninety (90) days of the award.

4.4 An estimate of the mean time between failures for the system shall be furnished within sixty (60) days of the award of the contract. The estimate shall be in hours and be based on the design criteria and field experience. The estimates shall be for both hardware and software, independently and as a system. Basis of the calculation shall be provided.

4.5 The Bidder shall submit within sixty (60) days after the award of the contract, for all equipment supplied, a recommended technical support parts list that includes prices. The prices shall be valid through the term of the Contract.

4.6 The Bidder must identify a source of parts for all components of equipment supplied that are not identified as standard commercially available parts. A current price list including all such components available from the Bidder or from a supplier shall be furnished within sixty (60) days of the award of the contract.

4.7 Detailed shop drawings of the solid-state type CTC field code units are to be furnished within ninety (90) days after the award of the contract and be approved by Metra's Chief Engineering Officer before manufacture begins.

4.8 Final plans shall be produced after incorporating all field changes that were made during installation and testing. Final plans shall not be submitted until all issues regarding design or equipment performance have been resolved. The contractor will first submit an electronic file and hard copy plot of all final plans. Once approved, Metra will electronically sign the electronic files and return them to the contractor. CAD drawings and electronic files of the final plans and five (5) black and white copies shall be delivered. The CAD drawings shall be MicroStation format on CD-Rom per Metra Specification 1040, Signal Engineering CAD Drawings.

4.9 Final plans will also include CAD drawings of all relay/circuit equivalent plans of all program logic used in the software of the field code unit and shall be arranged in a manner that emulates Metra's typical book of plans for an interlocked control point.

4.10 All software for programming and listings for ladder logic or other Metra approved methods shall be furnished in printed form. Source software as well as other needed files shall be provided on disk. Programming shall be arranged in a manner that emulates Metra's typical book of plans for an interlocked control point.

5.0 IDENTIFICATION AND SHIPPING

5.1 Unit(s) shall be plainly marked with manufacturer's references including serial and model numbers.

5.2 The product shall be assembled or packed as to permit convenient handling and to protect against loss or damage during shipment. Loose pieces shall be tightly taped or wired to the unit(s) or shipping pallet or, packed separately but be firmly attached to the product.

5.3 A detailed list of packages and their contents shall be provided for all shipments. One copy will be included with shipment and one copy will be sent directly to Metra's Chief Engineering Officer. Metra Engineering's copy will be mailed not later than the shipping date of the equipment.

5.4 Manufacturer shall notify Metra of the shipping date 48 hours prior to shipment.

6.0 SHIPMENT

6.1 The field code equipment shall be assembled and packed so as to permit convenient handling, and to protect against loss or damage during shipping.

6.2 All assemblies shall be packaged together and in one shipment. Packing slips listing the inventory of the shipment shall be included with the shipment and a copy of the packing slips will be sent to Metra's headquarters at the time of shipment.

7.0 INSPECTION AT SHIPMENT

Metra will inspect the unit(s) after delivery and contact the Manufacturer listing any items not conforming to this Specification. The Manufacturer shall provide a timely schedule to furnish, deliver to destination and install or correct, without charge to Metra, such items. Failure to respond appropriately shall be cause for rejection with return of the rejected unit(s) at the Manufacturer's total expense.

8.0 GUARANTEE

The Manufacturer shall replace (furnish, deliver to destination and install or correct) without charge, any part of material which fails within a period of one (1) year of date of installation from defects of material, design, manufacture and/or workmanship.

9.0 DEMONSTRATION

9.1 If requested prior to purchase, Bidder shall arrange for inspection before one or more of Metra's representatives, of the basic unit to be furnished. Failure of a unit to be equal to or better than the quality herein specified by Metra shall be cause for rejection of bid. Such inspection shall be performed at no cost to Metra within a distance of not more than fifty (50) miles from Metra's

headquarters at 547 West Jackson Boulevard, Chicago, unless otherwise agreed upon by Metra.

9.2 Metra or its Representative reserves the right to inspect all equipment at Manufacturer's plant prior to shipment.

REQUISITION INSTRUCTIONS
FOR
SOLID-STATE TYPE
C.T.C. FIELD CODE UNITS

1. Specify interface for data circuits, data multiplexers or data radio system. (P-2.1.5)

2. Specify codeline based or radio based system. (P-2.1.6)

3. Specify number of trainees. (P-2.4.4.1)

4. Specify relay interface as normal acting or magnetic stick type relays. (P-3.2.1.3)

5. Specify if a laptop diagnostic computer is required. (P-3.3.2.1)

6. Specify if an external event logging system is required. (P-3.3.2.10)

7. Specify if a local control panel is required. (P-3.4.1)

METRA

SIGNAL SPECIFICATION

FOR

RADIO BASED
RAILROAD C.T.C. CODE SYSTEM

SPECIFICATION NO. 0929

March 22, 2013

1.0 SCOPE

1.1 This Specification is for furnishing Solid State type Radio Based Railroad C.T.C. Code System with radio-based facilities for code communication. The equipment furnished on this Specification shall be of the most current design. The material, equipment and workmanship shall be of the highest commercial quality.

1.2 Failure to conform to the highest standards of the industry shall be cause for rejection.

1.3 Metra's Chief Engineering Officer or his duly authorized representative shall be the final authority for deciding as to whether a competitive item conforms to these requirements and complies with the intention of this Specification.

1.4 This Specification is intended to be descriptive, but not restrictive and is solely for the purpose of indicating the type and quality of the article that will meet with the approval of Metra.

1.5 Capacities and dimensions listed herein shall be considered as the bounds of acceptability; variations from values listed will be judged as to their effect and ability to perform the work intended.

1.6 It shall be the responsibility of the Manufacturer to make certain that all systems, parts and components fit and function together properly.

1.7 Where brand, manufacturer or product names are indicated in this Specification, they are included only for the purpose of establishing identification and general descriptions of the item. Wherever such names appear, the term "or Metra approved equivalent" is considered to follow.

1.8 The article/unit submitted under this Specification must be in production and must have had a previous satisfactory in service performance record of at least two years on three Class I railroads. Proof of performance statement(s) shall be provided, upon request, with confirming statement(s) from previous purchaser(s). Failure to provide proof may be cause for rejection.

2.0 SYSTEM DESCRIPTION

2.1 The system to be furnished by this Specification shall consist of ATCS compatible base radio(s) and/or field radio(s) as specified. The ATCS office will communicate to the base radio code station via existing Metra full duplex microwave circuits (4 wire voice grade channel). The base unit(s) will communicate with the field locations via UHF radio using ATCS coordinated frequencies and protocols. Commercial telephone lines will be used as backup from the control office to the field station radio site(s).

2.2 The equipment to be furnished under this Specification shall consist of base radio and field radio systems complete with all racks, protocol converters, power supplies, antennas, interface equipment, and coaxial cables. The systems shall be supplied complete with all equipment preprogrammed to Metra's requirements and each system shall be complete and ready to provide control and indication communication between the control office and either: 1) existing non-vital field equipment or 2) specified field equipment. All modems and back-up systems shall be considered a part of the total system.

3.0 SYSTEM REQUIREMENTS

3.1 The radio code system shall be compliant with ATCS Specification Number 200. Communication shall be linked from the Base Station site to the field locations by 900 MHz UHF radio.

3.2 Messages shall be transmitted in a packetized format that insures correct and error free reception. A CRC (Cyclical Redundancy Check) shall be used as the primary error detection method. Data messages shall be formatted so that one data bit is equal to one control or indication function in the field.

3.3 The Radio portion of the system shall operate in a 'Contention' mode and shall not require continuous polling to update field indications.

"Contention" mode being described as:

> No data is transmitted until a status has changed. When data is received correctly an acknowledgment message is sent back to the transmitting station. If an acknowledgment is not received within a predetermined period of time the message is re-transmitted (retry). The system shall only retry a predetermined number of times after which transmission will cease until the next status change, office interrogation, or control message.

3.4 The system shall provide message throughput of no more than 2 seconds under normal circumstances (i.e., no interference, data collisions, etc.). This time does not include inherent message delays of the older office stepper type DC code systems; when that type of office control system is used.

Throughput is the duration required from the start of a message transmission (activation of control message start function by control operator) to message reception (delivery of function output to field application relay).

3.5 The output of the radio code system field unit shall be an RS-232 or RS-422 serial communications port that can communicate directly with a non-vital field interface unit. This communication shall be in the ATCS format.

3.6 The system shall provide a means to verify operational status of each field location. If a field location does not report an indication message for a defined period of time, the code system office unit shall transmit an interrogation message addressed to that location. The field location will respond with an acknowledgment message. If the field location does not respond within a predetermined number of retries the system shall log an alarm and the office equipment shall initiate the backup configuration for the affected location.

The system log shall identify the location affected, the time, date, and the result of the attempt to execute the backup configuration.

3.7 Dial backup switching shall be incorporated at all locations - field control points and office. The system shall be capable of switching around a communication failure between the office and the field locations via commercial leased telephone lines. In the event of a single control point failing to respond, the system shall provide switching to commercial telephone lines to enable direct line communications between that failed control point and the office.

3.8 The Base Station Controller shall be able to identify and redirect only messages to or from control points assigned under its control.

The system shall provide for user creation of routing tables, new Base Station or field location addresses, or modification of existing tables, preferably through the diagnostic port of each type of equipment.

3.9 A diagnostic port (RS232) shall be provided to access a system data logging device and user maintenance interface to the code equipment.

3.10 Diagnostic port data log format shall provide as a minimum:

A. Time and Date stamped control and indication messages
B. Time and Date stamped system alarms and error messages

3.11 Upon power-up of the Base Station, a diagnostic self-test shall be performed, alerting the technician of any diagnostic failures.

A diagnostic metering panel shall be supplied for maintenance by a qualified technician.

In addition, provisions shall be made for a serial data port for diagnostics and maintenance. Any software required to provide maintenance for the Base Station shall be provided as part of this contract.

3.12 Upon power-up of the Field Radio Units, a diagnostics self-test shall be performed, alerting the technician of any diagnostic failures.
Provisions shall be included for serial port diagnostics and maintenance. Any

software required to provide maintenance of the Field Radio Unit shall be provided as part of this contract.

4.0 BASE STATION RADIO EQUIPMENT

4.1 Base Station(s), antenna(s), coax, and miscellaneous items shall be furnished as required. The equipment shall interface with Metra's microwave equipment and provide the RF path to the remote units as described in this specification.

The following list of Metra approved major components shall be provided by the Contractor. All items shall be as listed below unless a substitute is approved by Metra.

MANUFACTURER	MODEL NO.	DESCRIPTION
Safetran	Q422E-2	Duplexer
Motorola	MTR 2000	Radio
Safetran	A53444	Base Control Module
Motorola	T5829A	Oscillator
UDS	V.3600	Modem
Polyphaser	TSX-NFF-1	ATCS Surge Protector
Safetran	SP-24-1B	Battery Line Protector
NRS	24V	Rectifier

As minimum, the following general requirements shall be provided:

4.2 Cabinet

Standard 19" (48.26 cm) rack-type mounting facilities shall be provided for mounting the equipment chassis assemblies. The equipment chassis subassemblies shall be easily removable without the need for clipping or soldering. All station components shall be properly ventilated without the need for an electric fan or additional devices to force air circulation.

4.3 Power Supply

The station shall operate from a 28 volt DC, positive ground system. Any DC-to-DC conversion or DC-to-AC inversion shall be supplied by the contractor. Power supply design shall be such that there will be no performance degradation when the DC line input varies from -20% to +10%.

4.4 Wire Line Interface (Base Station to Office Communication)

The input to the Base Station shall be 4 wire full duplex on 3002 unconditioned lines.

Data protocol shall be HDLC Balanced-mode Protocol per ATCS Specification 200 Appendix 'K' or HDLC polled-mode protocol per ATCS Specification 200, Appendix 'J'.

The Base Station shall be able to accept standard baud rates up to 9600 baud.

The bit error rate shall be set at 10-6 at 9600 bps with 26 db S/N using 3002 unconditioned lines.

4.5 Performance Specification, RF

The RF baud rate shall be 4800 baud.

Error correction shall be Reed-Solomon (16, 12) Block coding with Forward Error Correction and Cyclical Redundancy Check, per ATCS Specification 200, Appendix 'L'.

Data modulation shall be GMSK, direct FM.

Channel access control shall use data "Busy-Bit" protocol per ATCS Specification 200, Appendix 'L.'

4.6 Frequency Stability

The equipment shall employ frequency synthesis to produce both transmitter and receiver frequencies.

The transmitter and receiver oscillator modules shall maintain frequency stability within 1.5 ppm of the assigned frequency over an ambient temperature range of -30° C to +60° C (-22° F to +140° F). The oscillators shall maintain frequency stability within +/-0.00015% of the assigned center frequency with primary power supply voltage variation from -20% to +10%.

4.7 Environment

The Base Station shall be designed to operate over a range of ambient temperatures from -30° C to +60° C (-22° F to +140° F), with relative humidity between 0% and 95% at 40° C (104° F) non-condensing. The equipment shall be housed in suitable enclosures to protect from dust, foreign matter, and inadvertent dripping or splashing of water and other liquids. The equipment and installation shall meet all local, state, and national electric codes for safety.

5.0 BASE RADIO TRANSMITTER

The transmitter shall fully comply with the EIA Standard RS-152B and applicable FCC type acceptance Rules and Regulations. The unit shall employ

only solid-state circuitry utilizing high quality, long-life transistors (no tubes shall be used).

5.1 Power Control and Protection

The transmitter shall employ power control and protection circuitry capable of automatically adjusting the operating power input of the transmitter to a level sufficient to allow transmission without exceeding safe operating conditions for the power amplifier transistors. Return to rated power output shall occur when any condition causing shutback is removed. The circuitry shall consist of the following:

A. Current Limit circuitry that monitors and limits the maximum current drawn by the final power amplifier transistors
B. Drive Limit circuitry that limits the maximum voltage available to the exciter, which drives the power amplifier
C. Temperature Sense and Shutback circuitry that monitors the temperature of the final power amplifier transistors
D. VSWR Detection circuitry consisting of a forward power sense circuit that maintains a constant level forward output power and reflected power-sensing circuitry which cuts back the power output if an excessive VSWR is encountered

The transmitter shall be equipped with an instantaneous power control such that the power output will not vary more than 10% with increasing transmitter supply voltage from EIA nominal to +20%.

5.2 Emission

The transmitter emission shall be designated either 10K0F1D, 11K0F2D, or 11K0F3E as defined in FCC Rules and Regulations and shall comply with all EIA Standards and FCC Rules and Regulations.

5.3 Transmitter Sideband Spectrum

The transmitter sideband spectrum shall be at least 80 dB down at +/- 12.5 kHz.

5.4 RF Power Output

The transmitter shall be continuously variable with the power delivered to the output terminals of the transmitter capable of being set from 5 watts to 0.1 watts when the output terminals are connected to a nominal output impedance of 50 ohms, in accordance with EIA Standard RS-152B, Sections 2 and 3.

5.5 Frequency

The transmitter frequency shall utilize one of the standard ATCS frequency pairs between 935 and 941 mHz (exact frequency to be determined later).

5.6 Spurious & Harmonic

All spurious and harmonic responses shall be attenuated at -65dBc in accordance with EIA Standard RS-152B, Section 4.

6.0 BASE RADIO RECEIVER

The receiver shall be of the double-conversion superheterodyne type and shall employ only solid-state circuitry for long life and reliability.

Major selectivity elements shall precede the major gain-determining elements to minimize effects from signals on other channels. The major portion of the receiver rejection capabilities shall be controlled by fixed-tuned monolithic crystal filters in the IF section which collectively exhibit a sharp-skirted bandpass characteristic. As minimum, the requirements are as follows:

6.1 Usable Sensitivity (EIA-SINAD)

Usable sensitivity shall be at least 0.25 microvolt for 12dB SINAD at -110 dBm in accordance with EIA Standard RS-204B, Section 4.

6.2 Spurious Response Attenuation

All spurious responses shall be attenuated at least 100 dB below the on-frequency signal level that produced 20 dB of noise quieting in accordance with EIA Standard RS-204B, Section 12.

6.3 Intermodulation Response Rejection

Intermodulation response rejection shall be at 75 dB minimum in accordance per EIA specification.

6.4 Selectivity

The receiver shall have a usable selectivity of 80 dB at +/- 12.5 KHZ in accordance with EIA Standard RS-204B.

6.5 Frequency

The receiver shall be frequency synthesized and shall utilize one of the standard ATCS frequency pairs between 896 and 902 MHZ (exact frequency to

be determined later).

6.6 Diagnostics and Servicing

Upon power-up of the Base Station, a diagnostic self-test shall be performed, alerting the technician of any diagnostic failures.

A diagnostic metering panel shall be supplied for maintenance by a qualified technician.

In addition, provisions shall be made for a serial data port for diagnostics and maintenance. Any software required providing maintenance for the Base Station shall be provided as part of this contract.

7.0 FIELD RADIO EQUIPMENT

Field remote radio(s), antenna(s), coax, and hardware shall be furnished as required. This equipment shall work in conjunction with the Base Station as described in Sections 4.0, 5.0, and 6.0. The following general requirements shall be provided as a minimum.

7.1 Modules

The approved transceiver (radio unit), the ATCS modem interface, and any DC converters required for proper operation shall be provided as separate modules and be rack mountable in a standard 19" rack.

7.2 Power Supply

All equipment supplied for these locations shall be designed for proper operation at 12 volts DC, isolated ground.

7.3 Wire Line Interface

An ATCS modem interface shall be supplied as part of the field remote radio to interface the radio transceiver to the Field Application Units as described in this Specification. The Manufacturer must guarantee and supply all equipment needed for proper interface of these two units.

7.4 Performance Specifications, RF

The RF Baud rate shall be 4800 baud.

Error correction shall be Reed-Solomon (16, 12) Block Coding with Forward Error Correction and Cyclical Redundancy Check, per ATCS Specification 200, Appendix 'L'.

Data Modulation shall be GMSK, direct FM.

Channel access control shall use Data "Busy-Bit" protocol as per ATCS Specification 200, Appendix 'L'.

7.5 Frequency Stability

The equipment shall employ frequency synthesis to produce both transmitter and receiver frequencies.

The transmitter and receiver oscillator modules shall maintain frequency stability within 1.5 ppm +/- 0.00015% of the assigned frequency over an ambient temperature range of -30° C to +60° C (-22° F to 140° F). The oscillator shall maintain frequency stability within +/- 0.00015% of the assigned center frequency with primary power supply voltage variation from -20% to +10%.

8.0 FIELD TRANSMITTERS

The transmitter shall fully comply with EIA Standard RS-152B and applicable FCC type acceptance Rules and Regulations. The unit shall employ only solid-state circuitry utilizing high quality, long-life transistors (no tubes shall be used).

8.1 Power Control and Protection

The transmitter shall employ power control and protection circuitry capable of automatically adjusting the operating power input of the transmitter to a level sufficient to allow transmission without exceeding safe operating conditions for the power amplifier transistors. Return to rated power output shall occur when any condition causing shutback is removed. The circuitry shall consist of the following:

A. Current Limit circuitry that monitors and limits the maximum current drawn by the final power amplifier transistors
B. Drive Limit circuitry that limits the maximum voltage available to the exciter, which drives the power amplifier
C. Temperature Sense and Shutback circuitry that monitors the temperature of the final power amplifier transistors
D. VSWR Detection circuitry consisting of a forward power sense circuit which maintains a constant level forward output power and reflected power sensing circuitry which cuts back the power output if an excessive VSWR is encountered

The transmitter shall be equipped with an instantaneous power control such that the power output will not vary more than 10% with increasing transmitter supply

voltage from EIA nominal to +20%.

8.2 Emission

The transmitter emission shall be designated either 10K0F1D or 11K0F3E as defined in FCC Rules and Regulations and shall comply with all EIA Standards and FCC Rules and Regulations.

8.3 Transmitter Sideband Spectrum

The transmitter sideband spectrum shall be at least 80 dB down at +/-12.5 kHz.

8.4 Conducted Spurious and Harmonic Emissions

Conducted spurious emissions shall be attenuated below the maximum level of emissions of the carrier frequency by at least -65 dBc in accordance with EIA Standard RS-152B, Section 4.

8.5 FM Noise and Residual Hum

FM noise and residual hum shall be at least 40 dB below 60% maximum deviation at 1,000 Hz test tone as measured through a standard 6 dB per octave de-emphasis network.

8.6 Frequency

The transmitter shall utilize one of the standard ATCS frequency pairs in conjunction with the Base Station as described in this Specification.

9.0 FIELD RECEIVERS

The receiver shall be of the double-conversion superheterodyne type and shall employ only solid-state circuitry for long life and reliability.

Major selectivity elements shall precede the major gain determining elements to minimize effects from signals on other channels. The major portion of the receiver rejection capabilities shall be controlled by fixed-tuned monolithic crystal filters in the IF section which collectively exhibit a sharp-skirted band pass characteristic. As minimum, the requirements are as follows:

9.1 Usable Sensitivity (EIA-SINAD)

Usable sensitivity shall be at least 0.30 microvolt for a 12 dB, SINAD at -110 dBm, in accordance with EIA Standard RS204B, Section 4.

9.2 Spurious Response Attenuation

All spurious responses shall be attenuated at least 85 dB below the on-frequency signal level that produced 20 dB of noise quieting in accordance with EIA Standard RS204B, Section 12.

9.3 Selectivity

The receiver shall have a usable selectivity of 65 dB minimum at +/- 12.5 kHz and -80 dB at +/- 25 kHz in accordance with EIA Standard RS-204B.

9.4 Frequency

The receiver shall be frequency synthesized and shall work in conjunction with the ATCS frequency pairs that will be determined. The Field Radio Unit shall be capable of 99 channels.

9.5 Diagnostics and Servicing

Upon power-up of the Field Radio Units, a diagnostics self-test shall be performed, alerting the technician of any diagnostic failures.

Provisions shall be included for serial port diagnostics and maintenance. Any software required to provide maintenance of the Field Radio Unit shall be provided as part of this contract.

9.6 Environment

The Field Radio Units shall be designed, as minimum, for the following conditions:

Storage Temperature	-55^{o} C to +85^{o} C
Operating Temperature	-30^{o} C to +60^{o} C
Storage and Operating Humidity	0% to 95%
Vibration	(5 to 10 Hz) 7.6 mm pk-pk
(10 to 50 Hz)	1.5 g pk
(50 to 100 Hz)	1.5 g pk
(100 to 200 Hz)	1.5 g pk
Abrasive	Sand and Dust Resistant

10.0 ANTENNA, COAX AND HARDWARE

The following list of Metra approved items shall be provided by the Contractor. All items shall be as listed below unless a substitute is approved by Metra.

Manufacturer	Model No.	Description
CUSHCRAFT	PC8910N	YAGI ANTENNA
ANDREW	LDF4P-50A-42	824-960 MHZ, 1/2" FOAM HELIAX, CONTINUOUS ON ONE SPOOL
ANDREW	L4TNM-PSA	"N" PLUG (MALE)
ANDREW	L4TNF-PSA	"N" JACK (FEMALE)
ANDREW	43211A	1/2" HANGER
ANDREW	31769-1	HARDWARE KIT
ANDREW	204989-1	GROUNDING KIT (1/2")
ANDREW	12395-1	WRAPLOCK
CUSHCRAFT	SMK	SIDE MOUNT KIT
CUSHCRAFT	LAC-4N	COAXIAL LIGHTNING ARRESTER

11.0 INTERFACES

11.1 Code Line Interface

All control machine interface equipment, protocol converters or communications switching processors shall operate from 12 volts DC.

11.2 Wire Line Interface (Base Station to Office)

The input to the Base Station shall be 4 wire full duplex on 3002 unconditioned lines. Data protocol shall be HDLC Balanced-mode Protocol per ATCS Specification 200 Appendix 'K" or HDLC polled-mode protocol per ATCS Specification 200, Appendix 'J'.

The Base Station shall be able to accept standard baud rates up to 9600 baud. The bit error rate shall be set at 10^{-6} at 9600 bps with 26 db S/N using 3002 unconditioned lines.

11.3 Wire Line Interface (Field Radio to Field Code Unit)

The Manufacturer must guarantee and supply all equipment needed for proper interface of these two units.

12.0 DOCUMENTATION

12.1 Hardware Documentation

Documentation for the hardware supplied with the system shall include, but not be limited to, the following:

A. One copy of equipment installation, operation, and maintenance manuals per location
B. Documentation showing detailed interconnections between various modules, racks, panel and other assemblies. Information shall include descriptions of individual control and data lines that are part of these interconnections and identify their particular location in connectors.
C. Documentation showing, describing and identifying control and data lines of all internal buses connecting individual circuit board modules together
D. Documentation showing and identifying the placement of individual circuit board modules in each assembly of the system
E. Documentation complete enough to allow troubleshooting of the system down to the circuit board module level. Documentation shall include a description of how each circuit board module operates and how to determine whether or not it is functioning properly.

12.2 Software Documentation

Documentation for the software supplied with the system shall include, but not be limited to, the following:

One copy of appropriate system manuals containing information necessary for proper support of system software including instructions describing how modifications to user changeable data and logic are to be performed.

12.3 Any other documentation deemed necessary to understand system software including block diagrams, logic flow charts, instructions, etc.

13.0 TRAINING

13.1 The Manufacturer shall provide a maintenance and service training course that allows maintenance to be performed down to at least the board level. This includes basic troubleshooting by the maintainer to make the unit operational and more technical content for technicians. A preliminary descriptive outline shall be provided prior to the training.

13.2 The Manufacturer shall provide a complete set of technical manuals, plans and other documents required for training each trainee.

13.3 A copy of the Course Outline and other training materials shall be provided two months prior to the actual training for Metra approval and comments.

The training Course Outline shall include:

A. Course objectives and the method for evaluating when the objectives have been met
B. A breakdown, in the order to be taught, of the subjects to be covered
C. The anticipated hands-on experience which will be required and the plan for training on the actual equipment
D. The approximate time to be spent on each subject

14.0 INSTALLATION SUPPORT

The Manufacturer shall assist during installation and cutover of the systems as specified.

15.0 SUBMITTALS

15.1 Catalog cuts, descriptions, etc. of the Manufacturer's typical current production from which the submittal will be based shall be included with the quotation.

15.2 A full set of detailed system configuration and circuit drawings are to be furnished ninety (90) days after the award of the contract, and be approved by the Metra Chief Engineering Officer before manufacture begins.

16.0 SHIPMENT

16.1 The field code equipment shall be assembled and packed so as to permit convenient handling, and to protect against loss or damage during shipping.

16.2 All assemblies shall be packaged together and in one shipment. Packing slips listing the inventory of the shipment shall be included with the shipment and a copy of the packing slips will be sent to Metra's headquarters at the time of shipment.

16.3 Metra will inspect the unit(s) after delivery and contact the Manufacturer listing any items not conforming to this Specification. The Manufacturer shall provide a timely schedule to furnish, deliver to destination and install or correct, without charge to Metra, such items. Failure to respond appropriately shall be cause for rejection with return of the rejected unit(s) at the Manufacturer's total expense.

16.4 Manufacturer shall notify Metra of shipping date 48 hours prior to shipment.

17.0 GUARANTEE

The Manufacturer shall replace (furnish, deliver to destination and install or correct) without charge, any part of material which fails within a period of one (1) year of date of installation from defects of material, design, manufacture and/or workmanship.

18.0 DEMONSTRATION

18.1 If requested prior to purchase, Bidder shall arrange for inspection before one or more of Metra's representatives, of the basic unit to be furnished. Failure of a unit to be equal to or better than the quality herein specified by Metra shall be cause for rejection of bid. Such inspection shall be performed at no cost to Metra within a distance of not more than fifty (50) miles from Metra's headquarters at 547 West Jackson Boulevard, Chicago, unless otherwise agreed upon by Metra.

18.2 Metra or its Representative reserves the right to inspect all equipment at Manufacturer’s plant prior to shipment.

REQUISITION INSTRUCTIONS
FOR
RADIO BASED RAILROAD C.T.C. CODE SYSTEM

1. Specify if base radios, field radios or both are required. (P-2.1)

2. Specify frequency of base radio transmitter. (P-5.5)

3. Specify frequency of base radio receiver. (P-6.5)

4. Specify frequency of field transmitter. (P-8.6)

5. Specify number of trainees. (P-13.2)

METRA

SPECIFICATION

FOR

SIGNAL ENGINEERING CAD DRAWINGS

SPECIFICATION NO. 1040

April 12, 2011

1.0 SCOPE

1.1 The Metra Signal Engineering Computer Aided Drafting (CAD) Specification defines the CAD set up and deliverables required for all Signal Engineering projects.

1.2 This Specification provides an explanation of the format to be used in preparing project design/as-built files. Any deviation from these CAD requirements and standards shall require written approval from the Director of Metra Signal Engineering.

2.0 GENERAL

2.1 This Specification is based on Metra's CAD System and its software design. Consultant/Manufacturer CAD files shall be produced on a CAD system that shall be fully compatible with Metra's workstations running Bentley System's Microstation version 8.1 software operating in V7 workmode.

2.2 The CAD files shall be provided to Metra in Microstation V7 design file format. Files should be compressed using Microstation's "Compress Design" command prior to delivery. Files may be delivered to Metra on a CD or a USB flash drive.

A printed list of contents shall also be required.

3.0 CREATING DESIGN FILES

All design files will be created as "B" sized drawings. If there is a need to produce other than "B" size files, Metra shall be contacted and the appropriate seed file and reference border will be furnished as needed.

A Compact Disc is included as a part of this Specification. It contains Metra's seed file, reference border file, cell library and color table. The files contained on this disc shall not be altered.

Files provided by Metra:

sigbseed.dgn - This is the seed file to be used for creating all Metra design files. Copying and modifying of previously submitted work will not be allowed. The "SAVE SETTINGS" command shall not be used in any design file. This seed file establishes the settings and parameters as required by this specification.

sigbbord.dgn - Reference border for "B" size prints. This file shall not be used to create a design file. It is referenced to the design file and shall not be copied onto the design file. The reference attachments settings shall not

"Save Full Path" or "Locate" the reference border file. If the border file is kept in the working directory, it will be referenced automatically. You may modify your workspace configuration (MS-RFDIR). No other reference files shall be used.

MetraV8.cel - Metra's Cell Library - The library is updated approximately every six months. Only the most current cell library shall be used.

metraclr.tbl - Color Table - It is the same as Microstation's default (color.tbl) color table. The default color table is attached to the seed file.

4.0 WORKING UNITS

The working units as established in the seed file shall not be altered. These settings are:

Unit Names:	Master Unit:	Meter	Label:	MU
	Sub Unit:	Millimeter	Label:	SU
Resolution:	254000 SU per Meter			
	Pos Units per SU			
Working Areas:	Total:	35461414 Kilometers		
	Solids:	16.909320 Kilometers		

Enlarged view drawings shall be drawn at 1" = 20' scale.

5.0 GRID SETTINGS

The grid has been set as follows:

Grid Master:	0.1250
Grid Reference:	8
Grid Config:	Ortho
Grid Aspect:	1.0000

6.0 LOCK TOGGLES

The grid lock shall be ON whenever possible.

The unit lock shall be ON for all element placement. Unit lock distance (UR) has been set in the seed file for 4 steps between grid marks.

The snap lock shall be ON. The snap divisor (KY) has been set at 2.

The remaining locks have been toggled OFF.

7.0 GLOBAL ORIGIN

The global origin is the point on the design file where the coordinates 0.0 are assigned with respect to the design plane. The location of the global origin in the seed file has been set to the equivalent of the lower left corner of the finished print.

8.0 ELEMENT ATTRIBUTES

The following element attributes shall be adhered to.

8.1 Level

LV = 1	All element placement.

8.2 Color

CO = 0	The color white shall be used except as noted.
CO = 3	Red - OUT circuit changes - (active fill color 3).
CO = 4	Yellow - IN circuit changes - (active fill color 244).

8.3 Style

LC = 0	Main drawing lines, symbols and all text.
LC = 1	Dotted line (when needed).
LC = 7	Multiple contact lines and centerlines.

8.4 Weight

WT = 1	All element placement.

8.5 Class

Primary	All element placement.

9.0 TEXT

9.1 Text Font

Engineering font #3 shall be used. All text will be in upper case letters.

9.2 Text Size

The following sizes shall be used for text:

General Text, Notes, Equipment Description and line tagging.

Height	0.0750
Width	0.0750
Line Spacing	0.0375
Line Length	255
Interchar Spacing	0.0000
Slant	0.0

Components names, heading and title block information.

Height	0.1000
Width	0.1000
Line Spacing	0.0500
Line Length	255
Interchar Spacing	0.0000
Slant	0.0

9.3 Text Placement

All text shall be placed with the unit lock ON.
Wire tag text shall be centered 2 units above wires.
Line tags shall be aligned using left justification.
"Enter data fields" shall be used where provided.

9.4 Text Justification

The preferred justification settings are:

TXJ = LC, CC, or RC
TNJ = LC, CC, or RC

10.0 CELLS

Metra's most current cell library shall be used for all cells. Design files using cells from an out-of-date cell library will be rejected.

If a cell is proposed to be used and is not contained in Metra's Cell Library, it must be sent to Metra for review. Written approval from Metra must be received before the cell is used in a design file. All new cells must follow the existing Cell Library features that are contained on the compact disc provided by Metra.

11.0 VIEW ATTRIBUTES

The following view attributes shall be adhered to.

VIEW ATTRIBUTES		
	VIEW 5	**VIEW 1**
ACS TRIAD	OFF	OFF
BACKGROUND	OFF	OFF
CAMERA (dimmed)	N/A	N/A
CLIP BACK (dimmed)	N/A	N/A
CLIP FRONT (dimmed)	N/A	N/A
CLIP VOLUME	ON	ON
CONSTRUCTIONS	OFF	ON
DIMENSIONS	ON	ON
DYNAMICS (3D)	ON	ON
DATA FIELDS	OFF	ON
DISPLAYSET	OFF	OFF
FAST CELLS	OFF	OFF
FAST CURVES	OFF	OFF
FAST FONT	OFF	OFF
FILL	ON	ON
GRID	OFF	ON
LEVEL SYMBOLOGY	OFF	OFF
LINE STYLES	ON	ON
LINE WEIGHTS	ON	ON
PATTERNS	ON	ON
TAGS	ON	ON
TEXT	ON	ON
TEXT NODES	OFF	OFF

12.0 FILE NAMING CONVENTION

12.1 The filename assignment for a drawing shall use the following format:

sub1234.567
sub---------- Subdistrict Abbreviation (from Section 12.2)
1234---------- Mile Post (decimal point implied - M.P. 12.34)
.567---------- Sheet Number (.001 will be first page)

EXAMPLE: jol2647.003
jol---------- Joliet Subdistrict - Rock Island District
2647-------- Mile Post 26.47
.003-- Third Sheet for location

12.2 List of Subdistrict Abbreviations:

Burlington Northern
- aur - Aurora Subdivision

Chicago South Shore and South Bend
- ssl - South Shore Line

Illinois Center
- her - Heritaqe Corridor

Metra Electric District
- bis - Blue Island Subdistrict
- scs - South Chicago Subdistrict
- ups - University Park Subdistrict

Milwaukee District
- elg - Elgin Subdivision
- fox - Fox Lake Subdivision (including C&M Sub.)

Rock Island District
- bev - Beverly Subdistrict
- jol - Joliet Subdistrict
- sws - Southwest Subdistrict

Union Pacific
- gen - Geneva Subdivision
- har - Harvard Subdivision
- ken - Kenosha Subdivision
- mch - McHenry Subdivision

Wisconsin Central
- ncs - North Central Service

13.0 TITLE BLOCK INFORMATION

MAIN TITLE: (east end of line) TO (west end of line)
specific location description
page description

EXAMPLE: CHICAGO TO JOLIET
264-265 SIGNAL LOCATION
TRACK TWO ELECTROCODE

REFERENCE: (First Print Number) THRU (Last Sheet Number)

EXAMPLE: 26.47 SH. 1 THRU SH. 4

DATE: Estimated date for delivery of plans (use the same on all pages).

DESIGNED: Company name or logo is to be used - Designer's initials are optional. It must fit space allotted.

DRAWN: Company name or logo is to be used - CAD operator's initials are optional. It must fit space allotted.

CHECKED: Will be filled in by Metra.

APPROVED: Will be filled in by Metra.

DISTRICT: District abbreviation (from Section 13.1).

PRINT NUMBER: (mile post) SH. (sheet number)

EXAMPLE: 26.47 SH. 3

13.1 List of Districts:

Metra Electric District
- ME/BI - Blue Island Subdistrict
- ME/SC - South Chicago Subdistrict
- ME - University Park Subdistrict

Milwaukee District
- MW/W - Elgin Subdivision
- MW/N - Fox Lake Subdivision (including C&M Sub.)

Rock Island District
- RI/S - Beverly Subdistrict
- RI - Joliet Subdistrict
- SWS - Southwest Subdistrict

14.0 PLOTTING

14.1 View 5 is Metra Signal Engineering's standard plotting view. All finished plots shall be 11" x 17" unless otherwise requested by Metra. All plots shall be clear and legible. Drawings shall be supplied per project specifications.

14.2 The margins around the "b" size design border will be as follows:

1.25"- Left
0.25" - Right
0.25" - Top
0.25" - Bottom

14.3 Line widths will be plotted as:

WT=0 - .025mm
WT=1 - .175mm
WT=2 - .350mm
WT=3 - .525mm
WT=4 - .700mm
WT=5 - .875mm
WT=6 - 1.050mm
WT=7 - 1.225mm
WT=8 - 1.400mm
WT=9 - 1.575mm

Higher weights are not used by Metra.

14.4 Colors will be plotted as:

CO=0 - black
CO=1 - blue
CO=3 - red
CO=4 - yellow

All other colors shall be plotted as black.

14.5 Construction prints shall use the RED=OUT / YELLOW=IN color scheme. If a color plotter is used, the circuit changes (red and yellow) must be clearly identifiable and easy to read. Special pen tables or plotting files shall not be permitted without prior written approval.

14.6 Ability for Metra to plot files.

All files will be plotted using view 5 attributes and either Microstation's "PLOT" command or Interplot software. Data fields, grid, and text nodes will not be

plotted. Metra has developed and uses plot settings files to enable the highlighting of yellow elements. Copies of the Metra Signal Engineering plot settings files may be requested but will not be adapted by Metra for external use.

15.0 CHECKING AND APPROVAL OF PLANS

All construction and final plans will be reviewed by Metra to ensure they conform to all Metra Signal Engineering drawing standards. Metra may request a sample of the CAD files during the early stages of a project for review.

METRA

SIGNAL SPECIFICATION

FOR

NATURAL GAS FIRED
HOT AIR SNOW MELTERS

SPECIFICATION 1198

April 12, 2011

1.0 SCOPE

1.1 This Specification is for furnishing gas fired hot air snow melter. The unit(s) furnished under this Specification shall be of the most current design. The material, equipment and workmanship shall be of the highest quality.

1.2 Failure to conform to the highest standards of the industry shall be cause for rejection.

1.3 Metra's Chief Engineering Officer or his duly authorized representative shall be the final authority for deciding as to whether a competitive item conforms to these requirements and complies with the intention of this Specification.

1.4 This Specification is intended to be descriptive, but not restrictive and is solely for the purpose of indicating the type and quality of articles that will meet the approval of Metra.

1.5 Capacities and dimensions listed herein shall be interpreted as minimum; variation from the values listed will be judged as to their effect and ability to perform the work intended.

1.6 It shall be the responsibility of the Manufacturer to make certain that all parts and components fit and function together properly.

1.7 Where brand, manufacturer or product names are indicated in this Specification, they are included only for the purpose of establishing identification and general descriptions of the item. Wherever such names appear, the term “or Metra approved equivalent” is considered to follow.

1.8 The article(s)/unit(s) submitted under this Specification must be in production and must have had a previous, satisfactory in-service performance record of at least two years on three Class I railroads. Proof of performance statement(s) shall be provided, upon request, with confirming statement(s) from previous purchaser(s). Failure to provide proof may be cause for rejection.

2.0 GENERAL

2.1 Each hot air snow melter shall meet the requirements established by the American Railway Engineering and Maintenance-of-Way Association (AREMA) Communications & Signals Manual of Recommended Practices, Part 12.5.22 where the requirements of the AREMA specification do not conflict with any requirements specified in this section.

2.2 The snow melters shall be low profile models, housed in properly thermally insulated metal enclosures.

2.3 The electrical and mechanical equipment shall be totally enclosed, watertight and vandal-resistant.

2.4 The snow melters shall be capable of delivering sufficient heated air so as to prevent snow and ice from interfering with normal switch point movement under unusually severe weather conditions.

2.5 The snow melter shall have a minimum 420,000 BTU output and the airflow should be at least 2,000 CFM measured with the ductwork connected to melter (at measured nozzle point).

2.6 The snow melter shall have a 2 HP motor at 240V AC, 1 PH, 60 Hz power. The control voltage shall be 24V AC.

2.7 Each snow melter shall be located 10 feet from the outside of the main track, as close as possible to the appropriate switch.

2.8 A junction box shall be provided for the purpose of terminating control and indication wiring between the snow melter and signal house. The junction box shall be Alstom's, Catalog No. A91-0230, or Metra approved equivalent.

2.9 Metallic flexible conduits shall be provided as required, Type HC "Sealtite" as manufactured by American Brass Company or approved equivalent.

2.10 Each snow melter shall meet proper Metra clearance in both single and multi-track layouts.

2.11 The hot air snow melters shall be Model 951 Low Profile, as manufactured by Railway Equipment Co. or Metra approved equivalent.

3.0 SNOW MELTER CONTROLS AND INDICATIONS

3.1 Each snow melter shall be self-contained, totally independent and complete with all operating, control and protective equipment necessary for Metra's designed operation. All equipment shall be properly sized and designed for this application.

3.2 The snow melter controls shall include but not be limited to the following:

A. Remote-off-local selector switch
B. Adjustable air temperature sensor
C. Adjustable rail temperature sensor
D. Adjustable start-up delay timer
E. Adjustable run timer
F. Adjustable snow detector timer
G. Select burner operation: High/Low/Auto

3.3 The snow melter indications shall include but not be limited to the following:

A. Mode of control and snow melter on
B. Air and rail temperature limit
C. Moisture detection
D. Flame on
E. Melter on
F. Gas valve on
G. Ignition on
H. Fault detection
I. Motor current and voltage

LED's shall be used to display all indications.

The fault detection and snow melter on shall each provide a dry contact closure rated at 24V DC when these indications are activated.

3.4 The snow melter shall also have the following features:

A. Circuit breaker
B. Motor starter and overload protection
C. Heat modulating timer with mode selector for full or partial heat
D. Electric solenoid gas valve
E. Gas shut-off valve
F. Low pressure gas regulators, internal and external
G. Remote and local snow detectors
H. Remote fault reset
I. Audible tone before start-up
J. "Y" strainers
K. Flex pipe to match inlet size

4.0 DUCT WORK

4.1 Ducting for each heater shall consist of a tie duct, two track ducts, and two nozzles.

4.2 The tie duct shall be thermally insulated between the melter and the trackside of the switch so as to retain heat. This shall be accomplished by providing a flexible offset duct that will insulate the melter from the duct and also provide a means of compensating for any misalignment between the duct and melter.

4.3 The tie duct shall be electrically insulated between rails and between tracks where the duct crosses another track in going from the melter to the switch.

The tie duct shall also be electrically insulated between the melter and trackside of the switch.

4.4 The layout of the snow melters shall be as shown in figures 1 and 2. The melter shall always be installed opposite the switch machine. Snow melters shall not be installed between tracks. When switch machines are installed on the field side of a track in two track territory, the snow melter shall be installed to the field side of the other track and duct work and tie ducts installed under both tracks to bring hot air to the switch points.

4.5 The track ducts shall provide hot air to the tie cribs and along the switch points. The track ducts shall be galvanized or otherwise corrosion resistant, and designed so as not to interfere with the free movement of the switch points. Heat resistant foam blocks of sufficient dimension shall be provided to block off each crib eye beneath the stock rail so as to lessen hot air loss and the invasion of cold air and snow.

4.6 The nozzles shall direct hot air from the tie duct down the switch points. Snow deflectors will be provided for mounting behind point nozzles so as to resist longitudinal wind or train driven snow driving into the points.

4.7 All ductwork hardware such as bolts, washers, nuts, etc., shall be suitably protected from corrosion with a substantial plating of cadmium, nickel, zinc or equivalent materials.

5.0 LOCAL PANEL CONTROLS AND INDICATIONS

5.1 A control and indication panel shall be installed inside the signal house and shall include a programmable logic controller (PLC) as shown in the Snow Melter Drawing. The PLC shall be capable of operating over a temperature range of -40°C to +60°C (-40°F to +140°F). A rack or wall mounted NEMA 4 enclosure with a temperature-regulating device capable of maintaining a temperature within the operating range of the PLC shall be provided for housing the PLC. Controls and indication LEDs shall be mounted on the enclosure door.

5.2 The controls on the Local Panel shall control all snow melters at the location. The controls shall include:

A. A toggle switch for automatic or manual operation
B. A snow and temperature sensor panel (mounted on the signal house)
C. A provision for accepting a remote request for snow melter activation

5.3 The indications shall be displayed on the local panel by means of a colored LED. Separate indications shall be provided for each snow melter. The panel shall also have provisions for energizing a non-vital relay when an indication is being displayed. The output to the relays shall be consolidated into one output for all snow melters. The indications shall include:

A. Snow melter functioning properly (green LED (Data Display P/N C96-NWG-24H and socket P/N PS90), labeled "RUN")

B. Snow melter failure (red LED (Data Display P/N C96-NWR-24H and socket P/N PS90), labeled "FAIL")

5.4 The local panel information shown on the faceplate shall be applied using a photo-etching process to be approved by Metra. The faceplate shall be one-eighth inch thick; #4 finish aluminum. Details are to be drawn in black. Each pair of LED indicators shall have a label above them with the number of the corresponding switch machine.

5.5 The PLC shall be provided with an independent 24V DC ungrounded power source. All wiring exiting the enclosure shall be terminated on a Metra approved terminal block mounted on top of the enclosure.

6.0 SUBMITTAL

6.1 Catalog cuts, drawings, descriptions, etc., of the Manufacturer's typical current production from which the submittal will be based shall be included with the quotation.

6.2 Detailed shop drawings of the local panel faceplate, hot air snow melter layout with insulation are to be furnished within 15 days of the award of the contract, and be approved by Metra's Chief Engineering Officer before manufacture begins.

7.0 IDENTIFICATION AND SHIPPING

7.1 Hot air snow melter layouts and accessories shall be plainly marked with Manufacturer’s references including serial and model numbers.

7.2 The product shall be assembled or packed as to permit convenient handling and to protect against loss or damage during shipment. Loose pieces shall be tightly taped or wired to the hot air snow melter or shipping pallet or, packed separately but firmly attached to the product.

7.3 A detailed list of packages and their contents shall be provided for all shipments. One copy will be included with shipment and one copy will be sent directly to Metra's Chief Engineering Officer. Metra Engineering's copy will be mailed not later than the shipping date of the equipment.

7.4 Manufacturer shall notify Metra of shipping date 48 hours prior to shipment.

8.0 INSPECTION AT SHIPMENT

Metra will inspect the unit(s) after delivery and contact the Manufacturer listing any items not conforming to this Specification. The Manufacturer shall provide a timely schedule to furnish, deliver to destination and install or correct, without charge to Metra, such items. Failure to respond appropriately shall be cause for rejection with return of rejected units at the Manufacturer's total expense.

9.0 GUARANTEE

The Manufacturer shall replace (furnish, deliver to destination and install or correct) without charge, any part of material, which fails within a period of one year of date of installation from defects of material, design, manufacture and/or workmanship.

10.0 DEMONSTRATION

10.1 If requested prior to purchase, bidder shall arrange for inspection before one or more of Metra's representatives, of the basic unit to be furnished. Failure of a unit to be equal to or better than the quality herein specified by Metra shall be cause for rejection of Bid. Such inspection shall be performed at no cost to Metra within a distance of not more than 50 miles from Metra's headquarters at 547 West Jackson Boulevard, Chicago unless otherwise agreed upon by Metra.

10.2 Metra or its Representative reserves the right to inspect all equipment at Manufacturer’s plant prior to shipment.

REQUISITION INSTRUCTIONS FOR NATURAL GAS FIRED HOT AIR SNOW MELTERS

1. Specify weight of rail.
2. Specify length of track ducts. (P-4.5)
3. Specify number of switches.
4. Attach snow melter Typical Drawings.

METRA

SIGNAL SPECIFICATION

FOR

STANDBY POWER GENERATOR
AND
AUTOMATIC TRANSFER SWITCH

SPECIFICATION 1325

August 23, 2012

1.0 SCOPE

1.1 This Specification is for furnishing standby power generator and automatic transfer switch. The unit(s) furnished under this Specification shall be of the most current design. The material, equipment, and workmanship shall be of the highest quality.

1.2 Failure to conform to the highest standards of the industry shall be cause for rejection.

1.3 Metra's Chief Engineering Officer or his duly authorized representative shall be the final authority for deciding as to whether a competitive item conforms to these requirements and complies with the intention of this Specification.

1.4 This Specification is intended to be descriptive, but not restrictive and is solely for the purpose of indicating the type and quality of articles that will meet the approval of Metra.

1.5 Capacities and dimensions listed herein shall be interpreted as minimum; variation from the values listed will be judged as to their effect and ability to perform the work intended.

1.6 It shall be the responsibility of the Manufacturer to make certain that all parts and components fit and function together properly.

1.7 Where brand, manufacturer or product names are indicated in this Specification, they are included only for the purpose of establishing identification and general descriptions of the item. Wherever such names appear, the term “or Metra approved equivalent” is considered to follow.

1.8 The article(s)/unit(s) submitted under this Specification must be in production and must have had a previous, satisfactory in-service performance record of at least two years on three Class I railroads. Proof of performance statement(s) shall be provided, upon request, with confirming statement(s) from previous purchaser(s). Failure to provide proof may be cause for rejection.

2.0 GENERAL - STANDBY POWER GENERATOR

2.1 The standby power generator shall provide a 120/240V, single-phase 3-wire output. The generator may be supplied separately or as a combined unit with the automatic transfer switch as specified within. The ATS amperage capacity shall be equal to the amperage capacity of the generator set main breaker.

2.2 Spark-ignited engine-generator set shall be natural gas fueled and operate at 1800 rpm. The Manufacturer shall perform power calculations to determine

the capacity of the generator set. The generator sets will be capable of supplying 125% of the calculated load.

2.3 Prototype tests and evaluation shall have been performed on a complete and functional unit, component level type tests will not substitute for this requirement.

2.4 Voltage regulation shall be plus or minus two percent for any constant load between no load and rated load. Random voltage variation shall not exceed one percent for any constant load.

2.5 Frequency regulation shall be isochronous from steady state no load to steady state rated load. Random frequency variation with any steady load from no load to full load shall not exceed plus or minus 0.3%.

2.6 The engine-generator set shall be capable of single step load pick up of 100% nameplate kW and power factor, less applicable de-rating factors, with the engine-generator set at operating temperature..

2.7 The generator set shall be capable of sustaining a minimum of 90% of rated no load voltage with the specified kVA load at near zero power factor applied to the generator set.

2.8 The alternator shall produce a clean AC voltage waveform, with not more than 3.5% total harmonic distortion at full linear load, when measured from line to neutral, and with not more than 3% in any single harmonic. Telephone influence factor shall be less than 50.

2.9 The engine shall be natural gas, radiator and fan cooled.

2.10 The horsepower rating of the engine at its minimum tolerance level shall be sufficient to drive the alternator and all connected accessories. Engine accessories and features shall include:

A. Complete engine fuel system for natural gas, including all pressure regulators, strainers, and control valves. The fuel system shall be plumbed to the generator set skid for ease of site connections to the generator set. An electronic governor system shall provide automatic isochronous frequency regulation.

B. Skid-mounting radiator and cooling system rated for full load operation in 140° F (50°C) ambient as measured at the generator air inlet. Radiator shall be provided with a duct adaptor flange. The cooling system shall be filled with an ethylene glycol/water mixture by the equipment supplier, which will prevent coolant freezing down to -40°C. Rotating parts shall be guarded against accidental contact per OSHA requirements.

C. An electric starter capable of three complete cranking cycles without overheating
D. Positive displacement, mechanical, full pressure, lubrication oil pump
E. Full flow lubrication oil filters with replaceable spin-on canister elements and dipstick oil level indicator
F. Oil drain line extension for easy oil change
G. An engine driven, mechanical, positive displacement fuel pump
H. Replaceable dry element air cleaner
I. Flexible supply and return fuel lines
J. Engine mounted battery charging alternator, 37-ampere minimum and solid-state voltage regulator

2.11 The AC alternator shall be synchronous, four pole, 2/3 pitch, revolving field, drip proof construction, single prelubricated sealed bearing, air cooled by a direct drive centrifugal blower fan, and directly connected to the engine with flexible drive disc. All insulation system components shall meet NEMA MG1 temperature limits for Class H or better insulation system. Actual temperature rise measured by resistance method at full load shall not exceed 105°C.

The generator shall be capable of delivering rated output (kVA) at rated frequency and power factor, at any voltage not more than 5 percent above or below rated voltage.

2.12 The engine-generator set control panel shall be mounted on the generator set, enclosed in the weatherproof housing and with vibration isolators. The control shall be vibration isolated and prototype tested to verify the durability of all components under the vibration conditions encountered. The generator set mounted control shall include the following features and functions:

A. THREE-POSITION CONTROL SWITCH: Switch shall be labeled RUN/OFF/AUTO. In the RUN position the generator set shall automatically start and accelerate to rated speed and voltage. In the OFF position, the generator set shall immediately stop, bypassing all time delays. In the AUTO position, the generator set shall be ready to accept a signal from an automatic transfer switch to start and accelerate to rated speed and voltage and shut down when the normal source of power is restored.
B. RESET SWITCH: The reset switch shall be used to clear a fault and allow restarting the generator set after it has shut down for any fault condition.
C. Key pad for navigating controller functions.
D. GENERATOR SET CONTROLLER: The generator set shall be provided with a controller with the following features and functions:

1) Isochronous speed control
2) Digital Voltage regulation with over-voltage protection
3) Alternator protection
4) Digitally adjustable voltage/frequency settings
5) Built in PLC functions for custom inputs and outputs
6) RS232 or RS485 communication ports
7) Data logging, trending and automatic service reminders
8) Diagnostic and digital graphing capabilities
9) Modem or Ethernet connectivity

E. GENERATOR SET ALARM AND STATUS DISPLAY: The generator set controller shall be provided with dual LCD display panels to indicate generator status and existing alarm and shutdown conditions. The generator set controller shall indicate the existence of the following alarm and shutdown conditions on the display panel:

1) Low oil pressure (shutdown)
2) Low coolant level (alarm)
3) Low coolant level (shutdown)
4) High coolant temperature (alarm)
5) High coolant temperature (shutdown)
6) Over crank (shutdown)
7) Over speed (shutdown)
8) Ground fault (alarm) (optional when required by code or specified)
9) “Fail to start” alarm
10) RPM sensor loss (shutdown)

In addition, the following provisions shall be made for indication of two customer-specified alarm or shutdown conditions.

A. The non-automatic indicating lamp shall be red and shall flash to indicate that the generator set is not able to automatically respond to a command to start from a remote location.
B. A 24V contact shall be provided to indicate the generator is producing electricity.

2.13 The following engine status monitoring devices shall be provided on the generator set controller LCD display.

A. Engine oil pressure
B. Engine coolant temperature
C. Engine operation hour

D. Battery voltage (DC volts)
E. kW
F. KVA
G. Power factor
H. Frequency
I. Phase Voltages
J. Currents

2.14 The engine control system provided shall include a cycle cranking system. When the control panel receives a start signal, it initiates the programmed starting sequence. The start sequence consists of the number of crank attempts, the length of each crank attempt, and the rest time between each crank attempt. If the engine has not started by the end of the final crank attempt, an alarm is generated.

2.15 Alternator control functions shall include an automatic voltage regulation system that is matched and prototype tested with the governing system provided. It shall be immune from disoperation due to load-induced voltage waveform distortion and provide a pulse width modulated output to the alternator exciter. The system shall include a torque-matching characteristic that shall reduce output voltage in proportion to frequency below a threshold of [58-59] Hz.

2.16 Control interfaces for remote monitoring shall provide the following features in the control system:

A. RS232 or 485 communications port
B. A high speed, high current solid state surge suppression device for the communications ports between the ATS and the generator, capable of providing line to line and line to ground protection from transient over voltages.
C. Local/remote interface communications software
D. Optional modem or Ethernet connectivity
E. Form “C” dry common alarm contact set rated 2A at 30V DC to indicate existence of any alarm or shutdown condition on the generator set.
F. One set of contacts rated 2A at 30V DC to indicate generator set is ready to load. The contacts shall operate when voltage and frequency are greater than 90% of rated condition.
G. A fused 10 Amp switched 12V DC power supply circuit shall be provided for customer use. DC power shall be available from this circuit whenever the generator set is running.
H. A fused 20-amp 12V DC power supply circuit shall be provided for customer use. DC power shall be available from this circuit at all times

from the engine starting/control batteries.

2.17 The engine-generator set shall be mounted on a heavy-duty steel base to maintain alignment between components. The base shall incorporate a battery tray with hold-down clamps within the rails. Vibration isolators shall be provided between the engine/alternator and the generator set base.

2.18 Generator set auxiliary equipment and accessories shall include:

A. Engine mounted, thermostatically controlled, water jacket heater for each engine. The heater shall be sized as recommended by the generator set manufacturer. Heater voltage shall also be based on Manufacturer's recommendations. Provide proper power supply circuits for the heater as required for the voltage and load of the heater, connected to a normally serviced distribution circuit.

B. Exhaust muffler shall be provided for each engine, size and type as recommended by the generator set manufacturer. The mufflers shall be residential/critical grade. Exhaust system shall be installed according to the generator set manufacturer's recommendations and applicable codes and standards.

C. Starting and control battery bank, calcium/lead antimony type, 12-volt DC, sized as recommended by the generator set manufacturer, shall be supplied for each generator set with battery cables and connectors.

2.19 Generator set main circuit breaker shall be set-mounted and wired, UL listed, molded case type with thermal-magnetic trip unit, and rated based on Manufacturer's power calculations. Submittals shall demonstrate that the circuit breaker provides proper protection for the alternator by a comparison of the trip characteristic of the breaker with the thermal damage characteristic of the alternator. Field circuit breakers shall not be acceptable for generator over current protection.

2.20 Generator set outdoor weather protective housing shall be provided factory-assembled to generator set base and radiator cowling. Housing shall provide ample airflow for generator set operation at rated load in the ambient conditions previously specified. The housing shall have hinged side-access doors and rear control door. All doors shall be lockable. All sheet metal shall be primed for corrosion protection and finish painted with the Manufacturer's standard color using a two-step electro-coating paint process, or equal meeting the performance requirements specified below. All surfaces of all metal parts shall be primed and painted. The painting process shall result in a coating that meets the following requirements:

A. Primer thickness, 0.5 – 2.0 mils; top coat thickness, 0.8 – 1.2 mils

B. Gloss, per ASTM D523-89, 80% plus or minus 5%; gloss retention after

one year shall exceed 50%

C. Crosshatch adhesion, per ASTM D3359-93, 4B - 5B
D. Impact resistance, per ASTM D2794-93, 120 – 160 inch-pounds
E. Salt spray, per ASTM B117-90, 1000 + hours
F. Humidity, per ASTM D2247-92, 1000 + hours
G. Water soak, per ASTM D2247-92, 1000 + hours

Painting of hoses, clamps, wiring harnesses and other non-metallic service parts shall not be acceptable. Fasteners used shall be corrosion resistant and designed to minimize marring of the painted surface when removed for normal installation or service work.

2.21 The generator set shall be as manufactured by General or Metra approved equivalent.

3.0 GENERAL - AUTOMATIC TRANSFER SWITCH

3.1 Transfer switch equipment shall be a completely factory assembled transfer switch with number of poles, amperage and voltage as specified. The transfer switch may be supplied separately or as a combined unit with the standby power generator as specified within.

3.2 The transfer switch shall be equipped with electronic controls designed for surge voltage isolation. Voltage sensors shall be on all phases of both sources, with positive switching from “normal” to “emergency” (by means of linear operators or other means) without being jammed in between the two positions. The transfer switch shall also be equipped with manual handles, positive mechanical and electrical interlocking, and mechanically held contacts.

3.3 Based on power calculations per application the Manufacturer shall determine:

A. The sizes and types of transfer switch equipment
B. The withstand and closing ratings
C. Number of poles
D. Voltage and ampere ratings
E. Enclosures and accessories

All transfer switches and accessories shall be UL listed and labeled, tested per UL Standard 1008, and CSA Approved.

Main contacts shall be rated for 600 Volts AC minimum.

Transfer switches shall be rated to carry 100 percent of rated current continuously in the enclosure, in ambient temperatures of -40° C to +50° C, relative humidity up to 95% (non-condensing) and altitudes up to 10,000 feet (3000M).

Transfer switch equipment shall have a withstand and closing rating (WCR) greater than:

A. 1,400V AC-RMS symmetrical for A.T.S. up to 100A
B. 30,000V AC-RMS symmetrical for A.T.S. 100A up to 260A
C. 65,000V AC-RMS symmetrical for A.T.S. 300A up to 600A
D. Transfer switches over 1000 amperes shall be equipped with manual operators for service use only under de-energized conditions.

The transfer switch and its upstream protection shall be coordinated. The transfer switch shall be UL listed and labeled for use with the specific protective device(s) installed in the application.

3.4 Construction of transfer switches shall be double-throw, electrically and mechanically interlocked, and mechanically held in both positions.

Transfer switches rated through 1000 amperes shall be equipped with permanently attached manual operating handles and quick-break, quick-make over-center contact mechanisms suitable for safe manual operation under load.

Main switch contacts shall be high-pressure silver alloy. Contact assemblies shall have arc chutes for positive arc extinguishing. Arc chutes shall have insulating covers to prevent interphase flashover. One set of Form C auxiliary contacts on both sides, operated by transfer switch position, rated 10 amps 250V AC shall be provided.

Transfer switches which are designated as 2-pole, shall be provided with a neutral bus and lugs, sized to carry 100% of the current designated on the switch rating. Enclosures shall be UL listed. The enclosure shall provide NEC wire bend space. The cabinet door shall be key locking and have provisions for padlocking. Controls on cabinet door shall be key-operated. An adequate electric strip heater and humidistat shall be installed for climate control.

Transfer switches shall be mounted in outdoor type enclosures on an independent "H" unistrut type structure. Separate enclosures shall be the NEMA type specified. The enclosure shall provide required wire bend space at point of entry. Manual operating handles and all control switches (other than key-operated switches) shall be accessible to authorized personnel only by opening the key-locking enclosure door. Transfer switches with manual

operating handles and/or non key-operated control switches located on outside of enclosure do not meet this specification and are not acceptable.

3.5 Automatic controls of transfer switches shall be provided with a fully automatic control system, and provisions for manual operation as described in this section.

3.5.1 Control shall be solid-state and designed for a high level of immunity to power line surges and transients, demonstrated by test to IEEE Standard 587-1980. The control shall have optically isolated logic inputs, high isolation transformers for AC inputs, and relays on all outputs.

Solid-state under voltage sensors shall simultaneously monitor all phases of both sources. Pick-up and dropout settings shall be adjustable. Voltage sensors shall allow for adjustment to sense partial loss of voltage on any phase. Voltage sensors shall have field calibration of actual supply voltage to nominal system voltage.

The switch shall transfer when the emergency source reaches the set point voltage and frequency. A solid-state time delay on transfer, adjustable from 0 to 120 seconds shall be provided.

The switch shall retransfer the load to the normal source after a time delay adjustable from 0 to 30 minutes. Retransfer time delay shall be immediately bypassed if the emergency power source fails.

Controls shall signal the engine-generator set to stop after a time delay, adjustable from 0 to 10 minutes, beginning on return to the normal source.

Power for transfer operation shall be from the source to which the load is being transferred.

The control shall include latching diagnostic indicators to pinpoint the last successful step in the sequence of control functions, and to indicate the present status of the control functions in real time, as follows:

A. Source 1 OK
B. Start Gen Set
C. Source 2 OK
D. Transfer Timing
E. Transfer Complete
F. Retransfer Timing
G. Retransfer Complete
H. Timing for Stop

The control shall include remote transfer inhibit and area protection features.

Transfer switches shall be equipped with field adjustable controls to allow the operator to control the transfer switch operating time during switching in both directions. The controls shall control the time the load is isolated from both power sources, to allow load residual voltage to decay before closure to the opposite source. The transfer switch operating speed control feature shall have an adjustable range of 0 to 7.5 seconds. Phase angle monitor is not acceptable substitute for this feature.

3.5.2 Provide devices mounted on cabinet front consisting of a key-operated selector switch to provide the following positions and functions:

A. Test – Simulates normal power loss to control for testing of generator set.
B. Controls shall provide for a test with or without load transfer.
C. Normal – Normal operating position
D. Retransfer – Momentary position to override retransfer time delay and cause immediate return to normal source, if available.
E. Transfer switch position and source available lamps

3.6 Transfer switches shall be equipped with accessories as follows:

A. Meters: Provide an AC voltmeter, an ammeter and a frequency meter, 2.5-inch, analog, 2% accuracy. Provide a phase selector switch to read L-L voltage and current of both power sources.
B. Exerciser Clock: Provide solid-state exerciser clock to set the day, time and duration of generator set exercise/test period. Provide a with/without load selector switch for the exercise period.
C. Battery Charger:
    1) Provide a float charge battery charger rated 2 amps.
    2) DC output voltage shall be as required for the starting batteries and coordinated with generator's control voltage input.
    3) An ammeter shall display charging current.
    4) The battery charger shall have fused AC input and fused DC output.

3.7 The automatic transfer switches shall be manufactured by Generac, Zenith, ASCO or Metra approved equivalent.

4.0 GENERAL - DISTRIBUTION CASE

4.1 The distribution case shall be an outdoor type NEMA 3R/12 enclosure. The case shall be lockable by means of a padlock that can be inserted into the handle of the door. The distribution case shall be mounted next to the automatic transfer switch (ATS) enclosure on the same Unistrut "H" structure as described in the ATS portion of this specification.

4.2 A two-inch galvanized rigid steel conduit and fittings shall be provided for all wiring between the ATS housing and the distribution case. Three cable knockouts in the bottom of the distribution case shall be provided. The knockouts shall be at least 4 inches in diameter. Screw type cable entrance collars and a 5-foot long riser pipe shall be provided for each knockout.

4.3 The distribution case shall contain a single phase 3-wire 120/240 load center that shall be equal to the current and voltage rating of the standby generator and ATS. The load center shall be provided with a surge protector similar to the Cutler-Hammer Clipper TVSS Surge Protective Device (Catalog part number CVL 100CH240SBDRSX) or Metra approved equivalent.
The load center shall be equipped with a main breaker and single or double pole ancillary load breakers. The quantity of breaker spaces and the size of the enclosure will be determined by the amperage rating of the main breaker as shown in the table below.

Main Breaker Amperage	Number of Breaker Spaces	Load Center Square D Part #	NEMA Enclosure Square D part #
100 Amp	20	NQOD20M100CU	MH26WP
200 Amp	30	NQOD220Q2MB	MH44WP
400 Amp	42	NQOD2400LAMB	MH68WP

5.0 SUBMITTAL

5.1 Manuals: Manufacturer shall furnish a bound Operation Manual inside enclosure door with each unit provided.

5.2 Catalog cuts, drawings, descriptions, etc., of the Manufacturer's typical current production from which the submittal will be based shall be included with the quotation.

5.3 Detailed shop drawings of the standby power generator and automatic transfer switch are to be furnished within 15 days of the award of the contract and be approved by Metra's Chief Engineering Officer before manufacturing begins.

6.0 IDENTIFICATION AND SHIPPING

6.1 The standby power generator and automatic transfer switch shall be plainly marked with Manufacturer's references including serial and model numbers.

6.2 The product shall be assembled or packed as to permit convenient handling and to protect against loss or damage during shipment. Loose pieces shall be tightly taped or wired to the standby generator or automatic transfer switch or shipping pallet or, packed separately but be firmly attached to the product.

6.3 A detailed list of packages and their contents shall be provided for all shipments. One copy will be included with the shipment and one copy will be sent directly to Metra's Chief Engineering Officer. Metra's engineering copy will be mailed not later than the shipping date of the equipment.

6.4 Manufacturer shall notify Metra of shipping date 48 hours prior to shipment.

7.0 INSPECTION AT SHIPMENT

Metra will inspect the unit(s) after delivery and contact the Manufacturer listing any items not conforming to the Specification. The Manufacturer shall provide a timely schedule to furnish, deliver to destination and install or correct, without charge to Metra, such items. Failure to respond appropriately shall be cause for rejection with return of rejected units at the Manufacturer's total expense.

8.0 GUARANTEE

The Manufacturer shall replace (furnish, deliver to destination and install or correct) without charge, any part of material, which fails within a period of one year of date of installation from defects of material, design, manufacture and/or workmanship.

9.0 DEMONSTRATION

9.1 If requested prior to purchase, bidder shall arrange for inspection before one or more of Metra's representatives, of the basic unit to be furnished. Failure of a unit to be equal to or better than the quality herein specified by Metra shall be cause for rejection of Bid. Such inspection shall be performed at no cost to Metra within a distance of not more than 50 miles from Metra's headquarters at 547 West Jackson Boulevard, Chicago, unless otherwise agreed upon by Metra.

9.2 Metra or its Representative reserves the right to inspect all equipment at Manufacturer's plant prior to shipment.

METRA

SIGNAL SPECIFICATION

FOR

POSITIVE TRAIN CONTROL SYSTEM

SPECIFICATION NO. 1544

August 23, 2012

1.0 SCOPE

1.1 This Specification is for furnishing wayside positive train control (PTC) equipment for monitoring wayside signal equipment. The unit(s) furnished on this Specification shall be of the most current design. The material, equipment and workmanship shall be of the highest commercial quality.

1.2 Failure to conform to the highest standards of the industry shall be cause for rejection.

1.3 Metra's Chief Engineering Officer or his duly authorized representative shall be the final authority for deciding as to whether a competitive item conforms to these requirements and complies with the intention of this Specification.

1.4 This Specification is intended to be descriptive, but not restrictive and is solely for the purpose of indicating the type and quality of articles that will meet the approval of Metra.

1.5 Capacities and dimensions listed herein shall be interpreted as minimum; variation from the values listed will be judged as to their effect and ability to perform the work intended.

1.6 It shall be the responsibility of the Manufacturer to make certain that all parts and components fit and function together properly.

1.7 Where brand, manufacturer or product names are indicated in this Specification, they are included only for the purpose of establishing identification and general descriptions of the item. Wherever such names appear, the term “or Metra approved equivalent” is considered to follow.

1.8 The article(s)/unit(s) submitted under this Specification must be in production and must have had a previous, satisfactory in-service performance record of at least two years on three Class I railroads. Proof of performance statement(s) shall be provided, upon request, with confirming statement(s) from previous purchaser(s). Failure to provide proof may be cause for rejection.

2.0 GENERAL REQUIREMENTS

PTC equipment shall meet all American Railway Engineering and Maintenance-of-Way Association (AREMA) Communications & Signals Manual of Recommended Practices specifications including but not limited to Manual Section 24. PTC equipment shall be interoperable and ITC Specification Compliant.

2.1 There shall be two methods employed to collect the required data for the PTC system.

2.1.1 Upgrades to Solid State Train Control

Upgrades to vital solid-state microprocessor interlockings and microprocessor based solid-state DC coded track circuits shall be accomplished by swapping components at the board level and without changes to application software, wiring or signal operation. Upgrades will be accomplished without the need to retest application software. The upgraded system will be capable of reporting all necessary wayside signal system information including, but not limited to, signal aspects and switch positions by extracting the information from the existing software.

2.1.2 External Monitoring

External monitoring shall be accomplished by adding new components and wiring to the existing circuitry. Changes or modifications to the existing circuitry shall not be allowed. Signal monitoring shall be accomplished by devices that monitor the current flow within the signal lighting circuit for all aspects displayed by a signal. These devices will then be inputted to a processor module. The switch position will be inputted to the same processor module using conventional relay contacts of the switch correspondence relays.

2.2 Wayside Message Server

Both methods of data collection shall provide a wayside message server that will be capable of providing an interoperable communications gateway between the local wayside interface units and the and the communications network in an Interoperable Train Control (ITC) architecture.

2.3 Power Supply

Both systems shall use 12 volt DC as the only source of power.

3.0 TOOLS AND ACCESSORIES

Any special purpose tools, software for programming or accessories required for the installation, testing or maintenance of the PTC equipment shall be provided.

4.0 MANUALS

One Installation and Maintenance Manual shall be furnished with each unit.

5.0 SUBMITTAL

Catalog cuts, drawings, descriptions, etc., of the Manufacturer's typical current

production from which the submittal will be based shall be included with the quotation.

6.0 IDENTIFICATION AND SHIPPING

6.1 Unit(s) shall be plainly marked with Manufacturer's references including serial and model numbers.

6.2 The product shall be assembled or packed as to permit convenient handling and to protect against loss or damage during shipment. Loose pieces shall be tightly taped or wired to the unit(s) or shipping pallet or, packed separately but firmly attached to the product.

6.3 A detailed list of packages and their contents shall be provided for all shipments. One copy will be included with shipment and one copy will be sent directly to Metra's Chief Engineering Officer. Metra Engineering's copy will be mailed not later than the shipping date of the equipment.

7.0 INSPECTION AT SHIPMENT

Metra will inspect the unit(s) after delivery and contact the Manufacturer listing any items not conforming to this Specification. The Manufacturer shall provide a timely schedule to furnish, deliver to destination and install or correct, without charge to Metra, such items. Failure to respond appropriately shall be cause for rejection with return of rejected units at the Manufacturer's total expense.

8.0 GUARANTEE

The Manufacturer shall replace (furnish, deliver to destination and install or correct) without charge, any part of material, which fails within a period of one year of date of installation from defects of material, design, manufacture and/or workmanship.

9.0 DEMONSTRATION

9.1 If requested prior to purchase, bidder shall arrange for inspection before one or more of Metra's representatives, of the basic unit to be furnished. Failure of a unit to be equal to or better than the quality herein specified by Metra shall be cause for rejection of Bid. Such inspection shall be performed at no cost to Metra within a distance of not more than 50 miles from Metra's headquarters at 547 West Jackson Boulevard, Chicago, unless otherwise agreed upon by Metra.

9.2 Metra or its Representative reserves the right to inspect all equipment at Manufacturer's plant prior to shipment.

REQUISITION INSTRUCTIONS FOR POSITIVE TRAIN CONTROL SYSTEM

The following information must be included with all requisitions:

1. State if the system will be upgraded or externally monitored. (P-2.1.1 or P-2.1.2)

METRA

SIGNAL SPECIFICATION

FOR

COMMUNICATION TILT DOWN ANTENNA STRUCTURE

SPECIFICATION NO. 1548

August 23, 2012

1.0 SCOPE

1.1 This Specification is for furnishing a communication tilt down antenna structure and foundation. The unit(s) furnished in this Specification shall be of the most current design. The material, equipment and workmanship shall be of the highest commercial quality.

1.2 Failure to conform to the highest standards of the industry shall be cause for rejection.

1.3 Metra's Chief Engineering Officer or his duly authorized representative shall be the final authority for deciding as to whether a competitive item conforms to these requirements and complies with the intention of this Specification.

1.4 This Specification is intended to be descriptive, but not restrictive and is solely for the purpose of indicating the type and quality of articles that will meet the approval of Metra.

1.5 Capacities and dimensions listed herein shall be interpreted as minimum; variation from the values listed will be judged as to their effect and ability to perform the work intended.

1.6 It shall be the responsibility of the Manufacturer to make certain that all parts and components fit and function together properly.

1.7 Where brand, manufacturer or product names are indicated in this Specification, they are included only for the purpose of establishing identification and general descriptions of the item. Wherever such names appear, the term “or Metra approved equivalent” is considered to follow.

1.8 The article(s)/unit(s) submitted under this Specification must be in production and must have had a previous, satisfactory in-service performance record of at least two years on three Class I railroads. Proof of performance statement(s) shall be provided, upon request, with confirming statement(s) from previous purchaser(s). Failure to provide proof may be cause for rejection.

2.0 GENERAL REQUIREMENTS

2.1 The communications tilt down antenna structure shall consist of a base tube assembly and a swing tube assembly. Both assemblies shall be constructed of hot-dipped galvanized steel which meet the latest EIA and AGS standards.

2.2 The structure shall be able to withstand winds of up to 100 MPH.

2.3 The base tube shall be a 5-inch (minimum) square tube that is welded to a

base plate. The base plate and tube shall be the stationary component of the structure.

2.4 The swing tube shall be a 3-inch (minimum) square tube that has provisions for mounting a communications antennas for PTC and ATCS to the upper most part. This shall be the movable (tilt down) component of the structure.

2.5 A pre-cast concrete foundation capable of supporting the structure shall also be provided.

2.6 When fully assembled and in the full upright position the top of the swing tube shall be at a height as specified.

3.0 BASE TUBE

3.1 The base tube shall have provisions for routing a coaxial cable through the tube. The cable shall enter from underground and pass through the foundation, enter into the tube, exit at the top of the tube and continue along the outside of the swing tube. Protection shall be provided that will prevent the cable from being damaged while the swing tube is being pivoted.

3.2 The base tube shall be equipped with the following features:

A. A tamper-proof mechanism that holds the swing tube in the upright position

B. A method of locking the tamperproof mechanism with a padlock

C. A mechanism that allows the to swing tube to pivot, allowing the top to be lowered to the ground

4.0 SWING TUBE

4.1 The swing tube shall be equipped with the following features:

A. A counter balance to hold the swing tube in the upright position by gravity

B. A lanyard to pull the upper portion of the swing tube to the ground

C. Mounting brackets at the uppermost portion for attaching PTC and ATCS antennas

5.0 BASE PLATE

5.1 The base plate shall be welded to the bottom of the base tube. The bolt hole pattern of the plate shall be sized to match the pattern of the foundation bolts.

5.2 The base plate shall be provided with an opening in the center to allow the coaxial cable to pass through and enter the base tube.

6.0 FOUNDATION

6.1 The foundation shall be similar to the Dixie Precast Model No. DPS-2A EB.

6.2 Leveling nuts and washers shall be provided with the foundation.

6.3 A metallic shield between the top of the foundation and the bottom of the base plate shall be provided to prevent rodents from entering the base tube.

7.0 SUBMITTAL

7.1 Catalog cuts, drawings, descriptions, etc., of the Manufacturer's typical current production from which the submittal will be based shall be included with the quotation.

7.2 Detailed shop drawings of the antenna structure and foundation are to be furnished within 15 days of the award of the contract, and be approved by Metra's Chief Engineering Officer before manufacture begins.

8.0 IDENTIFICATION AND SHIPPING

8.1 The antenna structure and foundation shall be plainly marked with Manufacturer’s references including serial and model numbers.

8.2 The product shall be assembled or packed as to permit convenient handling and to protect against loss or damage during shipment. Loose pieces shall be identified, tightly taped or wired to the antenna structure or shipping pallet or, packed separately but firmly attached to the product.

8.3 A detailed list of packages and their contents shall be provided for all shipments. One copy will be included with shipment and one copy will be sent directly to Metra's Chief Engineering Officer. Metra Engineering's copy will be mailed not later than the shipping date of the equipment.

8.4 Manufacturer shall notify Metra of shipping date 48 hours prior to shipment.

9.0 INSPECTION AT SHIPMENT

Metra will inspect the unit(s) after delivery and contact the Manufacturer listing any items not conforming to this Specification. The Manufacturer shall provide a timely schedule to furnish, deliver to destination and install or correct, without charge to Metra, such items. Failure to respond appropriately shall be cause for rejection with return of rejected units at the Manufacturer's total expense.

10.0 GUARANTEE

The Manufacturer shall replace (furnish, deliver to destination and install or correct) without charge, any part of material, which fails within a period of one year of date of installation from defects of material, design, manufacture and/or workmanship.

11.0 DEMONSTRATION

11.1 If requested prior to purchase, bidder shall arrange for inspection before one or more of Metra's representatives, of the basic unit to be furnished. Failure of a unit to be equal to or better than the quality herein specified by Metra shall be cause for rejection of Bid. Such inspection shall be performed at no cost to Metra within a distance of not more than 50 miles from Metra's headquarters at 547 West Jackson Boulevard, Chicago, unless otherwise agreed upon by Metra.

11.2 Metra or its Representative reserves the right to inspect all equipment at Manufacturer’s plant prior to shipment.

REQUISITION INSTRUCTIONS
FOR
COMMUNICATION TILT DOWN ANTNENNA STRUCTURE

The following information must be included with all requisitions:

1. State the required height of the structure (not including the antenna). (P-2.6)

REVISIONS TO THE ILLINOIS PREVAILING WAGE RATES

The Prevailing rates of wages are included in the Contract proposals which are subject to Check Sheet #5 of the Supplemental Specifications and Recurring Special Provisions. The rates have been ascertained and certified by the Illinois Department of Labor for the locality in which the work is to be performed and for each craft or type of work or mechanic needed to execute the work of the Contract. As required by Prevailing Wage Act (820 ILCS 130/0.01, et seq.) and Check Sheet #5 of the Contract, not less than the rates of wages ascertained by the Illinois Department of Labor and as revised during the performance of a Contract shall be paid to all laborers, workers and mechanics performing work under the Contract. Post the scale of wages in a prominent and easily accessible place at the site of work.

If the Illinois Department of Labor revises the prevailing rates of wages to be paid as listed in the specification of rates, the contractor shall post the revised rates of wages and shall pay not less than the revised rates of wages. Current wage rate information shall be obtained by visiting the Illinois Department of Labor web site at http://www.state.il.us/agency/idol/ or by calling 312-793-2814. It is the responsibility of the contractor to review the rates applicable to the work of the contract at regular intervals in order to insure the timely payment of current rates. Provision of this information to the contractor by means of the Illinois Department of Labor web site satisfies the notification of revisions by the Department to the contractor pursuant to the Act, and the contractor agrees that no additional notice is required. The contractor shall notify each of its subcontractors of the revised rates of wages.